SPECIFICATIONS

Construction Issue

Joint Commissary & Navy Exchange

NSA Annapolis, Maryland
DeCA Project No. DW08MP12
NEXCOM Project No. N851708

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Fort Lee, Virginia
Engineering Directorate
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CONSTRUCTION ISSUE

JOINT COMMISSARY AND NAVY EXCHANGE

NSA ANNAPOLIS, MARYLAND

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SECTION 00320

GEOTECHNICAL DATA

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. A copy of a geotechnical report is included with the CD ROM issued with these specifications titled Geotechnical Engineering Study, NSA Joint Commissary and Navy Exchange, Annapolis, Maryland, dated September 30, 2009, Prepared by Schnable Engineering , LLC, 1504 Woodlawn, Drive, Baltimore, Maryland 21207, (410) 944-6170, (410) 944-1162 Fax No., SE Project 09140037.00.

b. The report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of the Architect/Engineer.

c. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in the Contract Documents.

d. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price/Sum accruing to the Government.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01000

DESCRIPTION OF WORK

PART 1 - GENERAL

1.1 GENERAL

1.1.1. A new joint commissary and navy exchange facility to provide sales and processing of miscellaneous commodities and grocery items for the military community of the installation..

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.3 SUBMITTALS (Not used)

1.4 PROJECT

1.4.1. The work performed under this contract consists of providing all plant, labor, appliances, equipment, materials, permits, bonds, insurance, and performing all operations necessary and incidental to the work, in accordance with the contract drawings and specifications to complete the following project:

1.4.1.1. PROJECT NAME: Joint Commissary and Navy Exchange.

1.4.1.2. PROJECT LOCATION: NSA Annapolis, Maryland.

1.4.1.3. PROJECT NUMBER: DeCA DW08MP12 / NEXCOM N851708.

1.4.1.4. PROJECT TYPE: New Store.

1.4.1.5. DESIGN LOADS: As indicated on drawings

a. Unless otherwise indicated calculate design loads according to building code.

b. Provide construction, including anchorage, capable of resisting the effects of applicable design loads.

c. Determine loads using the appropriate exposure coefficient for the construction configuration indicated

1.4.1.6. DESIGN AND CONSTRUCTION CRITERIA:

a. Department of Defense (DoD) Unified Facilities Criteria (UFC).

(1) Design: General Building Requirements, UFC 1-200-01, 16 August 2010.
(2) Building Code: 2009 International Building Code as supplemented and amended by UFC 1-200-01.

b. Unless otherwise indicated in the Contract Documents, provide materials, systems and equipment designed in accordance with design criteria specified herein.

c. Where performance criteria differ from each other within the Contract Documents, the more stringent performance criteria shall govern in accordance with the Contracting Officer's interpretation.

1.5 GENERAL DESCRIPTION OF PROJECT

1.5.1. The primary function of the facility is to provide sales and processing of miscellaneous commodities and grocery items for the military community of the installation. The paragraphs below depict the general nature of the work. The work includes, but is not limited to, the items listed in the paragraphs.

1.5.1.1. New Store: A new single-story joint commissary and navy exchange facility.

1.5.1.2. Building construction includes: Structural-steel frame on cast-in-place concrete foundations.

1.5.1.3. Building exterior consists of: Masonry, aluminum windows and single-ply roof.

1.5.1.4. The Work also includes: Loading-dock equipment, refrigeration system, fire-protection system, plumbing, mechanical, and electrical work.

1.5.1.5. Interior finishing and related construction includes: Interior partitions, floor coverings, suspended ceilings, and doors.

1.5.1.6. Commissary: The sales area includes: Meat, dairy, frozen, produce, deli, bakery, grocery departments, and their refrigerated display cases. Food preparation and storage areas including prefabricated coolers and freezers. The front end includes checkout counters and space for bagging and cart storage. Administrative offices and storage areas are also included.

1.5.1.7. Exchange: An outdoor living area, main exchange, food court, mall, administrative offices, and storage. The front end includes checkout counters and space for bagging and cart storage.

1.5.2. Site Work

1.5.2.1. Site construction includes parking areas, sidewalks and landscape improvements around the facility.

1.5.2.2. Benches, trash receptacles, and a bicycle rack are required.

1.6 OVERHEAD MOUNTED ARCHITECTURAL FEATURES

1.6.1. Mount overhead mounted architectural features weighing 31 lbs or more (excluding distributed systems such as suspended ceilings that collectively exceed that weight) in accordance with the following to minimize the likelihood they will fall and injure building occupants:

1.6.1.1. Mount such systems so they resist forces of 0.5 times the component weight in any horizontal direction and 1.5 times the component weight in the downward direction.

1.6.1.2. This requirement does not preclude the need to design architectural feature mountings for forces required by other criteria such as seismic requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01020

NOTICE TO PROCEED

PART 1 - GENERAL

1.1 GENERAL

1.1.1. The Contracting Officer will issue a single Notice to Proceed for this project. Issuance of the Notice to Proceed authorizes the contractor to proceed with the following

1.1.1.1. Mobilization

1.1.1.2. Submittal Processing

1.1.1.3. Construction (subject to paragraph 1.4.3). Construction (including demolition activities) may begin only after the satisfactory submittal and government approval of item requirements listed in paragraph 1.4.3 .

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.2.2. Specific Reference:

1.2.2.1. Section 01027 Fiscal Matters & Related Data

1.2.2.2. Section 01300 Administrative Requirements

1.2.2.3. Section 01310 Critical Path Method Schedule

1.2.2.4. Section 01312 Information Management

1.2.2.5. Section 01400 Quality Control

1.2.2.6. Section 01500 Mobilization and Temporary Controls

1.2.2.7. Section 01560 Environmental Protection

1.2.2.8. Section 01750 Safety, Fire and Security

1.3 SUBMITTALS

1.3.1. Refer to specification section 01300 –Administrative Requirements for procedures.

1.3.2. Submittal Schedule:

1.3.2.1. Provide the indicated quantity. Note that the Government will retain three copies and the pdf file.

1.3.3. Submittal action by reviewer:

1.3.3.1. R: Review each submittal, mark to indicate action taken, and return.

1.3.3.2. I: Submittal is for information or record purposes only. No action will occur.

1.3.4. Submittal requirements for this section are as follows:

Action	Section	Reference Para.	Submittal
I	Solicitation	See section	General Liability, and other items required in this section
R	Solicitation	See section	SF1413
R	01020	See section	Roster of Personnel, Suppliers and Subcontractors
R	01400	See section	Quality Control Plan
R	01310	See section	CPM schedule and Sub-schedules
R	01750	See section	Security Plan
R	01750	See section	Fire Prevention Plan
R	01750	See section	Safety Plan
R	01500	See section	Temporary Utilities Plan
R	01500	See section	Temporary Support Facilities Plan
R	01300	See section	Record Photographs
R	01560	See section	Spill Prevention and Response Procedure (SPRP) Plan
R	01560	See section	Hazardous Material List
R	01560	See section	Hazardous Waste Management Plan (HWMP)
R	01560	See section	Storm Water Pollution Prevention Plan (SWPPP)
R	01560	See section	Notice of Intent (NOI)
R	01560	See section	Solid Waste, Construction, and Demolition Debris Waste Management Plan

1.4 NOTICE TO PROCEED

1.4.1. The Contracting Officer will issue the Notice to Proceed only after Government receipt of Performance and Payment Bonds.

1.4.2. Contract Completion

1.4.2.1. The Notice to Proceed sets the Contractor's contract start and completion date.

1.4.3. Mobilization and Submittal Processing

1.4.3.1. The activities listed are all included in the time period set forth to complete the project.

1.4.3.2. Within ten (10) calendar days after receipt of Notice to Proceed, generate and submit items a. through l. of this paragraph for government review and/or approval. Government acknowledgement of their approval of these items is a condition-precedent to the contractor's commencement of <u>any</u> building construction or demolition activity. Allow for government review time of 21 calendar days for the first submission and an additional 14 calendar days for any re-submittals, if required.

a. SF 1413 for all trades
b. A project roster of contractor's personnel, subcontractors, and suppliers that includes the name of the firm, names, titles, mailing addresses, email addresses, business phones, and emergency phone numbers.
c. Quality Control Plan – Reference Section 01400
d. Security Plan – Reference Section 01750
e. Safety Plan – Reference Section 01750
f. Fire Prevention Plan – Reference Section 01750
g. Site Usage Plan and submittals related to Government's Designated Inspector office, Contractor's temporary facilities, fencing, and staging area.

    (1) Applicable submittal requirements for temporary facilities. See performance and submittal requirements in Section 01500.

h. The Government's Designated Inspector and contractor's temporary offices, utilities, other facilities, fencing, and staging are installed according to the approved submittals and operational.
i. All of the contractor's contractually required field staff is present and on site.
j. Record photographs
k. Storm Water Pollution Prevention Plan and Notice of Intent
l. Hazardous Material List and Waste Management Plan

1.4.4. Construction / Demolition

1.4.4.1. Notify the Contracting Officer upon 100% completion of the items identified in paragraph 1.4.3 and then commence construction activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01027

FISCAL MATTERS AND RELATED DATA

PART 1 - GENERAL

1.1 GENERAL

1.1.1. Section Includes:

1.1.1.1. Submittals

1.1.1.2. Funding

1.1.1.3. Construction Versus Equipment Elements

1.1.1.4. Unusually Severe Weather

1.1.1.5. Modification Procedures

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.2.2. Specific Reference:

1.2.2.1. Division 1 Section "Notice to Proceed"

1.2.2.2. Division 1 Section "Administrative Requirements"

1.2.2.3. Division 1 Section "Critical Path Method Schedule"

1.2.2.4. Division 1 Section "Information Management"

1.2.2.5. Division 1 Section "Quality Control"

1.2.2.6. Division 1 Section "Mobilization and Temporary Controls"

1.2.2.7. Division 1 Section "Contract Closeout"

1.3 SUBMITTALS

1.3.1. Refer to specification Division 1 Section "Administrative Requirements" for procedures.

1.3.2. Submittal action by reviewer:

1.3.2.1. R: Review each submittal, mark to indicate action taken, and return.

1.3.2.2. I: Submittal is for information or record purposes only. No action will occur.

1.3.3. Submittal requirements for this section are as follows:

Action	Section	Reference Para.	Submittal
R	01027	1.6	AF 3052 (Modifications) (one returned)

1.4 FUNDING

1.4.1. Elements of Work: The Government may fund different elements of the Work from different funding sources. Identify and segregate costs of the different elements of the work when preparing the critical path method (CPM) construction schedule and contract modification proposals.

1.5 CONSTRUCTION VERSUS EQUIPMENT ELEMENTS

1.5.1. Refer to the attachment at the end of this section for identification of building components and process equipment.

1.5.2. Use this attachment and the other specifically identified funded work requirements as it relates to CLIN allocation and as an aid in developing the schedule of values, the contractor's critical path method construction schedule, applications for payment, and contract modification proposals.

1.6 MODIFICATION PROCEDURES

1.6.1. Supplemental Instructions

1.6.1.1. From time to time during progress of the Work the Contracting Officer may issue supplemental instructions which interpret the Contract Documents or order minor changes in the Work without change in Contract Sum or Contract Time.

1.6.1.2. Should the Contractor consider that these instructions or minor change requires a change in the Contract Sum or Contract Time, he shall comply with F.A.R. notice requirements, and then submit an itemized proposal to the Contracting Officer prior to proceeding with the Work. If the government agrees to entitlement and the proposal is satisfactory and in proper order, a Contract Modification for that event will supersede the supplemental instructions.

1.6.2. Proposal Requests.

1.6.2.1. From time to time during progress of the Work, the Contracting Officer may issue a proposal request for an itemized quotation for a potential change in the work that affects the Contract Sum or Contract Time.

1.6.2.2. This is not a direction to proceed with the changes described therein.

1.6.3. Governments right to change:

1.6.4. Without invalidating the contract and without notice to any surety, the Contracting Officer may, at any time or from time to time, order additions, deletions, or revisions in the work, within the general scope of the contract

1.6.5. Modification Requests:

1.6.5.1. Owner-initiated proposal requests: The Contracting Officer will issue a detailed description of proposed changes in the work that will require adjustment to the contract sum or contract time. If necessary, the

description will include supplemental or revised drawings and specifications. Proposal requests issued by the Contracting Officer are for information only. Do not consider them an instruction either to accelerate or stop work in progress or to execute the proposed change.

1.6.5.2. Contractor-initiated proposals: When differing or unforeseen conditions require modifications to the contract, the contractor may propose changes by submitting a request for change to the Contracting Officer. Comply with F.A.R. notice requirements. Include a statement outlining the reasons for the change and the effect of the change on the work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the contract sum or schedule by including a detailed cost proposal and the CPM construction schedule depicting affected critical path changes.

1.6.6. Allowances:

1.6.6.1. Allowance adjustment: For unit cost allowance adjustment, base each modification proposal on the difference between the actual unit purchase amount and the unit allowance, multiplied by the final measurement of work-in-place. Where applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1.6.6.2. Unless specifically directed otherwise, include furnishing and installing the allowance item, inclusive of any testing or start-up requirements, in the allowance cost.

1.6.6.3. Notify the Contracting Officer or representative at least 24 hours in advance of installing allowance based items. Coordinate with the Contracting Officer’s representative who must be present for witness and certification of the quantity installed.

1.6.6.4. Submit proposals for increased costs because of a change in scope or nature of the allowance described in the contract documents, whether for the purchase order unit amount or the contractor's handling, labor, installation, overhead, and profit.

1.6.6.5. Submit proposals within 10 days of receipt of the modification or directive authorizing work to proceed. The Contracting Officer will reject claims submitted later than 10 days after the event giving rise to the claim.

1.6.6.6. There is no change to the contractor's indirect expense for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6.7. Differing site conditions: Refer to F.A.R 52.236-2

1.6.7.1. Promptly, and before disturbing such conditions (except in an emergency), notify the Contracting Officer.

1.6.7.2. Comply with written F.A.R. notice requirements. The Contracting Officer will not allow any claim for additional compensation by the contractor under this clause unless the contractor first gives notice required by this contract.

a. Promptly is defined as “without delay.”

1.6.7.3. In the event the Contracting Officer and the contractor are unable to reach an agreement concerning an alleged differing site condition, keep an accurate and detailed record which will indicate the actual cost of the work done under the alleged differing site condition. Failure to keep such record precludes the contractor’s recovery of alleged differing site conditions. Contractor must give the Contracting Officer the opportunity to supervise and check the keeping of such record.

1.6.8. Errors or Omissions:

1.6.8.1. Promptly, and substantially before work scheduled on such conditions (except in an emergency), notify the Contracting Officer in writing of:

a. The discovery of an error, omission, or some other conflict with the contract documents that materially affect the intended use of the facility.

1.6.8.2. The Government's Designated Inspector will promptly investigate the conditions and will notify the Contracting Officer who will provide the contractor with instruction.

1.6.9. Proposal preparation:

1.6.9.1. Include a detailed list of quantities of required products, labor, hours, rates, and unit costs, with the total amount of purchases.

a. State proposed change in the Contract Sum, if any.
b. State proposed change in the Contract Time of completion supported by a fragnet.
c. Clearly describe other changes in the Work, if any, required by the proposed change.
d. Include full backup data such as subcontractors' letter of proposal or similar information.

1.6.9.2. List and include applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

1.6.9.3. Comply with paragraphs of this contract that address substitution.

1.6.9.4. Within 10 days of receipt of a proposal request, on AF 3052, submit the proposal of cost necessary to execute the change, including time impact related costs, to the Government's Designated Inspector for review.

1.6.9.5. Refer to Specification Division 1 Section "Critical Path Method Schedule" for required schedule related attachments to the proposal.

1.6.9.6. The Contracting Officer will negotiate maximum mark-ups allowed in proposal cost estimates.

1.6.9.7. Use the modification numbering sequence established by the Contracting Officer to identify the various proposed modifications and approved modifications.

1.6.9.8. Instruct any subcontractor to comply with above requirements when the cost proposal includes a quotation from a subcontractor. Review subcontractors' cost and time proposals for legitimacy and reasonableness. Do not forward any illegitimate or unreasonable proposals to the Contracting Officer.

1.6.9.9. Upon the Contracting Officer's approval of a modification proposal, the Contracting Officer will issue a modification for the contractor's signature. The Contract Modification will become effective upon execution by the Contracting Officer and contractor.

1.6.10. Processing Proposal Requests

1.6.10.1. Make written reply to the Contracting Officer in response to each proposal request.

a. Submit response in single copy and simultaneously e-mail the Contracting Officer and Government's Designated Representative a duplicate PDF version.

1.6.10.2. When the Contracting Officer and the Contractor have agreed upon a change, or when the Contracting Officer directs that cost or credit be determined in accordance with the provisions of the contract, the Contracting Officer will issue a Contract Modification to the Contractor.

1.6.11. Processing Contract Modifications

1.6.11.1. The Contract Modification will describe the change or changes, will refer to the proposal requests or supplemental instruction involved, and contain the Contracting Officer's signature.

1.6.11.2. The Contracting Officer will issue the Contract Modification to the Contractor.

a. Promptly sign and return to the Contracting Officer and electronically transmit a duplicate scanned copy bearing both signatures to the Contracting Officer.

CONSTRUCTION ISSUE

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

CONSTRUCTION VERSUS EQUIPMENT ELEMENTS

Refer to Schedule "B" attachment to Standard Form 1442, "Solicitation, Offer, and Award," for CLINs applicable to this project

CONSTRUCTION

BUILDING

§ normal building construction, including foundations, slab and structural elements, roofing, walls and partitions.

§ normal architectural finishes, both interior and exterior.

§ plumbing, including sinks, toilets, and other fixtures

§ utility meters.

§ fire protection and alarm systems.

§ electrical power & lighting to the building and equipment, including power to all equipment such as balers, material handling equipment, charger units, processing equipment, etc. (but NOT to refrigerated equipment).

§ fire extinguisher cabinets

§ toilet partitions

§ toilet and bath accessories

§ building demolition (including foundation, and all building systems to 5' line

§ utilities 5' or less from building lines

- entry/exit automatic doors and associated appurtenances to include electrical connections
- overhead warehouse/receiving/shipping doors and door operating systems
- HVAC systems and associated appurtenances, including associated platforms and electrical connections, except systems serving the commissary sales area
- loading dock levelers and dock accessories including electrical connections
- trash chutes and conveyors, including associated doors and connections for compactors and storage containers.

SITE WORK

§ site clearing.

§ grading and drainage improvements.

§ Improvements for parking, circulation, walks, and receiving areas, including lighting more than 5' outside building lines.

§ Traffic safety devices, controls and other improvements.

§ landscaping.

§ retention ponds, environmental mitigation.

§ site demolition.

§ utilities more than 5' outside building lines and associated costs of extending utilities to the site.

- berms and force protection barriers
- exterior protective bollards and guard rails-fencing and other screening

CONSTRUCTION ISSUE

EQUIPMENT

GENERAL SALES AREA

§ all refrigerated and non-refrigerated display cases and shelving.

§ island merchandisers.

§ aisle markers and decor

§ carts (carryout, grocery, stocking, etc.).

§ cash registers and associated equipment.

§ scanning equipment.

§ scales.

§ checkout stands and lane number lights.

§ queuing directors.

§ pizza carts and tables.

§ plant and floral display units.

§ mass merchandising pedestals.

§ merchandise demonstration tables.

- equipment and wall protective bollards and rails
- sales area HVAC systems and appurtenances

BAKERY/DELI

§ reach-in freezers and coolers.

§ shelving.

§ ovens.

§ oven/proofer.

§ retarders.

§ glazing and icing centers.

§ mixers.

FURNITURE AND FIXTURES

§ systems furniture.

§ modular seating units.

§ desks.

§ file cabinets.

§ refrigerators.

§ microwave ovens.

MEAT DEPARTMENT

§ tables, freestanding.

§ conveyors.

§ slicers.

§ saws.

§ grinders.

§ scales

§ labelers.

§ wrappers.

§ fat testers.

§ platters and trays.

§ tenderizers.

§ molders.

§ carts

§ mixers.

§ patty machines.

STAGING AND RECEIVING

§ bumper guards.

§ dock seals.

§ storage racks.

§ materials handling equipment.

§ chargers.

§ forklifts.

§ pallet jacks.

§ order selectors.

§ balers.

§ compactors.

§ sweepers and scrubbers.

DAIRY DEPARTMENT

§ roll-in dairy milk bossy carts

§ Insulated curtains

- Glass door merchandisers and accessories

PRODUCT REFRIGERATION SYSTEMS

§ walk-in coolers and freezer enclosures.

§ refrigerated unit doors, seals, strips, and heater elements.

§ electrical power tie-in to all refrigerated systems.

§ plumbing tie-ins to all refrigerated equipment.

§ condenser units.

§ compressor units.

§ blowers and exhaust systems.

§ refrigeration system controls and monitoring devices.

§ refrigeration lines

§ Electrical Service from panel to compressor system

PROCESSING AREAS

§ ice machines.

§ wire rack shelving for refrigerated walk-in units.

§ garbage disposal units.

§ work tables

§ scales.

OTHER

§ telephone, intercom, public address and other in-store communications systems.

§ background music systems.

§ emergency generators and transfer switches

§ safe.

§ sales area marketing décor, including all departmental and store signage

§ lockers

§ protective bollards and rails in product storage and transfer areas

§ security systems (duress and intrusion)

- all prewiring and connection junctions for IT systems.

§ closed circuit television (CCTV) systems.

- Key cabinets and cipher locking systems

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.1 GENERAL

1.1.1. The following apply to this section:

1.1.1.1. Coordination

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.3 SUBMITTALS (Not used)

1.4 COORDINATION

1.4.1. Coordinate construction operations of work described in these contract documents to ensure orderly installation of each part of the work. Coordinate construction operations that depend on each other for proper installation, connection, and operation.

1.4.1.1. Sequence construction operations where installation of one part of the work depends on installation of other components, before or after its own installation.

1.4.1.2. Sequence construction operations to ensure that completed or work in progress is not subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

1.4.1.3. Coordinate installation of different components to ensure maximum accessibility for required maintenance, service, and repair.

1.4.1.4. Make provisions to accommodate items scheduled for later installation.

1.4.2. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1.4.2.1. Prepare similar memoranda for the government and outside contractors where required for coordination of work.

1.4.3. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:

1.4.3.1. Review of the contract documents well in advance of the work.

1.4.3.2. Preparation, production, and maintenance of project CPM construction schedule and Phasing Plan (if Add/Alter project).

1.4.3.3. Installation and removal of temporary facilities.

1.4.3.4. Delivery and processing of submittals.

1.4.3.5. Weekly progress meetings, toolbox meetings, and meetings with other parties and entities as required to facilitate the construction effort.

1.4.3.6. Contractor Quality Control meetings, testing, etc., preparation/submittal of the Contractor's Daily Inspection Log, and coordination of testing and inspections with the Government's Designated Inspector.

1.4.3.7. Production of Short Interval Schedules.

1.4.3.8. Project close-out activities.

1.4.4. Conservation: Coordinate construction operations to ensure that operations give consideration to conservation of energy, water, and materials.

1.4.5. General Coordination Provisions

1.4.5.1. Inspection of Conditions: Require the installer of each major component to inspect the substrate and conditions for compatibility with manufacturer's installation requirements. Do not proceed until the remedy of the unsatisfactory conditions.

1.4.5.2. Coordinate required inspections and tests to minimize the necessity of uncovering completed construction.

1.4.6. Cleaning And Protection

1.4.6.1. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to ensure protection from damage or deterioration at substantial completion.

1.4.6.2. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01042
MECHANICAL, REFRIGERATION, FOOD SERVICE EQUIPMENT, AND ELECTRICAL COORDINATION

PART 1 - GENERAL

1.1 GENERAL

1.1.1. The following apply to this section:

1.1.1.1. General reference

1.1.1.2. Related requirements

1.1.1.3. Space reference

1.1.1.4. Standards, laws, ordinances

1.1.1.5. Operation and Maintenance of equipment

1.1.1.6. Wiring

1.1.1.7. Grounding

1.1.1.8. Access Panels

1.1.1.9. Operation and Maintenance Manuals

1.1.1.10. Excavation and Backfill

1.1.1.11. Painting

1.1.1.12. Vandal Proofing

1.1.1.13. Protective Covering

1.1.1.14. Interruption of Service

1.1.1.15. Demolition and Remodeling

1.1.1.16. Disposition of salvaged equipment and material

1.1.1.17. Cleaning

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.3 SUBMITTALS

1.3.1. Refer to specification Division 1 Section “Administrative Requirements” for procedures.

1.3.2. Submittal Schedule:

1.3.2.1. Provide the indicated quantity. Unless otherwise stated, Provide four originals and 1 PDF version. The Government will retain three copies and the pdf file.

1.3.2.2. Submittal action by reviewer: Review each submittal, mark to indicate action taken, and return.

1.3.3. Each section of the specifications may contain submittal requirements. Review all sections of the specifications and provide all required submittals. Submittal requirements for this section are as follows:

1.3.3.1. Coordination Drawings.

1.3.3.2. Access Panels.

1.4 GENERAL

1.4.1. Coordinate with other trades regarding the location and size of pipes, equipment, fixtures, conduit, ducts, openings, switches, outlets, etc., so that there may be no interference between the installation or the progress of the work of any contractor or subcontractor on the project.

1.4.2. The mechanical and electrical drawings are diagrammatic. Follow as closely as actual construction of the building and the work of other trades will permit. Where the contractor provided shop drawings approved by the Contracting Officer; follow the shop drawings. Formally advise the Government's Designated Inspector of any required changes from the approved shop drawings, and record variances in record drawings.

1.4.3. The Government's Designated Inspector may change the location of any equipment 5-feet and any piping, ductwork, conduit, etc., up to 10-feet in any direction without incurring extra charge from the contractor, provided such changes occur before installation.

1.4.4. Unless specified otherwise, furnish and install each item of equipment or material complete with all necessary fittings, supports, trim, piping (supply, discharge, and drain), valves, switches, relays, disconnects, cable, cords, conduit, overcurrent and overload protection, interfaces or contacts, insulation, connection to power supply or source pipe, etc., as required for a complete and operating installation in accordance with applicable codes and regulations.

1.4.5. Install all equipment and material according to the manufacturer's written instruction unless otherwise specified.

1.5 RELATED REQUIREMENTS

1.5.1. Specified Elsewhere:

1.5.1.1. The General Requirements specified in individual Sections.

1.5.1.2. Division 8 Section " Access Doors and Frames" (If Applicable).

1.5.1.3. Division 9 Section "Painting" (If Applicable).

1.5.1.4. Division 11 – Equipment

1.5.1.5. Division 13 - Special Construction.

1.5.1.6. Division 15 - Mechanical.

1.5.1.7. Division 16 - Electrical.

1.5.1.8. Review the Architectural, Civil, Structural, Demolition, and any special Drawings to ensure the inclusion of mechanical, electrical, and plumbing included in those drawings but omitted in the mechanical, electrical, and plumbing drawings. Distribute such information to the appropriate subcontractor(s) for inclusion in the Work.

1.6 COORDINATION DRAWINGS AND SPACE PREFERENCE

1.6.1. Carefully verify and coordinate the location and level of all pipes, ducts, etc. Run preliminary levels and coordinate with all other contractors to avoid conflicts in other locations.

1.6.2. Plumbing lines below plumbing fixtures and electrical conduits above or below electric switchgear and panels have precedence over ductwork or heating mains. Do not install piping or ductwork directly over, under or within code required frontal clearances of the electrical equipment.

1.6.3. In spaces with high concentrations of inter-related equipment, piping, conduit, and ductwork (spaces like Mechanical Rooms), provide coordination drawings clearly depicting the layout (both plan and elevation, or perspective). Clearly define in advance of construction the relationship of all piping, conduit, ductwork, and equipment. Demonstrate clearance space sufficient to service the equipment.

1.7 STANDARDS, LAWS, AND ORDINANCES

1.7.1. Where laws require, obtain written approval of systems (such as fire alarm, sprinklers) from proper authorities before ordering equipment.

1.7.2. Supplementing the requirements of the General Conditions for compliance with laws and ordinances, meet or exceed the requirements of the following:

Building	ADA, International Building Code in conjunction with the UFC 1-200-01
Plumbing	National Standard Plumbing Code (NAPHCC)
Electrical equipment and wiring	NFPA 70 (National Electrical Code) in conjunction with the ICC EC – 06 ADA
HVAC	NFPA 90A in conjunction with the UFC 3-410-01FA
Boilers, water heaters, pressure vessels	ASME Boiler Code, Section VIII, Division 1 and 2 with Addenda; AGA
Sprinkler systems	NFPA 13, NFPA 24 in conjunction with the UFC 3-600-01

1.8 OPERATION AND MAINTENANCE OF EQUIPMENT

1.8.1. Be responsible for the operation, maintenance, and safety of all equipment furnished, make all necessary repairs, and do all necessary maintenance required to maintain the equipment in first class condition until acceptance by the government.

1.8.2. Unless otherwise stated in this or other specifications, where other contractors operate such equipment, the other contractor is solely responsible for the operation and safety of such equipment.

1.8.3. Maintenance work includes, but is not limited to:

1.8.3.1. Lubrication.

1.8.3.2. Adjustments.

1.8.3.3. Filter replacements.

1.8.3.4. Chemical treatment.

1.9 WIRING OF MECHANICAL EQUIPMENT AND MOTORS

1.9.1. Furnish and install all conduit, wiring, disconnects, starters, thermal overload heaters, holding coils, remote push buttons stations, "hand-off-auto," multi-speed switches, and pilot lights for all electrically operated mechanical equipment, including the final connections for ready operation, as specified and shown on the drawings.

1.9.2. Where motor starters come as an integral part of the equipment, comply with the contract documents including, but not limited to, overload protection on all phases. Install "hand-auto-off" switches on all heating, ventilating, air conditioning and temperature control starters.

1.9.3. Where starters or control panels come as an integral part of the respective equipment such as boilers, packaged air conditioning units, sump pumps, etc., furnish and install all wiring and make final connections to the line side of the starter or disconnect device and all wiring beyond this point.

1.9.4. Furnish and install all required control and interlock wiring for all automatic control devices, alarms, accessories, etc. Install on the holding coils of the starters or in the grounded load side of TT switches unless otherwise specifically shown on the electrical drawings or specified elsewhere.

1.9.5. Perform all electrical work in accordance with the contract documents. Install control wiring at 120 volt or less. Install all control wiring in conduit.

1.9.6. Consult with the electrical subcontractors before ordering or installing equipment. Coordinate the motor type, voltage, and sizes with starter type, voltage and sizes, holding coil voltage, thermal overload capacities, interlocks, etc. Each trade is equally responsible to ensure that the equipment installed is of proper size and type.

1.9.7. Have the electrical subcontractor(s) consult with all other contractors furnishing motors (that require starters by the electrical subcontractor(s)) to verify the exact type of starter required (e.g., part winding, across the line, two speed, etc.) for each motor before ordering starters.

1.9.8. After the electrical subcontractor(s) completes the wiring, have each contractor inspect the wiring before operating their respective motors. The contractor who furnished the motor is completely responsible for the motor’s protection during the warranty period including initial startup of each motor, unless specifically shown otherwise in the contract documents.

1.9.9. See Division 16 Section "Electrical Connections for Equipment" (if applicable).

1.9.10. Furnish motor protection devices on all 3 phase motors 5 HP and larger.

1.10 GROUNDING

1.10.1.1. Ground all electrically powered equipment per electrical specifications and NFPA 70. See specifically Sections 250-1, 42, 43, 44, 50, 70, and 90.

1.10.1.2. Non-electrical powered roof-mounted equipment such as roof hoods, chimneys, vents, etc.:.Ground as required by NFPA 70.

1.11 ACCESS PANELS

1.11.1. Where control valves, shut-off valves, drip traps, air vents, heating coils, pull boxes, or other mechanical or electrical equipment are above inaccessible furred ceilings or back of masonry or furred walls, provide access panels. The drawings indicate the location of many, but not necessarily all locations requiring access panels.

1.11.2. Size access panels of sufficient size for adequate servicing, adjustment, removal, and replacement of concealed equipment through the opening provided. Size panels as shown on the drawings. Size panels not dimensioned a minimum of 16 inches by 24 inches in walls and 24 inches by 24 inches in ceilings.

1.11.3. Submit shop drawings for approval before ordering panels. Furnish appropriated labeled doors where fire rating is required.

1.11.4. Division 8 Section "Access Doors and Frames".

1.12 OPERATION AND MAINTENANCE MANUALS

1.12.1. Submit all Mechanical, Electrical, and Plumbing operation and maintenance (O&M) manuals with the initial submittals. Prior to completion of the contract, provide inserts for the O&M manuals containing testing documentation related to the performance testing for each piece of equipment tested.

1.13 EXCAVATION AND BACKFILL

1.13.1. Each contractor performs all excavation, sheathing, bracing, and backfill required for the installation of his respective work.

1.13.1.1. See: Division 2 Section "Earthwork".

1.13.2. Bed piping, conduit, etc., firmly and continuously on undisturbed earth (or sand or pea gravel where specified or required). Where piping has bells, excavate deeper at same.

1.13.3. Where the excavation is in rock, ashes, cinders, refuse or other unsuitable materials, make the trench 6 inches deeper and 12 inches wider than required for the piping and backfill with sand or pea gravel 6 inches deep. In these areas, provide 6 inches of sand or pea gravel backfill around the entire perimeter of

pipe, conduit, etc. The intent is to have a minimum of 150mm (6 inches) of the appropriate fill below, on both sides, and atop the pipe, conduit, etc.

1.13.4. Maintain trenches and excavations free of standing water. Do not backfill trench until pressure tests are complete, joints and pipe are watertight and the installation inspected. Backfill trenches in 6-inch layers. Compact by tamping and puddling. Do not install frozen backfill material.

1.13.5. Place backfill for the first 12 inches over piping, etc., by hand and carefully tamp.

1.13.6. Use sand or pea gravel fill for trench backfill under floors, parking areas, streets, walks, drives, etc. Backfill over excavation with sand or pea gravel in 8-inch layers, dampen (do not soak) and mechanically tamp to 95% minimum of maximum density per ASTM D 1557-78. Where backfill of other construction surrounds pipe, remove same to undisturbed earth and backfill with sand or pea gravel.

1.13.7. Surplus earth is acceptable for backfill in yards and seeded areas of the project only upon approval. The backfill cannot contain cinders, ashes, wood, large rocks, concrete, or debris. Promptly remove (from the site) surplus excavation material not needed for backfill or elsewhere on the site.

1.13.8. Provide adequate barricades, construction signs, torches, red lanterns, guards, etc., as required during the progress of the excavation, installation, and backfill work. Observe all applicable regulations respecting safety provisions, sheathing, and barricades.

1.13.9. For excavations made through streets, lawns, sidewalks, curbs, parking areas or other finished surfaces, replace surfaces with material to match existing surfaces as approved by proper authorities, including reinforced steel, where required. Neatly perform all cuts with saws, etc.

1.13.10. Protect utilities, trees, shrubbery, fences, poles, sidewalks, curbs and all other property and surface structures from damage. Restore all disturbed by construction.

1.13.11. Before beginning excavation work, contact utility companies or, if applicable, responsible host installation shops and request they locate and stake buried piping, wiring, etc. Expose such piping, wiring, etc., by hand excavation prior to the use of power equipment.

1.13.12. The minimum cover over buried water pipe is frost depth plus 12 inches.

1.14 PAINTING

1.14.1. Clean, prepare, and paint the following with rust inhibitor followed by enamel paint at the time of fabrication to stop rusting, whether exposed or concealed, insulated or un-insulated:

1.14.1.1. Welds to building structural members.

1.14.1.2. Welds on pipes without insulation.

1.14.1.3. Supplementary steel supports (see Division 15 and Division 16).

1.14.2. Paint all surfaces visible through grilles of fin tube radiation, cabinet unit heaters, etc., with flat black paint.

1.14.3. Touch up all damaged or chipped paint on all materials furnished.

1.14.4. Perform all other painting and all finish painting (if any) of mechanical and electrical equipment, materials, etc. See Division 9, FINISHES. Leave all materials and equipment clean and dust free and ready for paint. Do not paint over manufacturers' name plates. Do not paint sprinkler heads.

1.15 VANDAL PROOFING

1.15.1. Reduce the number of exposed screws, bolts, etc., used in the occupied areas of the building to a minimum.

1.15.2. Where screws, bolts, etc. is unavoidable, provide a flat-span vandal proof type or Allen wrench type.

1.16 PROTECTIVE COVERING

1.16.1. Furnish and install suitable covering and protection for all equipment, devices, and materials, etc., stored or set-in-place on the project.

1.16.2. Prevent damage from mortar, plaster, paint, or other construction procedures or debris to coverings.

1.16.3. A 6 mil polyethylene covering securely attached is acceptable in most cases. In cases where daily temperature fluctuations will cause condensation inside the wrappings, provide a lamp or other heat source to prevent formation of corrosion on controls, contacts, etc.

1.16.4. Protect all equipment nameplates from damage or defacement.

1.17 CLEANING

1.17.1. Keep the premises free from accumulations of waste materials or rubbish caused by contractor operations. At completion of each days work, remove rubbish from the construction area. At the completion of the project, remove all rubbish, tools, scaffolding, surplus materials, etc.

1.17.2. At completion, clean all surfaces of all paint, plaster, mortar, stains, paper labels, stickers, dust, grime, etc. Do not mar or damage surfaces while cleaning.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01091

REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 GENERAL

1.1.1. Section includes:

1.1.1.1. Definitions

1.1.1.2. Specification format and content explanation

1.1.1.3. Industry standards

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.3 SUBMITTALS (Not used)

1.4 DEFINITIONS

1.4.1. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the drawings, or paragraphs or schedules in the Specifications and similar requirements in the contract documents. The use of terms such as "shown," "noted," "schedule," and "specified" help the reader locate the reference. Location does not limit.

1.4.2. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Contracting Officer, requested by the Contracting Officer, and similar phrases.

1.4.3. "Approved": The term "approved" when used in conjunction with the Contracting Officer's action on the contractor's submittals, applications, and requests, refers only to the Contracting Officer's duties and responsibilities as stated in the Conditions of the Contract.

1.4.4. "Regulations": The term "regulations" include laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the work.

1.4.5. "Furnish": The term "furnish" means supply and deliver to the project site, ready for unloading, inspection, inventory, unpacking, assembly, installation, and similar operations.

1.4.6. "Install": The term "install" describes operations at the project site including the actual unloading, temporary storage, unpacking, assembly, erecting, placing, anchoring, applying, working dimension, finishing, curing, protecting, cleaning, and similar operations.

1.4.7. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

1.4.8. "Installer": An installer is the contractor or another entity engaged by the contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including purchasing, installation, erection, application, or similar operations. Installers must possess experience in the operations they perform.

1.4.8.1. The term "experience" when used with the term "installer" means having a minimum of 5 previous projects similar in size and scope to this project, being familiar with the special requirements indicated, and having complied with requirements of authorities having jurisdiction.

1.4.8.2. Trades: Using terms such as "carpentry" does not imply performance of certain construction activities by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades- persons of the corresponding generic name.

1.4.9. "Project Site": The space available to the contractor for performing construction activities, either exclusively or in conjunction, with others performing work as part of the project.

1.4.10. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests at either the project site or elsewhere. The agency reports and, if required, interprets results of these inspections or tests.

1.4.11. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.

1.4.12. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

1.4.13. Products: Items purchased for incorporating into the work. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1.4.13.1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.

1.4.13.2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

1.4.13.3. Or Equal Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.4.14. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers.

1.5 SPECIFICATION FORMAT AND CONTENT EXPLANATION

1.5.1. Specification Format: The organization of these specifications into Divisions and Sections follow CSI's 16-Division format and Master Format's numbering system.

1.5.2. Specification Content: This specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are as follows:

1.5.2.1. Abbreviated Language: Abbreviations occur in languages used in specifications and other contract documents. Interpret words and meanings as appropriate. Interpolate words implied, but not stated, as the sense required. Interpret singular words as plural and plural words interpreted as singular where applicable as the context of the contract documents indicates.

1.5.2.2. Streamlined Language: The specifications generally use the imperative mood and streamlined language. The contractor performs requirements expressed in the imperative mood. At certain locations in the text, subjective language is for clarity to describe responsibilities of the contractor or others when so noted.

a. Imply the words "shall be" where a colon (:) is within a sentence or phrase.

1.6 INDUSTRY STANDARDS

1.6.1. Applicability of Standard: Except where the contract documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the contract documents to the extent referenced. Such standards are a part of the contract documents by reference.

1.6.2. Publication Dates: Comply with the standards in effect as of the issue date of the Solicitation except comply with standards having different revision dates as referenced in the Building Code indicated in Division 1 Section “Description of Work.”

1.6.3. Conflicting Requirements: Where the contract documents specify compliance with 2 or more standards and the standards establishes different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Before commencing, refer to the Contracting Officer for a decision on requirements that are different but apparently equal, and where it is uncertain which requirements are the most stringent.

1.6.3.1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum acceptable. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Contracting Officer for a decision before proceeding.

1.6.4. Copies of Standards: Require each entity engaged in construction on the project to be familiar with industry standards applicable to its construction activity. The contract documents do not contain bound copies of applicable standards.

1.6.5. Abbreviations and Names: Abbreviations frequently occur in trade association's names and titles of general standards. The use of such acronyms or abbreviations in the specifications or other contract documents, mean the recognized name of the trade association, standard-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Thompson Gale’s "Encyclopedia of Associations" or Columbia Books’ “National Trade & Professional Associations of the U.S.”

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01115

SUSTAINABLE DESIGN REQUIREMENTS

PREFACE

The following Attachments are included at the end of this Section:

1. LEED Checklist
2. Construction Waste Management Plan (Example)
3. Indoor Air Quality Management Plan (Example)
4. Indoor Air Quality Management Log (Example)

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. General requirements and procedures for compliance with Silver Certification under the LEEDv2009 for New Construction Rating System, Executive Order (EO) 13423 – Strengthening Federal Environmental, Energy, and Transportation Management, as identified in the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding, and Executive Order (EO) 13514 – Federal Leadership in Environmental, Energy and Economic Performance.

1.1.2. Related Sections:

a. Divisions 01 through 16 for sustainable design requirements specific to the work of each of these Sections.

b. Division 01560 Environmental Protection

c. Division 01810 Commissioning Requirements

1.2 DEFINITIONS

1.2.1. USGBC

a. U.S. Green Building Council.

1.2.2. LEED

a. Leadership in Energy & Environmental Design.

b. GBCI: Green Building Certification Institute (LEED reviewers)

1.2.3. EPA

a. U.S. Environmental Protection Agency

1.2.4. Material-Only Cost

a. The cost shall include all taxes and transportation expenses to deliver the material to the project site. Labor and equipment cost shall be excluded from the total.

1.2.5. Recycled Content

a. The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of the assembly to determine the recycled content value.

(1) “Post-consumer” material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product which can no longer be used for its intended purpose.

(2) "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

1.2.6. Regionally Extracted, Processed & Manufactured Materials

a. Materials extracted, harvested or recovered, as well as manufactured within 500 miles radius of the Project location. If only a fraction of a product or material is extracted/harvested/ recovered and manufactured locally, then only that percentage, by weight, shall contribute to the regional value.

1.2.7. Volatile Organic Compounds (VOCs)

a. Carbon compounds that participate in atmospheric photochemical reactions.

1.2.8. Urea Formaldehyde

a. A combination of urea and formaldehyde that is used in some glues and may emit formaldehyde at room temperature.

1.2.9. Forest Stewardship Council Certification

a. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-FSC-accredited certification body.

1.2.10. Green Label Program

a. Carpet and Rug Institute (CRI) Green Label and Green Label Plus certification: Certificates showing compliance with the VOC emission standards of the CRI Green Label or CRI Green Label Plus program. The Green Label program applies to carpet cushion and the Green Label Plus program applies to carpet and carpet adhesives.

1.2.11. FloorScore

a. Resilient Floor Covering Institute (RFCI) with Scientific Certification Systems (SCS) Certification: Certificates ensure compliance with the VOC emission standards set forth by the FloorScore program. The program applies to hard surface flooring including vinyl, linoleum, laminate, wood, ceramic, rubber and wall base.

1.3 SUSTAINABILITY REQUIREMENTS

1.3.1. Sustainability "LEED" requirements are addressed in this section and are also integrated into individual specification sections and are called out as Sustainable Design Requirements.

1.3.2. The LEED Certification for this contract requires all project team members to participate in LEED activities. The project is attempting a Silver Certification under the LEEDv2009 for New Construction Rating System. The items below outline the primary individual responsible for key items within the LEED Certification process. Responsibilities include:

a. General Contractor

(1) Primary responsibility is to provide all construction-related information as required by the Government's LEED Coordinator to complete "Construction" Phase Credits and as required in the various detail specification sections. Construction Phase credits are indicated on the LEED Scorecard attached at end of this Section. Upon completion of the project and all attempted LEED credits and credit documentation, the Government's LEED Coordinator will submit the project for review to GBCI. If there are comments relative to any of the Construction-phase credits and the associated contractor-provided documentation, the contractor shall assist the LEED Coordinator in developing a favorable response.
(2) Secondary or support responsibility on other credits per LEED rating system.
(3) Facilitate regular LEED coordination meetings and reporting as required by Government's LEED coordinator.
(4) Coordinate all system commissioning-related activities required by Government's Commissioning Agent, including any sub-contractor participation.

b. Government

(1) Credits relating to building operations, policies and post construction measures.
(2) Providing information to the USGBC regarding post-construction building performance.

c. Government's LEED coordinator

(1) Overseeing the LEED process and assisting the design and construction team with LEED related items.
(2) Reviewing LEED related design and construction documentation.
(3) Coordinating and submitting the LEED Design Phase Credits prior to the commencement of construction.
(4) Coordinating and submitting the LEED Construction Phase Credits after construction completion and occupancy of the project.

d. Government's Commissioning Agent

(1) Facilitate the commissioning of all required building systems including HVAC&R, lighting and daylighting controls, and domestic hot water systems. This work includes both standard commissioning and LEED commissioning as required. Refer to Section 01810 "Commissioning Requirements", 15997 "Commissioning Mechanical Systems", and 16997 "Commissioning Electrical Systems" for specific and additional requirements.

1.3.3. To comply with the project's sustainability requirements, the General Contractor is primarily responsible for the following items to ensure the building achieves a Silver level LEEDv2009 certification.

a. SScP1 Construction Activity Pollution Prevention
b. MRc2 Construction Waste Management
c. MRc4 Recycled Content
d. MRc5 Regional Materials
e. MRc7 Certified Wood
f. IEQc3.1 Construction Indoor Air Quality Management – During Construction
g. IEQc3.2 Construction Indoor Air Quality Management – Before Occupancy
h. IEQc4.1 Low-Emitting Materials – Adhesives & Sealants
i. IEQc4.2 Low-Emitting Materials – Paints & Coatings
j. IEQc4.3 Low-Emitting Materials – Flooring Systems
k. IEQc4.4 Low-Emitting Materials – Composite Wood & Agrifiber Products
l. IDc1.2 Exemplary Performance – MRc7 Certified Wood

1.3.4. To comply with the project's sustainability requirements, the General Contractor is partially responsible for the following items to ensure the building achieves a Silver level LEEDv2009 certification.

a. SSc7.2 Heat Island Effect – Roof
b. WEcP1 Water Use Reduction
c. WEc3 Water Use Reduction
d. EAcP1 Fundamental Commissioning of Building Energy Systems
e. EAc3 Enhanced Commissioning
f. EAc5 Measurement & Verification

1.3.5. Description of attempted LEED credits involving contractor participation.

1.3.5.1. Construction Activity Pollution Prevention (SScP1)

a. Install and comply with the erosion and sediment control (ESC) measures outlined in the project's construction documents during all stages of construction
b. Maintain and inspect all ESC measures on a weekly basis and following a minimum of ½ inch of rain or snow fall.
c. Maintain a project ESC log that includes date stamped photos of installed measures and issues related to the maintenance of the ESC measures during construction.

(1) Log Requirements included; Date, Period or Rain / Snow Fall, date stamped photos identifying ESC measure, ESC measure condition and corrective actions.

1.3.5.2. Construction Waste Management (MRc2)

a. All Contractors are to comply with the construction waste management practices outlined in the project's construction documents for the project site during construction as they conform to Division 1, Section "Environmental Protection" Part 7.
b. The project is to divert a minimum of 75% of all construction waste, excluding soil that may be removed from the site.

1.3.5.3. Recycled Content (MRc4)

a. Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 20% of the total value of all materials specified in Divisions 2 – 10 in the project specifications.
b. The recycled content value of a material assembly is to be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value. For additional information, see the USGBC LEED BD&C Reference guide for calculating assembly recycled content.
c. Only materials specified in Divisions 2 – 10 are to be included in the calculation.
d. Mechanical, electrical and plumbing components and specialty items such as FF&E and (Division 12) are not to be included in the calculation.
e. The total project material cost shall be calculated by adding the actual material costs of Divisions 2-10.
f. Recycled content is defined in accordance with the International Organization for Standardization document, ISO 14021-Environmental labels and declarations-Self-declared environmental claims (Type II environmental labeling).
g. See individual specification sections 2-10 for each material's recycled content requirement.

1.3.5.4. Regionally Supplied Materials (MRc5)

a. Use building materials and products specified in Divisions 2 – 10 that have been extracted, harvested or recovered, as well as manufactured, within a 500 mile radius of the project site for a minimum of 20% (based on cost) of the total materials value.
b. If only a fraction of a product or material is extracted/harvested/ recovered and manufactured locally, then only that percentage by weight is to contribute to the regional value.
c. Materials specified in Divisions 2 – 10 are to be included in the calculation.
d. Mechanical, electrical and plumbing components and specialty items such as FF&E and (Division 12) are not to be included in the calculation.
e. Only include materials permanently installed in the project.
f. See individual specification sections 2-10 for each material's requirements.

1.3.5.5. Certified Wood Products (MRc7)

a. All new wood and wood-containing materials are to be certified in accordance with the Forest Stewardship Council's Principles and Criteria. All materials shall be purchased from an FSC-certified vendor.
b. Materials include, but not limited to lumber, plywood, flooring, finishes and wood doors. Temporary construction applications like bracing, concrete formwork and pedestrian barriers are not to be included.

1.3.5.6. Construction Indoor Air Quality Management (IEQc3.1; IEQc3.2)

a. Comply with the Air Quality requirements and practices outlined in the project's construction documents as they conform to Division 1, Section "Environmental Protection" Part 4.
b. Comply with Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3).
c. Protect on-site and installed absorptive materials from moisture damage.
d. Install MERV 8 filters in air handling units and at air returns if permanent HVAC equipment is utilized during construction. Filters to be replaced prior to the building flush out and inspected and replaced if needed prior to occupancy.
e. Implement a building flush out prior to occupancy.

(1) Prior to occupancy but after all interior finishes are installed and punch list is complete, supply a total air volume of 14,000 cubic feet of outdoor air per square foot of floor area to the building.

(2) During the building flush, maintain a temperature of at least 60% and relative humidity no higher than 60%.

1.3.5.7. Volatile Organic Compounds Emitting Materials (IEQc4.1; IEQc4.2; IEQc4.3)

a. Adhesives and sealants: All adhesives and sealants used on the interior of the building (defined as inside of the waterproofing system and applied on-site) are to comply with the VOC limits of South Coast Air Quality Management District (SCAQMD) Rule #1168.
b. Paints and coatings: Paints and coatings used on the interior of the building (defined as inside of the waterproofing system and applied on-site) are to comply with the VOC content limits established in Green Seal Standard GS-11, Paints, First Edition, May 20, 1993 and SCAQMD Rule #1113 and GS-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.
c. Carpet Systems: All carpet systems installed in the building are to meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus Program. All carpet cushion installed in the building shall meet the requirements of the Carpet and Rug Institute Green Label program. All Carpet and flooring adhesives and sealants provided by the manufacture are required to meet the Adhesives and Sealant VOC level requirements.
d. Hard Surface Flooring: All flooring installed in the building must meet the testing and product requirements of the current FloorScore standard. Hard surface flooring includes vinyl, linoleum, laminate, wood, ceramic, rubber and wall base. All floor coatings and adhesives are required to meet the requirements outlined in 1.3.8-1 and 1.3.8-2.

1.3.5.8. Composite Wood and Agrifiber Product (IEQc4.4)

a. Use composite wood and agrifiber building products on the interior of the building only that contains no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
b. Composite Woods and Agrifiber products are defined as: particle board, medium density fiberboard (MDF), plywood, wheat board, strawboard, panel substrates and door cores.
c. Materials considered furniture, furnishings, and equipment (FF&E) are not considered base building elements and are not included in the requirement.

1.3.5.9. Building Mechanical Systems

a. The base building HVAC and lighting systems are designed in accordance with the standard, ASHRAE/IESNA 90.1-2007, mandatory provisions (Sections 5.4,6.4,7.4,8.4,9.4 and 10.4) and prescriptive requirements (Sections 5.5,6.5,7.5 and 9.5) or performance requirements (Section 11). (EAcP2 and EAc1)
b. The base building mechanical and refrigeration systems are designed with refrigerants that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming. (EAcP3 and EAc4)
c. The indoor air quality control systems of the building are designed in accordance with the standard, ASHRAE 62.1-2007, Ventilation for Acceptable Indoor Air Quality. Ventilation rates are designed to meet the Ventilation Rate Procedures of ASHRAE 62.1-2007, Sections 4 through 7. (IEQcP1)
d. If the permanent installed ventilation systems are used during construction, the units must have a minimum MERV filter rating of 8 or higher. (IEQc3.1)
e. New MERV 8 filters shall be installed prior to beginning the building flush out. Upon completion, the installed filters must be inspected prior to occupancy and replaced as needed. (IEQc3.2)

1.3.5.10. Plumbing Fixtures (WEcP1; WEc3)

a. Install domestic plumbing fixtures as indicated on project drawings that in aggregate use 30% less water than the water use baseline calculated for the building after meeting the Energy Policy Act of 1992, fixture performance requirements, and the American Society of Mechanical Engineers standard for public lavatory faucets: 0.5 gpm at 60 psi.

1.3.5.11. Roofing Membrane (SSc7.2)

a. Install roofing system as indicated on construction documents. The specified roofing system has a solar reflectance index (SRI) equal to or greater than 78 for at least 75% of the total roofing area excluding mechanical equipment and skylights.

1.3.5.12. The Contractor has partial responsibility for the following to ensure installed HVAC&R, lighting, domestic hot water, and related controls function as designed.

a. Facilitate Building Systems Commissioning (EAcP1; EAc3)
b. Refer to Section 01810 “Commissioning Requirements", 15997 “Commissioning Mechanical Systems” and 16997 “Commissioning Electrical Systems” for specific and additional requirements.

1.4 SUBMITTALS

1.4.1. Refer to specification section 01300 –Administrative Requirements for procedures and quantities.

1.4.1.1. Submit additional sustainable design submittals as required in individual Specification Sections. Include sustainable design (LEED) submittals as a line item in the master submittal log.

1.4.1.2. Sustainable design submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated sustainable design requirements.

1.4.2. Sustainable Design Action Plans Include:

a. Solid Waste, Construction, and Demolition Debris Waste Management (CWM) plan complying with section 01560 "Environmental Protection" and per 1.3.4 in section 01115 Sustainable Design Requirements.
b. Construction indoor-air-quality management (IAQ) plan complying with requirements of Division 01560 "Environmental Protection" and per 3.2 in section 01115 Sustainable Design Requirements.
c. LEED schedule of values (SOV): Provide statements indicating the total material only cost for each individual specification section for divisions 2-10.
d. Certified wood management plan complying with requirements of Division 1, FSC requirements. The plan shall include a list of all wood and wood containing products used in the project. Indicate each product containing certified wood, the source, and cost of the certified wood products.

1.4.3. Sustainable Design Progress Reports Include: Solid waste disposal progress reports complying with Part 7 - Waste Management and Disposal of Division 01 Section Environmental Management. (LEED Credit MR 2.1)

a. Recycled Content Status Report
b. Regionally Supplied Status Report
c. Certified Wood Status Report
d. ESC tracking log Status Report
e. IAQ tracking log Status Report

f. VOC products Status Report

1.4.4. Sustainable Design Submittals

a. As indicated in each individual specification section, provide product data or certification information, material safety data sheets (MSDS) for each of the individual products within the submission.
b. Provide the material only cost of individual products as identified in each individual section.
c. Provide Product cut sheet and material safety data sheet (MSDS) for all adhesives, sealants, paints, and coatings used on the interior of the building.
d. For all carpet and carpet pad, provide the manufactures Green Label and Green Label Plus Certification information as required in the individual specification section.
e. For all hard flooring and hard flooring systems, provide the manufacturers document confirming compliance with the FloorScore standard.
f. For all composite wood-based and agrifiber products, provide documentation from the manufacturer that indicates the product(s) does not contain any added urea-formaldehyde resins.
g. All new wood and wood containing materials:

(1) Provide the supplier and manufacturer's Forest Stewardship Council chain-of-custody numbers for materials/products used to meet these requirements.
(2) Provide invoices for all materials indicating the vendor's Chain of Custody (COC) number, wood materials on a line item bases, the cost of each line item, identification of each FSC materials as "FSC Pure, FSC Mixed, or FSC Mixed [%]."

(3) Provide a letter from the vendor stating the products are FSC Pure, FSC Mixed, or FSC Mixed [%] Certified.

h. Construction IAQ management "During Construction" and "Before Occupancy."

(1) Construction indoor air quality management plan. An example plan is provided at the end this section.
(2) Product cut sheet for each temporary filtration media used during construction at returns and within the air handling units. Include manufacturers name, model number and MERV value.
(3) Product cut sheet for filtration media installed prior to occupancy. Include manufacturers name, model number and MERV value.
(4) At a minimum, eight date-stamped photographs of at least three different phases evenly spaces during construction (at least 24 total). The photos shall be submitted with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures. At a minimum, at least one photo documenting of each of the following measures must be provided:

(1) Material Protection
(2) HVAC Protection
(3) Source Control
(4) Pathway Interruption
(5) Housekeeping
(6) Scheduling

(5) A copy of the Indoor Air Quality Management Activities Log. An example log is provided at the end this section.
(6) Provide a signed letter on letterhead indicating the building flush out process, dates & times. The letter shall include a description of how the LEED requirements for air temperature and humidity control were monitored and achieved.

i. Construction Activity Pollution Prevention (ESC)

(1) Provide the Erosion and Sediment Control Plan. An example plan is provided at the end this section.
(2) Provide date-stamped photographs of each measure after initial installation, and a minimum of eight date stamped photos at three other equally spaced phases of construction (more than 24 total). Each photo should include a brief description of the measure and if any repair was required.
(3) Provide the Erosion and Sediment Control Activities Log. An example log is provided at the end this section.

j. Construction Waste Management (CWM)

(1) Provide a Construction Waste Management Plan. An example plan is provided at the end this section.
(2) Provide a final Construction Waste Management Log totaling a diversion of at least 75% of the total construction waste excluding soil.
(3) Provide a signed letter from the Waste Hauler indicating the CWM Log summary amounts and percentages. The letter should include definitions of material types if not already included in the regular reports.

PART 2 - PRODUCTS

2.1 RECYCLED CONTENT OF MATERIALS

2.1.1. General

a. Select materials and products specified in Division 2-10 that contain recycled content such that the sum of post-consumer recycled content plus ½ of pre-consumer (post-industrial) recycled content constitutes at least 20% (based on cost) of the total value of all materials specified in the LEED SOV.

2.1.2. Percentage Calculation

a. Cost of post-consumer recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content for the Project constitutes a minimum of 20%, as defined above, of the cost of materials used for the Project.

2.1.2.2. Material Requirements

a. See individual sections for recycled content material requirements.

2.2 REGIONAL MATERIALS

2.2.1. Select materials and products specified in Divisions 2-10 that have been extracted, harvested or recovered, as well as manufactured, within 500 mile radius of the project site for a minimum of 20% (based on cost) of the total value of all materials specified in Divisions 2-10 for the project.

2.2.2. See individual sections for material requirements.

2.3 LOW-EMITTING MATERIALS

2.3.1. Adhesives and Sealants

a. For field applications that are inside the weatherproofing system, use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D:

(1) Wood Glues: 30 g/L.
(2) Metal-to-Metal Adhesives: 30 g/L.
(3) Adhesives for Porous Materials (Except Wood): 50 g/L.
(4) Plastic Foam Adhesives: 50 g/L.
(5) Carpet Adhesives: 50 g/L.
(6) VCT Tile Adhesives: 50 g/L.
(7) Cove Base Adhesives: 50 g/L.
(8) Gypsum Board and Panel Adhesives: 50 g/L.
(9) Rubber Floor Adhesives: 60 g/L.
(10) Ceramic Tile Adhesives: 65 g/L.
(11) Multipurpose Construction Adhesives: 70 g/L.
(12) Fiberglass Adhesives: 80 g/L.
(13) Contact Adhesive: 80 g/L.
(14) Structural Glazing Adhesives: 100 g/L.
(15) Plastic Cement Welding Compounds: 250 g/L.
(16) ABS Welding Compounds: 325 g/L.
(17) CPVC Welding Compounds: 490 g/L.
(18) PVC Welding Compounds: 510 g/L.
(19) Adhesive Primer for Plastic: 550 g/L.
(20) Sheet Applied Rubber Lining Adhesive: 850 g/L.
(21) Aerosol Adhesive, General Purpose Mist Spray: 65 percent by weight.
(22) Aerosol Adhesive, General Purpose Web Spray: 55 percent by weight.
(23) Special Purpose Aerosol Adhesive (All Types): 70 percent by weight.
(24) Other Adhesives: 250 g/L.
(25) Architectural Sealants: 250 g/L.
(26) Nonmembrane Roof Sealants: 300 g/L.
(27) Single-Ply Roof Membrane Sealants: 450 g/L.
(28) Other Sealants: 420 g/L.
(29) Sealant Primers for Nonporous Substrates: 250 g/L.
(30) Sealant Primers for Porous Substrates: 775 g/L.
(31) Other Sealant Primers: 750 g/L.

2.3.2. Paints and Coatings

a. For field applications that are inside the weatherproofing system, use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (Credit EQ 4.2):

(1) Flat Paints, Coatings, and Primers: VOC not more than 50 g/L.
(2) Nonflat Paints, Coatings, and Primers: VOC not more than 150 g/L.
(3) Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
(4) Stains: VOC not more than 250 g/L.
(5) Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
(6) Dry-Fog Coatings: VOC not more than 400 g/L.
(7) Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
(8) Pretreatment Wash Primers: VOC not more than 420 g/L.
(9) Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

2.3.3. Carpet Systems

a. All carpet systems installed in the building are to meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus Program. All carpet cushion installed in the building shall meet the requirements of the Carpet and Rug Institute Green Label program. All carpet adhesives are required to have a VOC limit of 50 g/L or less.

2.3.3.2. Hard Surface Flooring

a. All vinyl, linoleum, laminate, wood, ceramic, rubber and wall base flooring installed in the building must meet the requirements of the FloorScore certification standard. All flooring adhesives, sealants, and coatings required to meet the VOC requirements outlined in 2.3.1 and 2.3.2.

2.4 Certified Wood

a. All wood and wood based materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body that complies with FSC1-2, "Principles and Criteria".

2.5 Composite Woods and Agrifiber Products and Laminating Adhesives

a. Use wood-based products and laminating adhesives that contain no add urea-formaldehyde resins.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

3.1.1. Comply with Part 7 – Waste Management and Disposal of Division 01 Section "Environmental Protection" and in section 01115 Sustainable Design Requirements.

3.2 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

3.2.1. General

a. Comply with Part 4 – Air Quality of Division 01 Section "Environmental Protection".
b. Include flush out dates within the project construction schedule.

(1) The contractor shall notify the Government's Designated Respresentative if scheduling issues occur that effect the dates of the building flush out.

c. Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction," 2007, Chapter 3.

(1) Protect stored on-site or installed absorptive materials from moisture damage.
(2) If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 01 Section "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2-1999 at each return-air inlet for the air-handling system used during construction.
(3) Replace all air filters immediately prior to occupancy.

d. Comply with the following requirements:

(1) After construction ends, prior to occupancy and with all interior finishes installed and final cleaning is complete, install new filtration media with a MERV value of 8 and perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and, where mechanical cooling is operated, a relative humidity no higher than 60 percent.

LEED 2009 for New Construction and Major Renovation

Project: Joint Commissary & Navy Exchange
Project Location: Annapolis, Maryland
Date April, 2012

Y	N	?				
10		16		**Sustainable Sites**	Possible Points:	**26**
Y			C	Prereq 1	Construction Activity Pollution Prevention	
1			D	Credit 1	Site Selection	1
		5	D	Credit 2	Development Density and Community Connectivity	5
		1	D	Credit 3	Brownfield Redevelopment	1
		6	D	Credit 4.1	Alternative Transportation—Public Transportation Access	6
		1	D	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			D	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			D	Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	C	Credit 5.1	Site Development—Protect or Restore Habitat	1
1			D	Credit 5.2	Site Development—Maximize Open Space	1
1			D	Credit 6.1	Stormwater Design—Quantity Control	1
1			D	Credit 6.2	Stormwater Design—Quality Control	1
		1	C	Credit 7.1	Heat Island Effect—Non-roof	1
1			D	Credit 7.2	Heat Island Effect—Roof	1
		1	D	Credit 8	Light Pollution Reduction	1
6		2		**Water Efficiency**	Possible Points:	**10**
Y			D	Prereq 1	Water Use Reduction—20% Reduction	
4			D	Credit 1	Water Efficient Landscaping	2 to 4
		2	D	Credit 2	Innovative Wastewater Technologies	2
2			D	Credit 3	Water Use Reduction	2 to 4
15	2	18		**Energy and Atmosphere**	Possible Points:	**35**
Y			C	Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			D	Prereq 2	Minimum Energy Performance	
Y			D	Prereq 3	Fundamental Refrigerant Management	
8		11	D	Credit 1	Optimize Energy Performance (26% Level)	1 to 19
		7	D	Credit 2	On-Site Renewable Energy	1 to 7
2			C	Credit 3	Enhanced Commissioning	2
2			D	Credit 4	Enhanced Refrigerant Management	2
3			C	Credit 5	Measurement and Verification	3
	2		C	Credit 6	Green Power	2
7		7		**Materials and Resources**	Possible Points:	**14**
Y			D	Prereq 1	Storage and Collection of Recyclables	
		3	D	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	D	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			C	Credit 2	Construction Waste Management	1 to 2
		2	C	Credit 3	Materials Reuse	1 to 2

Y	N	?				
2			C	Credit 4	Recycled Content	1 to 2
2			C	Credit 5	Regional Materials	1 to 2
		1	C	Credit 6	Rapidly Renewable Materials	1
1			C	Credit 7	Certified Wood	1

9		6		**Indoor Environmental Quality**	Possible Points:	**15**
Y			D	Prereq 1	Minimum Indoor Air Quality Performance	
Y			D	Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1			D	Credit 1	Outdoor Air Delivery Monitoring	1
		1	D	Credit 2	Increased Ventilation	1
1			C	Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			C	Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			C	Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			C	Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			C	Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			C	Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
		1	D	Credit 5	Indoor Chemical and Pollutant Source Control	1
		1	D	Credit 6.1	Controllability of Systems—Lighting	1
		1	D	Credit 6.2	Controllability of Systems—Thermal Comfort	1
1			D	Credit 7.1	Thermal Comfort—Design	1
1			D	Credit 7.2	Thermal Comfort—Verification	1
		1	D	Credit 8.1	Daylight and Views—Daylight	1
		1	D	Credit 8.2	Daylight and Views—Views	1
4	2			**Innovation and Design Process**	Possible Points:	**6**
1			D	Credit 1.1	Innovation in Design: Ex Perf: SSc6	1
1			C	Credit 1.2	Innovation in Design: Ex Perf: MRc7	1
1			D	Credit 1.3	Innovation in Design: Sustainability Education Program	1
	1		D/C	Credit 1.4	Innovation in Design: TBD	1
	1		D/C	Credit 1.5	Innovation in Design: TBD	1
1			D	Credit 2	LEED Accredited Professional	1
2		2		**Regional Priority Credits--**	Possible Points:	**4**
				NOTE: These are automatic and 'free' if referenced credits are earned		
1			D/C	Credit 1.1	Regional Priority: SSc6.2	1
1			D/C	Credit 1.2	Regional Priority: WEc1	1
		1	D/C	Credit 1.3	Regional Priority: Specific Credit	1
		1	D/C	Credit 1.4	Regional Priority: Specific Credit	1
53	4	51		**Total**	Possible Points:	**110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

C	Construction Phase Credits. These are Contractor's Primary responsibility
D	Design Phase Credits. These have been submitted & are 'anticipated' based on info in Bid Drawings & Specifications
DC	Design or Construction

Construction Waste Management Plan (EXAMPLE)

April, 2012

PROJECT INFORMATION

Joint Commissary and Navy Exchange
NSA Annapolis, Maryland

(General Contractor Name, General Contractor)

LEED WASTE MANAGEMENT REQUIREMENTS

The project has established a waste management goal that the demolition and construction of the building shall generate the least amount of demolition and construction waste as possible.

Of the waste that is generated, as much of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized, and at maximum will be no greater than **25%** of the total demolition and construction waste.

This includes administrative and procedural requirements for the following:

- Recycling nonhazardous demolition and construction waste
- Disposing of nonhazardous demolition and construction waste

WASTE MANAGEMENT PROGRAM

The Waste Management (WM) Program herein has been prepared to promote the coordination of ***the General Contractor(GC) and its Subcontractors (SUB)*** to demonstrate, execute, and divert waste debris from landfills during demolition and construction.

The GC supports the effort of diverting waste debris from landfills. Therefore, the GC will implement the following means and methods to ensure that the employ of landfills as a disposal site for any re-directable construction material is avoided, and the proper handling of recyclables is conducted.

Intent

Divert waste debris from landfill disposal. Redirect recyclable recovered resources back into the manufacturing process. Redirect reusable materials to the appropriate sites. Consider processing land-clearing debris into on-site mulch, but do not include land-clearing debris in the diversion calculation.

Objectives

Implement WM measures, resulting in a minimum of a **75%** end-of-project rate for the salvage/recycling of all non-hazardous materials. Calculations shall be made by either weight or volume, consistently applied throughout, of total waste generated from the demolition and construction site.

Requirements

Implement a plan to recycle or salvage the maximum amount of waste material that is economically feasible from the demolition and construction phases of the project. At minimum, divert the project goal percentage of total non-hazardous waste debris from landfills. Identify and quantify the diverted material

types, where calculations are executed to illustrate the diverted amounts of material. The following list of materials, at a minimum, will be recycled or salvaged:

- Asphaltic concrete paving
- Concrete
- Concrete Reinforcing
- Brick
- Concrete masonry units
- Wood joists and studs
- Plywood and oriented strand board
- Wood paneling
- Wood trim
- Structural and miscellaneous steel
- Rough hardware
- Roofing
- Insulation
- Doors and frames
- Door hardware
- Windows
- Glazing
- Metal studs
- Gypsum board
- Acoustical tile and panels
- Carpet
- Carpet pad

Calculations

The calculation below complies with the USGBC LEED rating system submittal requirements. A spreadsheet format will be used to track the amount of demolition/construction waste that is deposited in landfills and the amount of demolition/construction waste that is recycled or salvaged. The following equation will be used to determine the recycled percentage by either volume or weight, one of which must be chosen and used consistently across all measurements and calculations.

$$\text{Recycled Rate [\%]} = \frac{\text{Recycled Waste}}{\text{Recycled Waste + Trash}}$$

IMPLEMENTATION & ACTIONS

The site manager will be responsible for implementing, monitoring and reporting the status of the Waste Management Program. His responsibilities will include the following:

- General implementation of and compliance with the WM Program
- Informing all subcontractors of proper waste management procedures
- Distributing the waste management work plan to all subcontractors prior to beginning work
- Ensuring that subcontractors comply with the Waste Management Work Program

Action Items

- Conduct waste management operations to ensure minimum interface with streets and walks.
- Recycling Company will provide all waste containers and label them properly.
- All waste materials shall be separated by the responsible contractor.
- Containers shall be inspected for hazardous materials. If hazardous materials are found, they will be removed and disposed of properly.
- Waste materials stockpiled on the site will not be intermixed with other materials; and will be located away from the demolition/construction area and the drip line of remaining trees.
- Verify the recovery of all old refrigerants by a trained recovery technician. All work will be performed in accordance with the EPA regulation for refrigerant recovery.
- As waste containers become full of material, they will be removed from the site.
- Full containers will be removed from the site with measures to prevent spillage of materials.
- No burning of waste material will take place on the site.
- Construction office to collect recyclable paper, plastic, cans and bottles within the office.

- All materials – salvaged, donated or sold to individuals – will be documented by name and destination address.
- Waste hauler will provide a list of destination addresses where the recycled material and the landfilled material will be delivered.

Reports
Ongoing reports will be provided to verify progress toward the project goal percentage of diversion. The Waste Reduction Progress Reports will include the following information:

- Material category
- Total quantity of waste by either volume or weight, one of which is chosen and used consistently across all measurements and calculation
- Quantity of waste salvaged, estimated and actual
- Quantity of waste recycled, estimated and actual
- Total quantity of waste recovered
- Total quantity of waste recovered as a percentage of total waste

Submittal
The report will be submitted at the end or substantial completion of the project, with the following information:

- Waste reduction calculations showing the end-of-project rates for salvage, recycling, and disposal as a percentage of the total waste generated by the project.
- Copies of the records of all salvaged waste that was either donated or sold.
- Copies of the landfill and incinerator disposal records, which entail materials that were sent to landfills or for incineration.
- Copies of the recycling and processing records, which include materials sent for processing.
- Copies of refrigerant recovery records signed by refrigerant recovery technician.
- From the waste hauler, 1) a signed letter on company letterhead outlining the items included in the section ***Calculations*** listed above and 2) the list of destination addresses where the recycled material and the landfilled material was delivered.
- A final calculation spreadsheet showing the total amounts and % diverted from landfill.
- From the site manager, a signed copy of the Waste Management Program as outlined above, indicating compliance upon project completion.

QUALITY ASSURANCE

The General Contractor is committed to complying with the project's demolition and construction waste management requirements. To meet and exceed the project goal, our team will manage the pickup and processing of the project's demolition and construction waste materials.

Additional quality assurance measures will include conducting a waste management meeting with the subcontractors at the project site. The agenda for the meeting will involve reviewing responsibilities, documentation, procedures and the collection and transportation of materials.

CONSTRUCTION ISSUE

PROGRAM COMPLIANCE

Upon completion of the project, the site manager will sign the Waste Management Program to indicate compliance in the field.

I, _____ certify that this project has implemented a waste management program and has diverted _____ % of demolition and construction waste, excluding land-clearing debris, to uses other than landfills.

Signature: _____

Organization: _____

CONSTRUCTION ISSUE

Indoor Air Quality Management Plan (EXAMPLE)

April, 2012

PROJECT INFORMATION

Joint Commissary and Navy Exchange
NSA Annapolis, Maryland

(General Contractor Name, General Contractor)

PURPOSE

This Indoor Air Quality (IAQ) Program has been prepared to conduct and promote the coordination of The ***General Contractor Name (GC) and their Subcontractors (SUB)*** to demonstrate, execute, prevent and control indoor pollution during construction of the project.

The GC believes safety is priority on any project, both for those working within the building and those that are within the proximity of the construction project. Therefore, the GC will implement the following means and methods to prevent the spread of airborne dust and odors throughout the building and vicinity.

INTENT

The plan is intended to control and prevent the degradation of indoor air quality resulting from the construction process. These measures are taken in effort to sustain the comfort and well-being of construction workers, occupants in the vicinity of the construction site, and post-construction building occupants.

OBJECTIVE

Implement means and methods to protect the integrity of indoor air quality during construction by way of developing an efficient approach of protection for the following areas:

- HVAC Equipment and Systems
- Indoor Spaces
- Construction Teams and Building Occupants
- Building Materials

CONTROL MEASURES – DURING CONSTRUCTION

1.1 HVAC Protection

All HVAC equipment will be protected from collecting both dust and dirt prior to installation. Each of the systems will be evaluated to determine the ideal method to protect the systems from construction dust and odors. Specific methods will be implemented on the central filtration and the supply/return sides of the HVAC system.

1. ALL return and supply system openings will be sealed with plastic prior to installation and are to remain after installation. Damage compromising the seal of the plastic will be monitored and the plastic replaced immediately.
2. ALL equipment (including but not limited to HVAC equipment, kitchen equipment, etc) will be wrapped in plastic prior to installation and will be protected from dust and dirt after installation. Damaged plastic or protection materials will be replaced immediately.
3. No waste or construction materials will be stored in the Air Handling Rooms.

4. The diffusers and ducts will be inspected for visible construction debris before system startup.
5. HVAC systems will be inspected and dust/dirt build-up will be cleaned as necessary prior to start-up.
6. If air handlers must be used during construction, no matter the loading, filtration media having a Minimum Efficiency Reporting Value (MERV) of 8 will be installed in the equipment and at each return grill as determined by ASHRAE 52.2-1999.
    a. The filters will be frequently inspected and replaced as needed.
7. If a building flush-out will be performed, immediately prior to flush-out it is to be ensured that only new, unused filtration media is installed at all filter locations with a minimum MERV 8 rating.
8. Replace all filtration media immediately prior to occupancy, installing only a single set of final filtration media.

1.2 Source Control

The following measures will be adopted to prevent and control the spread of VOCs throughout the project.

1. The SUB shall be informed of the architect's intent regarding VOC limits, per the plans and specifications.
2. Products containing VOCs shall be monitored, including but not limited to the following product categories:

    - Adhesives, Sealants, Sealant Primers, Tile Setting Adhesives, Grout – Interior, On-site applied only
    - Clear Wood Finishes, Floor Coatings, Stains, Primers, Sealers, Shellacs – Interior, On-site applied only
    - Paints and Coatings
    - Housekeeping products and cleaning products
    - Composite wood materials
    - Flooring materials (carpet, VCT, etc.)
    - Wall coverings

3. Restrict idling of motor vehicles where the emissions could be drawn into the building.
4. When motors and other equipment are not in use, they are to be cycled off.
5. Inform the subcontractor that open containers of adhesives, paints, caulk, etc. should be sealed when not in use to prevent possible spills, and/or unnecessary VOC emissions around absorptive materials.
6. Construction vehicles or tools that use any fuel source other than electricity, such as gasoline, will be prohibited from use within the building once the building is closed in.
7. All smoking is strictly prohibited on the construction site to prevent absorption into materials.

1.3 Pathway Interruption

The following measures will be implemented to isolate work areas to avoid contamination of clean or occupied spaces.

1. During construction, isolate work areas and materials to prevent cross contamination of clean and occupied spaces and materials.
2. As required, erect temporary barriers between work areas and non-work areas.
3. Areas with contaminated air will be ventilated with 100% outside air and exhausted directly to the exterior during installation of VOC-emitting materials.
4. If HVAC systems are operational during construction, temporary barriers and pressure differentials will be maintained to prevent cross contamination of clean and occupied spaces.

5. Identify and mark the major indoor construction walkways and pathways for the project.
6. As needed and required the work area will be depressurized, creating an air pressure differential between construction areas and clean areas in order to contain dust and odors.

1.4 Housekeeping

The following housekeeping activities will be instituted during the construction phase.

1. In an effort to suppress dust and debris accumulation, all indoor work areas will be swept on a regular, weekly basis at minimum. If required, a wetting agent “Perfect Plus” shall be applied to reduce airborne contaminants.
2. All material spills will be removed and the surface cleaned with proper spot removers or cleaning agents as soon as possible.
3. When possible, low odor cleaning supplies will be used.
4. All indoor accumulated water will be removed daily to prevent mold.
5. All indoor finishing materials and porous materials will be protected from weather and moisture and will be stored in a clean area prior to installation.
6. All HVAC coils, air filters and fans will be cleaned before performing test and balancing procedures.
7. All absorbent materials such as drywall and insulation will be stored inside the building on skids.
8. If any absorbent material gets wet, it will be replaced.

1.5 Scheduling

The construction schedule will be sequenced to reduce absorption of VOCs by porous materials.

1. Sequence the construction schedule to include proper VOC control during the installation of materials, ensuring that high VOC emitting materials have proper drying and ventilation time before installation of porous products, such as ceiling tiles and carpet.
2. Porous materials directly exposed to moisture through precipitation, plumbing leaks or condensation will be replaced.
3. All VOC emitting materials and installation areas will be provided proper drying and ventilation time.
4. Delivery, storage and installation of materials will be scheduled to reduce cross product contamination.

1.6 Building Flush Out

A building flush-out will be implemented after the punch list is complete and prior to occupancy. The flush-out will encompass the following items:

1. After construction ends, prior to occupancy and with all interior finishes installed and punch list complete, perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent. OR
2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft of outside air has been delivered to the space.
3. The HVAC filtration media will be replaced prior to the beginning of the flush-out period and again prior to occupancy.
4. The filtration media will have a Minimum Efficiency Reporting Value (MERV) of 8.

CONSTRUCTION ISSUE

VERIFICATION AND REPORTING

The General Contractor is committed to complying with the project's Indoor Air Quality requirements. To meet the project goals, our team will execute the following:

1. Meet with each subcontractor to review the Indoor Air Quality Program.
2. Provide a total minimum of 18 date-stamped photographs. Photographs to be taken on a minimum of three separate occasions, spaced equally over the IAQ Program duration, and submitted in a timely manner for review. Photographs will document the execution of each IAQ management strategy outlined in this program during the construction process.
3. If permanently installed air handlers are used during construction, provide a cut sheet for each type of filtration media installed in the equipment and at each return air grille. The product sheets will have the following information: Manufacturer, Model Number, Filter Type and MERV value.
4. Provide a cut sheet for each type of filtration media installed prior to occupancy. The product sheets will have the following information: Manufacturer, Model Number, Filter Type and MERV value.

PROGRAM COMPLIANCE

Upon completion of the project, the site manager will sign the Construction IAQ Management Program to indicate field compliance.

I, _____ declare that an Indoor Air Quality (IAQ) Management Program has been developed and implemented for the construction and pre-occupancy phase of the project.

Signature: _____

Organization: _____

Indoor Air Quality Management Log (EXAMPLE)

Date	Installed / Removed	Inspected	Repaired	Photo -- REQUIRED	Description / Comments	HVAC Protection	Source Control	Pathway Interruption	Housekeeping	Scheduling	Other (Describe)

CONSTRUCTION ISSUE

SECTION 01140

WORK RESTRICTIONS

PREFACE

The following Attachment is included at the end of this Section:

1. Form I-9, Employment Eligibility Verification

PART 1 - GENERAL

1.1 GENERAL

1.1.1. Section Includes:

1.1.1.1. Contractor Use of Premises.

1.1.1.2. Occupancy Requirements.

1.1.1.3. Government Furnished, Contractor Installed Products.

1.1.1.4. Government Furnished, Government Installed Products.

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.2.2. Specific Reference:

1.2.2.1. Division 1 Section "Coordination".

1.2.2.2. Division 1 Section "Mechanical, Refrigeration, Food Service Equipment, And Electrical Coordination".

1.2.2.3. Division 1 Section "Critical Path Method Schedule".

1.2.2.4. Division 1 Section "Quality Control".

1.2.2.5. Division 1 Section "Mobilization and Temporary Controls".

1.2.2.6. Division 1 Section "Environmental Protection".

1.2.2.7. Division 1 Section "Contract Closeout".

1.3 CONTRACTOR ACCESS AND USE OF PREMISES

1.3.1. Activity Regulations: Ensure that Contractor personal employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. Wear hard hats in designated areas. Do not enter any restricted areas unless

required to do so and until cleared for such entry. The Contractor's equipment shall be conspicuously marked for identification.

1.3.1.1. Subcontractors and Personnel Contracts: Furnish a list of contract personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.3.1.2. Identification Badges: Identification badges, if required, will be furnished without charge. Application for and use of badges will be as directed. Furnish a completed EMPLOYMENT ELIGIBILITY VERIFICATION (DHS FORM I-9) form for all personnel requesting badges. This form is available at http.//www.uscis.gov/files/form/I-9_IFR_02-02-09.pdf. Immediately report instances of lost or stolen badges to the Contracting Officer.

1.3.1.3. No Smoking Policy: Smoking is prohibited within and outside of all buildings on installations under the cognizance of NAVFAC except in designated smoking areas. This applies to existing buildings, buildings under construction and buildings under renovation. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines. The Contracting Officer will identify designated smoking areas.

1.3.2. Working Hours: Regular working hours shall consist of an 8-1/2 –hour period established by the Contracting Officer, between 7 a.m. and 3:30 p.m., Monday through Friday, and 7 a.m. to 11 p.m. on Saturday, excluding Government holidays.

1.3.3. Work Outside Regular Hours: Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Contracting Officer. Make utility cutovers after normal working hours or on Saturdays, Sundays, and Government holidays unless directed otherwise.

1.3.4. Exclusionary Period: There are no exclusionary periods applicable to this project.

1.3.5. Utility Cutovers and Interruptions:

a. Make utility cutovers and interruptions after normal working hours or on Saturday, Sundays, and Government holidays. Conform to procedures required in the paragraph "Work Outside Regular Hours".
b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.
c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, and compressed air shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours". There is no limitation on the interruption time for utility cutovers, but utility outages require approval by the PWD Utilities Branch and may require standby utility service depending on the utility and the length of the outage.
d. Operation of Station Utilities: The Contractor shall not operate nor disturb the setting of control devices in the station utilities system, including water, sewer, electrical, and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer giving reasonable advance notice when such operation is required.

1.3.6. Personnel List: Submit for approval, at least 15 days prior to the desired date of entry, an original alphabetical list of personnel who require entry into Government property to perform work on the project. Furnish for each person:

a. Name.
b. Date and place of birth.
c. Citizenship.
d. Home address.

e. Social security number.
f. Current pass expiration date.
g. Naturalization or Alien Registration number.
h. Passport number, place of issue, and expiration date.

The request for personnel passes shall be accompanied with the following certification:

"I hereby certify that all personnel on this list are either born U.S. citizens, naturalized U.S. citizens with the naturalization number shown, or legal aliens with the alien registration number indicated."

Signature/Firm Name

1.3.6.1. Citizenship Requirements: Contractors must fill in the form in Division 1 Section "Form I-9, Employment Eligibility Verification" in order to obtain a contractor ID. This applies to aliens as well.

1.3.6.2. Documents Acceptable for Proof of Citizenship:

a. Birth registration card.
b. Certificate of live birth, birth certificate.
c. Certificate of naturalization.
d. Certificate of registration.
e. DD-214 (Must Cite Birthplace).
f. DD Form 4 (Contract for Enlistment and Must Cite Birthplace).
g. DD 1966 (Application for Enlistment).
h. Military discharge papers (must cite birthplace).
i. Delayed birth certificate.
j. Hospital birth certificate.
k. Marriage license certificate.
l. Merchant marine certificate.
m. Military officer ID card.
n. Notification of birth registration.
o. USA passport.

1.3.7. Vehicle List: Submit an original list of vehicles to be utilized at the work site with the following information for each vehicle:

a. Make.
b. Year.
c. Model.
d. License number.
e. Registered owner.

1.3.8. Passes: Submit request for personnel and vehicle passes together. Include the Certificate of Insurance for Contractor and Subcontractor(s) and the Statement of Acknowledgement Form SF 1413 with the submittal. Passes will normally be issued within 21 days.

1.3.8.1. Control: Maintain strict accountability over passes. Immediately report to the source of issue, passes missing or lost and the circumstances. If the Contractor has another active contract or one commencing immediately, employees' names may be transferred from one contract to the other. Final payment will not be effected until employees are transferred to another contract or the records are cleared. Furnish a signed letter, countersigned by the source of issue, stating that passes have been turned in.

1.3.9. Use of the Site: Limit use of the premises to work in areas indicated in the contract documents. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the indicated work areas. Utilize the lay down area identified in the contract drawings for all materials and supplies.

1.3.10. Driveways and Entrances: Unless otherwise indicated, keep driveways and entrances serving the premises clear and available to the government, government employees, store patrons, truck traffic, and emergency vehicles at all times. Do not use these areas for parking or storage of material. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

1.3.11. Do not unreasonably encumber site with materials or equipment.

1.3.12. Assume full responsibility for protection and safekeeping of material, equipment, and products stored on premises.

1.3.13. Keep temporary office yard and material storage (staging) areas arranged in orderly manner, clean and mowed. Repair areas damaged during construction operations.

1.3.14. Provide temporary chain link fence enclosure (gated and locked) around material storage area as indicated and as specified in Section 01500. The temporary construction fence remains in place until final acceptance of the project. Provide temporary barriers around site work areas to keep pedestrians out of the construction areas.

1.3.15. Obtain and pay for use of additional storage or work areas as needed for contractor operations.

1.3.16. Provide signage and physical barriers to control, direct, and maintain vehicular and pedestrian traffic during the construction process.

1.4 OCCUPANCY REQUIREMENTS – NEW STORES

1.4.1. Partial Government Occupancy: The government reserves the right to occupy and to place and install equipment in areas of the facility under construction prior to construction completion, provided such occupancy does not interfere with completion of the work.

1.5 GOVERNMENT-FURNISHED, CONTRACTOR INSTALLED PRODUCTS

1.5.1. The government will furnish items indicated on the drawings as Government-Furnished, Contractor Installed (GFCI). The Contractor's work includes providing support systems (including mechanical and electrical connections) for the government's equipment.

1.5.1.1. The government will provide necessary manufacturer's product data to the contractor, upon request.

1.5.1.2. The government will arrange for delivery of Government-Furnished items.

1.5.1.3. Identify delivery dates of Government-Furnished items in the Contractor's Construction Schedule per Section 01310.

a. Notify the Government one-month prior to any delay affecting the delivery date of Government-Furnished items. Notify the Government two months prior to any acceleration affecting the delivery date of Government-Furnished items. After providing the Government with the initial delivery dates, and to which the Government agrees, the Government will attempt to meet, but is not obligated to change the delivery dates as requested by the Contractor.

1.5.1.4. Review shop drawings, product data, and samples and return them to the Contracting Officer noting discrepancies or problems anticipated in the use of the product.

1.5.2. Protect Government-Furnished items from damage, including damage from exposure to the elements to include rain, heat and/or cold. Repair or replace, as determined by the Contracting Officer, items damaged as a result of construction operations.

1.6 GOVERNMENT-FURNISHED, GOVERNMENT INSTALLED PRODUCTS

1.6.1. The government will furnish and install items indicated on the drawings as Government-Furnished, Government Installed (GFGI). Unless otherwise indicated, GFGI operations will occur simultaneously with work under this Contract. The Contractor's work includes preparation of areas and providing support systems, as indicated, to receive GFGI equipment.

1.6.1.1. The government will provide necessary manufacturer's product data to the contractor, upon request.

1.6.1.2. The government will arrange for delivery of GFGI items.

1.6.1.3. Identify delivery dates of GFGI items in the Contractor's Construction Schedule per Division 1 Section "Critical Path Method Schedule.

a. Notify the Government one-month prior to any delay affecting the delivery date of Government-Furnished items. Notify the Government two months prior to any acceleration affecting the delivery date of Government-Furnished items. After providing the Government with the initial delivery dates, and to which the Government agrees, the Government will attempt to meet, but is not obligated to change the delivery dates as requested by the Contractor.

1.6.1.4. Prior to installation of GFGI items or contract close-out, examine areas that are to receive GFGI items with the Government Installer.

1.6.1.5. Protect GFGI items from damage, including damage from exposure to the elements to include rain, heat and/or cold. Repair or replace, as determined by the Contracting Officer, items damaged as a result of construction operations. All GFGI equipment shall be stored in a storage enclosure or trailer in accordance with Division 1 Section "Mobilization and Temporary Controls".

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01140

FORM I-9, EMPLOYMENT ELIGIBILITY VERIFICATION

OMB No. 1615-0047; Expires 06/30/09

Department of Homeland Security
U.S. Citizenship and Immigration Services

Form I-9, Employment Eligibility Verification

Instructions

Please read all instructions carefully before completing this form.

Anti-Discrimination Notice. It is illegal to discriminate against any individual (other than an alien not authorized to work in the U.S.) in hiring, discharging, or recruiting or referring for a fee because of that individual's national origin or citizenship status. It is illegal to discriminate against work eligible individuals. Employers **CANNOT** specify which document(s) they will accept from an employee. The refusal to hire an individual because the documents presented have a future expiration date may also constitute illegal discrimination.

What Is the Purpose of This Form?

The purpose of this form is to document that each new employee (both citizen and non-citizen) hired after November 6, 1986 is authorized to work in the United States.

When Should the Form I-9 Be Used?

All employees, citizens and noncitizens, hired after November 6, 1986 and working in the United States must complete a Form I-9.

Filling Out the Form I-9

Section 1, Employee: This part of the form must be completed at the time of hire, which is the actual beginning of employment. Providing the Social Security number is voluntary, except for employees hired by employers participating in the USCIS Electronic Employment Eligibility Verification Program (E-Verify). **The employer is responsible for ensuring that Section 1 is timely and properly completed.**

Preparer/Translator Certification. The Preparer/Translator Certification must be completed if **Section 1** is prepared by a person other than the employee. A preparer/translator may be used only when the employee is unable to complete **Section 1** on his/her own. However, the employee must still sign **Section 1** personally.

Section 2, Employer: For the purpose of completing this form, the term "employer" means all employers including those recruiters and referrers for a fee who are agricultural associations, agricultural employers or farm labor contractors.

Employers must complete **Section 2** by examining evidence of identity and employment eligibility within three (3) business days of the date employment begins. If employees are authorized to work, but are unable to present the required document(s) within three business days, they must present a receipt for the application of the document(s) within three business days and the actual document(s) within ninety (90) days. However, if employers hire individuals for a duration of less than three business days, **Section 2** must be completed at the time employment begins. **Employers must record:**

1. Document title;
2. Issuing authority;
3. Document number;
4. Expiration date, if any; and
5. The date employment begins.

Employers must sign and date the certification. Employees must present original documents. Employers may, but are not required to, photocopy the document(s) presented. These photocopies may only be used for the verification process and must be retained with the Form I-9. **However, employers are still responsible for completing and retaining the Form I-9.**

Section 3, Updating and Reverification: Employers must complete **Section 3** when updating and/or reverifying the Form I-9. Employers must reverify employment eligibility of their employees on or before the expiration date recorded in **Section 1**. Employers **CANNOT** specify which document(s) they will accept from an employee.

A. If an employee's name has changed at the time this form is being updated/reverified, complete Block A.

B. If an employee is rehired within three (3) years of the date this form was originally completed and the employee is still eligible to be employed on the same basis as previously indicated on this form (updating), complete Block B and the signature block.

C. If an employee is rehired within three (3) years of the date this form was originally completed and the employee's work authorization has expired **or** if a current employee's work authorization is about to expire (reverification), complete Block B and:

1. Examine any document that reflects that the employee is authorized to work in the U.S. (see List A **or** C);
2. Record the document title, document number and expiration date (if any) in Block C, and
3. Complete the signature block.

What Is the Filing Fee?

There is no associated filing fee for completing the Form I-9. This form is not filed with USCIS or any government agency. The Form I-9 must be retained by the employer and made available for inspection by U.S. Government officials as specified in the Privacy Act Notice below.

USCIS Forms and Information

To order USCIS forms, call our toll-free number at **1-800-870-3676**. Individuals can also get USCIS forms and information on immigration laws, regulations and procedures by telephoning our National Customer Service Center at **1-800-375-5283** or visiting our internet website at **www.uscis.gov**.

Photocopying and Retaining the Form I-9

A blank Form I-9 may be reproduced, provided both sides are copied. The Instructions must be available to all employees completing this form. Employers must retain completed Forms I-9 for three (3) years after the date of hire or one (1) year after the date employment ends, whichever is later.

The Form I-9 may be signed and retained electronically, as authorized in Department of Homeland Security regulations at 8 CFR § 274a.2.

Privacy Act Notice

The authority for collecting this information is the Immigration Reform and Control Act of 1986, Pub. L. 99-603 (8 USC 1324a).

This information is for employers to verify the eligibility of individuals for employment to preclude the unlawful hiring, or recruiting or referring for a fee, of aliens who are not authorized to work in the United States.

This information will be used by employers as a record of their basis for determining eligibility of an employee to work in the United States. The form will be kept by the employer and made available for inspection by officials of U.S. Immigration and Customs Enforcement, Department of Labor and Office of Special Counsel for Immigration Related Unfair Employment Practices.

Submission of the information required in this form is voluntary. However, an individual may not begin employment unless this form is completed, since employers are subject to civil or criminal penalties if they do not comply with the Immigration Reform and Control Act of 1986.

Paperwork Reduction Act

We try to create forms and instructions that are accurate, can be easily understood and which impose the least possible burden on you to provide us with information. Often this is difficult because some immigration laws are very complex. Accordingly, the reporting burden for this collection of information is computed as follows: **1)** learning about this form, and completing the form, 9 minutes; **2)** assembling and filing (recordkeeping) the form, 3 minutes, for an average of 12 minutes per response. If you have comments regarding the accuracy of this burden estimate, or suggestions for making this form simpler, you can write to: U.S. Citizenship and Immigration Services, Regulatory Management Division, 111 Massachusetts Avenue, N.W., 3rd Floor, Suite 3008, Washington, DC 20529. OMB No. 1615-0047.

OMB No. 1615-0047; Expires 06/30/09

Department of Homeland Security
U.S. Citizenship and Immigration Services

Form I-9, Employment Eligibility Verification

Please read instructions carefully before completing this form. The instructions must be available during completion of this form.

ANTI-DISCRIMINATION NOTICE: It is illegal to discriminate against work eligible individuals. Employers CANNOT specify which document(s) they will accept from an employee. The refusal to hire an individual because the documents have a future expiration date may also constitute illegal discrimination.

Section 1. Employee Information and Verification. To be completed and signed by employee at the time employment begins.

Print Name: Last	First	Middle Initial	Maiden Name
Address *(Street Name and Number)*		Apt. #	Date of Birth *(month/day/year)*
City	State	Zip Code	Social Security #

I am aware that federal law provides for imprisonment and/or fines for false statements or use of false documents in connection with the completion of this form.

I attest, under penalty of perjury, that I am (check one of the following):

☐ A citizen or national of the United States
☐ A lawful permanent resident (Alien #) A _____
☐ An alien authorized to work until _____
(Alien # or Admission #) _____

Employee's Signature	Date *(month/day/year)*

Preparer and/or Translator Certification. *(To be completed and signed if Section 1 is prepared by a person other than the employee.) I attest, under penalty of perjury, that I have assisted in the completion of this form and that to the best of my knowledge the information is true and correct.*

Preparer's/Translator's Signature	Print Name
Address *(Street Name and Number, City, State, Zip Code)*	Date *(month/day/year)*

Section 2. Employer Review and Verification. To be completed and signed by employer. Examine one document from List A OR examine one document from List B and one from List C, as listed on the reverse of this form, and record the title, number and expiration date, if any, of the document(s).

	List A	OR	List B	AND	List C
Document title:					
Issuing authority:					
Document #:					
Expiration Date *(if any)*:					
Document #:					
Expiration Date *(if any)*:					

CERTIFICATION - I attest, under penalty of perjury, that I have examined the document(s) presented by the above-named employee, that the above-listed document(s) appear to be genuine and to relate to the employee named, that the employee began employment on *(month/day/year)* _____ **and that to the best of my knowledge the employee is eligible to work in the United States. (State employment agencies may omit the date the employee began employment.)**

Signature of Employer or Authorized Representative	Print Name	Title
Business or Organization Name and Address *(Street Name and Number, City, State, Zip Code)*		Date *(month/day/year)*

Section 3. Updating and Reverification. To be completed and signed by employer.

A. New Name *(if applicable)*	B. Date of Rehire *(month/day/year) (if applicable)*

C. If employee's previous grant of work authorization has expired, provide the information below for the document that establishes current employment eligibility.

Document Title: _____ Document #: _____ Expiration Date (if any): _____

I attest, under penalty of perjury, that to the best of my knowledge, this employee is eligible to work in the United States, and if the employee presented document(s), the document(s) I have examined appear to be genuine and to relate to the individual.

Signature of Employer or Authorized Representative	Date *(month/day/year)*

LISTS OF ACCEPTABLE DOCUMENTS

LIST A Documents that Establish Both Identity and Employment Eligibility	OR	LIST B Documents that Establish Identity	AND	LIST C Documents that Establish Employment Eligibility
1. U.S. Passport (unexpired or expired)		**1.** Driver's license or ID card issued by a state or outlying possession of the United States provided it contains a photograph or information such as name, date of birth, gender, height, eye color and address		**1.** U.S. Social Security card issued by the Social Security Administration *(other than a card stating it is not valid for employment)*
2. Permanent Resident Card or Alien Registration Receipt Card (Form I-551)		**2.** ID card issued by federal, state or local government agencies or entities, provided it contains a photograph or information such as name, date of birth, gender, height, eye color and address		**2.** Certification of Birth Abroad issued by the Department of State *(Form FS-545 or Form DS-1350)*
3. An unexpired foreign passport with a temporary I-551 stamp		**3.** School ID card with a photograph		**3.** Original or certified copy of a birth certificate issued by a state, county, municipal authority or outlying possession of the United States bearing an official seal
4. An unexpired Employment Authorization Document that contains a photograph (Form I-766, I-688, I-688A, I-688B)		**4.** Voter's registration card		**4.** Native American tribal document
		5. U.S. Military card or draft record		**5.** U.S. Citizen ID Card *(Form I-197)*
5. An unexpired foreign passport with an unexpired Arrival-Departure Record, Form I-94, bearing the same name as the passport and containing an endorsement of the alien's nonimmigrant status, if that status authorizes the alien to work for the employer		**6.** Military dependent's ID card		**6.** ID Card for use of Resident Citizen in the United States *(Form I-179)*
		7. U.S. Coast Guard Merchant Mariner Card		
		8. Native American tribal document		**7.** Unexpired employment authorization document issued by DHS *(other than those listed under List A)*
		9. Driver's license issued by a Canadian government authority		
		For persons under age 18 who are unable to present a document listed above:		
		10. School record or report card		
		11. Clinic, doctor or hospital record		
		12. Day-care or nursery school record		

Illustrations of many of these documents appear in Part 8 of the Handbook for Employers (M-274)

CONSTRUCTION ISSUE

SECTION 01300

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL

1.1.1. Section Includes:

1.1.1.1. Project Coordination

1.1.1.2. Submittal Procedures

1.1.1.3. Shop Drawings

1.1.1.4. Product Data

1.1.1.5. Quality Assurance Submittals

1.1.1.6. Samples

1.1.1.7. Substitutions

1.1.1.8. Requests For Information Procedures

1.1.1.9. Project Register

1.1.1.10. Contractor Production Report

1.1.1.11. Record Photographs

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.2.2. Specific Reference:

1.2.2.1. Division 1 Section “Notice to Proceed”

1.2.2.2. Division 1 Section “Fiscal Matters and Related Data”

1.2.2.3. Division 1 Section “Mechanical, Refrigeration, Food Service Equipment, and Electrical Coordination”

1.2.2.4. Division 1 Section “Sustainable Design Requirements”

1.2.2.5. Division 1 Section “Critical Path Method Schedule”

1.2.2.6. Division 1 Section “Information Management”

1.2.2.7. Division 1 Section “Quality Control”

1.2.2.8. Division 1 Section “Mobilization and Temporary Controls”

1.2.2.9. Division 1 Section “Environmental Protection”

1.2.2.10. Division 1 Section “Contract Closeout”

1.2.2.11. Division 1 Section “Commissioning Requirements”

1.2.2.12. Division 15 Section” Commissioning Mechanical Systems”

1.2.2.13. Division 16 Section “Commissioning Electrical Systems”

1.3 SUBMITTALS

1.3.1. Submittal Schedule:

1.3.1.1. Provide the indicated quantity. Note that the Government will retain three copies and the pdf file.

1.3.2. Submittal action by reviewer:

1.3.2.1. Action Submittals: Written and graphic information and physical samples that require Contracting Officer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as follows:

a. R: Review each submittal, mark to indicate action taken, and return.

1.3.2.2. Informational Submittals: Written and graphic information and physical samples that do not require Contracting Officer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as follows:

a. I: Submittal is for information or record purposes only. No action will occur.

1.3.3. Submittal requirements for this section are as follows:

Action	**Reference Para.**	**Submittal**
R	1.10	Substitutions
I	1.11	Requests for Information
R	1.12	Project Meeting Minutes
R	1.13	Project Register
R	1.14	Contractor Production Report
R	1.14.4	Record Photographs

1.4 PROJECT COORDINATION

1.4.1. Comply with the Government’s procedures for intra-project communications; submittals, report and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

1.5 SUBMITTAL PROCEDURES

1.5.1. Definitions.

1.5.1.1. Field samples are full size physical examples erected on site to illustrate finishes, coatings, or finish materials. Field samples will establish the standard by which the Contracting Officer will judge the work.

1.5.1.2. Delegated-Design

a. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

(1) If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Contracting Officer.

b. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

(1) Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.5.2. Send all material submittals for review to the Contracting Officer or his designated representative.

1.5.3. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
b. Coordinate transmittal of different types of submittals for related elements of work so processing does not delay by the need to review submittals concurrently for coordination.

(1) The reviewer reserves the right to withhold action on a submittal requiring coordination with other submittals until receipt of all related submittals.
(2) Review of separate items does not constitute review of an assembly in which items function.

c. Processing: To avoid the need to delay installation as a result of the time required to process submittals:

(1) Allow 21 calendar days for initial review. Allow additional time if the reviewer must delay processing to permit coordination with subsequent submittals.
(2) If an intermediate submittal is necessary, process the same as the initial submittal.
(3) Allow 14 calendar days for reprocessing each submittal.
(4) Contracting Officer will not extend contract time because of failure to transmit submittals to the reviewer sufficiently in advance of the work to permit processing.

1.5.4. Provide the following types of submittals to the Government's Designated Inspector:

1.5.4.1. Requests for interpretation

1.5.4.2. Requests for substitution

1.5.4.3. Shop drawings, product data, and samples

1.5.4.4. Test and inspection reports

1.5.4.5. Design data

1.5.4.6. Manufacturer's instructions and field reports

1.5.4.7. Applications for payment and change order requests

1.5.4.8. Progress schedules (Print and electronic)

1.5.4.9. Coordination drawings

1.5.4.10. Closeout submittals

1.5.4.11. Operations and Maintenance Manuals

1.5.4.12. Submittal Schedules

1.5.4.13. Submittal Registers

1.5.4.14. Record Photographs

1.5.4.15. Submittals for Authorities in Jurisdiction

1.5.4.16. SOVs

1.5.4.17. AF3052 (Modifications)

1.5.4.18. Sustainable Design submittals

1.5.5. Quantity of Submittals: Unless otherwise noted, provide four originals and 1 PDF version. The Government will retain three copies and the pdf. To obtain additional reviewed sets, submit additional sets over these requirements. The pdf file is not required for physical samples.

1.5.6. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1.5.6.1. Provide a space approximately 4 by 5 inches on the label or beside the title block on shop drawings to record the contractor's review and approval markings and the action taken.

a. Include the following information on the label for processing and recording action taken.
b. Project name.
c. Date.
d. Name and address of the reviewer.
e. Name and address of the contractor.
f. Name and address of the subcontractor.
g. Name and address of the supplier.
h. Name of the manufacturer.
i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.

1.5.7. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the contractor to the reviewer using the Government transmittal form. The reviewer will not accept submittals received from sources other than the contractor.

a. On the transmittal, record relevant information and requests for data. Comply with paragraphs entitled "Substitutions", for deviations from contract document requirements, including variations and limitations. Include contractor's certification that information complies with contract documents requirements.
b. Transmittal Form: Use Government Form Number AF 3000, "Material Approval Submittal".

1.5.8. Submittal Information. Include the following information on submittals, as applicable:

a. Room names and numbers in which Contractor will install equipment.

b. Identification of product or material:

(1) Use identifying symbols indicated on contract documents.
(2) Indicate salient features and other information necessary for complete equipment identification.
(3) Clearly identify model submitted where catalog cuts show more than one model of a product.
(4) Submit capacity and performance data in same form, units, and completeness given in contract documents.

c. Relation to adjacent structure or material and clearances required.
d. Field dimensions, clearly identified.
e. Applicable standards, such as ASTM, ANSI, Federal Specifications

1.5.9. Submittal Register and Schedule.

1.5.9.1. Develop two documents; a submittal schedule and a submittal register.

1.5.9.2. Coordinate submittals progress schedule with the Schedule required in Division 1 Section “Critical Path Method Schedule”.

1.5.9.3. Prepare the schedule in chronological order and the register in specification order. On each, provide the following information for each required submittal.

a. Scheduled date for the first submittal.
b. Specification Section number.
c. Related Section numbers.
d. Submittal category (shop drawings, product data, samples, certificates, or other).
e. Description of the part of the work covered.
f. Scheduled date for submission or resubmission.
g. Scheduled date for the reviewer's final release or approval.

1.5.9.4. Distribution: Following response to the initial submittal, print and distribute copies to the reviewer, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the project meeting room and field office.

a. When Contractor makes revisions, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the work.

1.6 SHOP DRAWINGS

1.6.1.1. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the contract documents. Do not reproduce contract documents or copy standard information as the basis of shop drawings. Standard information prepared without specific references to the project is not a shop drawing.

1.6.1.2. Shop drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:

a. Dimensions.

b. Identification of products and materials included by sheet and detail number.
c. Compliance with specific standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurements.
f. Sheet size: Except for templates, patterns, and similar full-size drawings, submit shop drawings on sheets at least 8 ½ by 11 inches but no larger than 30 by 42 inches.
g. Submittal: Submit blue or black line prints for review.
h. Do not use shop drawings without an appropriate final stamp indicating action taken.
i. Do not submit shop drawings until Contractor confirms compliance with requirements of the contract documents.
j. Distribution: Furnish copies of final submittal to installer, subcontractors, suppliers, manufacturer, fabricators, and others required for performance of construction activities. Show distribution on transmittal form.

(1) Do not proceed with installation until a copy of the approved or approved as noted shop drawing is in the installer's possession.
(2) Do not permit use of unmarked copies of shop drawings for construction.

1.7 PRODUCT DATA

1.7.1.1. Collect product data into a single submittal for each element of construction or system. Product data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, rough-in diagrams, templates, standard wiring diagrams, and performance curves.

a. Mark each copy to show applicable choices and options. Where printed product data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:

(1) Manufacturer's printed recommendations.
(2) Compliance with trade association standards.
(3) Compliance with recognized testing agency standards.
(4) Application of testing agency labels and seals
(5) Notation of dimensions verified by field measurements.
(6) Notation of coordination requirements.

b. Do not submit product data until Contractor confirms compliance with requirements of the contract documents.
c. Distribution: Furnish copies of final submittal to installer, subcontractors, suppliers, manufacturer, fabricators, and others required for performance of construction activities. Show distribution on transmittal form.

(1) Do not proceed with installation until a copy of the approved product data is in the installer's possession.
(2) Do not permit use of unmarked copies of product data for construction.

1.7.1.2. Bind each group of manufacturer's data and catalog cuts in a heavy paper binder such as "Duo-tang" binder or an "Accopress" press board binder.

1.8 SAMPLES

1.8.1.1. Submit full-size fully fabricated samples cured and finished as specified and physically identified with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

a. Mount or display samples in the manner to facilitate review of qualities indicated. Prepare samples to match the reviewer's sample, if any. Include the following:

(1) Specification Section number and reference.
(2) Generic description of the sample.
(3) Sample source.
(4) Product name or name of the manufacturer.
(5) Compliance with recognized standards.
(6) Availability and delivery time.

b. Submit samples for review of size, kind, color, pattern, and texture. Submit samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

(1) Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variation.
(2) Refer to other specification sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operations, and similar construction characteristics.
(3) Refer to other Section for samples returned to the contractor for incorporation in the work. Such samples must be undamaged at the time of use. On the transmittal, indicate special requests regarding disposition of sample submittals.

(a) Samples not incorporated into the work, or otherwise designated as the Government's property, are the property of the contractor and contractor must remove from the site prior to project's final acceptance.

c. Preliminary Submittals: Submit a full set of choices where contractor submits samples for selection of color, pattern, texture, or similar characteristics from a range of standard choices.

(1) The reviewer will review and return preliminary submittals with the reviewer's notations, indicating selection and other action. Do not proceed with installation until a copy of the approved sample is in the installer's possession.

d. Maintain sets of samples, as returned, at the project site, for quality comparisons throughout construction.

(1) Unless Contracting Officer observes noncompliance with contract documents provisions, the submittal may serve as the final submittal.
(2) Contractor may use sample sets to obtain final acceptance of the construction associated with each set.

1.8.1.2. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the work. Show distribution on transmittal forms.

a. Field samples are full size examples erected on site to illustrate finishes, coatings, or finish materials, and to establish the project standard.

(1) Process transmittal forms to provide a record of activity.

1.9 SUBMITTAL REVIEW

1.9.1. Government Reviewer's Action.

1.9.1.1. Review of submittal is to determine approval for general conformance with the design concept and contract documents. Reviewer's approval is not an approval of any deviation from the requirements of the contract documents. If the reviewer takes no exceptions or comments or marks on or attaches to the submittal, it does not relieve the contractor from compliance with the contract documents. It does not construe authorization of departures or a change. Only when the parties to the original contract agreement sign a written contract modification are changes in the contract documents made effective. If there is conflict between the contract documents and submittals, the contract documents govern. Contractor remains responsible for details and accuracy, for confirming and correlating quantities and dimensions, for selecting fabrication processes, for techniques of assembly, for coordination of work between trades, and for performing work safely.

1.9.1.2. Where reviewer requests submittals for information or record only, the reviewer will receive and file such submittals for its use. The reviewer will not necessarily take any action on such submittals unless in its judgment action is required. Reviewer not taking action does not imply in any way its approval of any submittal.

1.9.1.3. Except for submittals for the record or information, where contract documents require action and return, the reviewer will review each submittal, mark to indicate action taken, and return promptly.

a. Compliance with specified characteristics is the contractor's responsibility.

1.9.1.4. Action Stamp: The reviewer will stamp each submittal with a uniform action stamp. The reviewer will mark the stamp appropriately to indicate the action taken as follows:

a. Final Unrestricted Release: When the reviewer marks a submittal "Approved" the work covered by the submittal may proceed provided it complies with requirements of the contract documents.
b. Final-but-Restricted Release: When the reviewer marks a submittal "Approved as Noted," the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the contract documents.
c. Returned for Re-submittal: When the reviewer marks a submittal "Not approved, Revise and Resubmit," do not proceed with work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

(1) Do not use, or allow others to use, submittals marked "Not Approved, Revise and Resubmit" at the project site or elsewhere where work is in progress.

1.9.1.5. Unsolicited Submittals: The reviewer will return unsolicited submittals to the sender without action.

1.10 SUBSTITUTIONS

1.10.1. General

1.10.1.1. Definition: Substitutions -- Changes in contract-required products, materials, equipment, and methods of construction. Contracting Officer will consider substitutions proposed by the Contractor after award of the Contract. The Government does not consider the following requests for substitutions:

a. Revisions to the Contract Documents requested by the Contracting Officer.
b. Specified options of products and construction methods included in the Contract Documents.
c. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.10.2. Conditions.

1.10.2.1. The Contracting Officer will receive and consider the Contractor's request for substitution when Contractor satisfies a, b, and c of the following conditions and one or more of the items in d through k of the following conditions, as determined by the Contracting Officer. If the contractor does not satisfy these conditions, the Contracting Officer will return the request without action except to record noncompliance with these requirements.

a. The Contract Documents do not require extensive revisions.
b. Proposed changes are in keeping with the general intent of the Contract Documents.
c. The request is timely, fully documented, and properly submitted.
d. The contractor cannot provide the specified product or method of construction within the Contract Time. The Contracting Officer will not consider the request if the contractor cannot provide the product or method as a result of failure to pursue the Work promptly or coordinate activities properly.
e. The request directly relates to an "or-equal" clause or similar language in the contract documents.
f. The requested directly relates to a "product design standard" clause in the contract documents.
g. The requested substitution offers the Government's a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Government must assume. The Government's additional responsibilities may include compensation to the Architect-Engineer for redesign and evaluation services, increased cost of other construction by the Government, and similar considerations.
h. The specified product or method of construction cannot receive necessary approval by a governing authority, and the Contracting Officer can approve the requested substitution.
i. The Contractor cannot provide the specified product or method of construction in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
j. The Contractor cannot coordinate the specified product or method of construction with other materials and where the Contractor certifies they can coordinate the proposed substitution.
k. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.

1.10.2.2. The contractor's submittal and the Contracting Officer's acceptance of shop drawings. Shop drawings, product data or samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitutions, nor do they constitute approval.

1.10.3. Submittals.

1.10.3.1. Substitution Request Submittal: The Contracting Officer will consider requests for substitution if received within 60 days after commencement of the Work. Contracting Officer will reject requests received more than 60 days after commencement of the Work at his discretion.

a. Submit requests in submittal format and according to procedures required for contract modification proposals. Display in bold and in a conspicuous area the words "REQUEST FOR SUBSTITUTION."
b. Identify the replacement for the product or the fabrication or installation method in each request. Include related Specification Section and Drawing numbers.
c. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate.

(1) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Government and separate contractors, which will be necessary to accommodate the proposed substitution.
(2) A detailed comparison of significant qualities of the proposed substitution with those of the size, durability, and visual effect.
(3) Product data, including drawings and descriptions of products and fabrication and installation procedures.
(4) Samples, where applicable or requested.
(5) A statement indicating the substitution's effect on the Contractor's Construction Progress Management Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
(6) Cost information, including a proposal of the net change, if any in the Contract Sum.
(7) The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.

1.10.3.2. Contracting Officer's Action: If necessary, the Contracting Officer will request additional information or documentation for evaluation for a request for substitution. The Contracting Officer will notify of acceptance or rejection of the substitution within 20 calendar days after receipt, or 7 calendar days after receipt of additional information or documentation. Acceptance will be in the form of a change to the contract.

1.10.3.3. Use the product specified if the Contracting Officer cannot make a decision on the use of a proposed substitute within the time allocated.

1.11 REQUESTS FOR INFORMATION

1.11.1. General

1.11.1.1. Submit a Request For Information (RFI) when questions arise concerning interpretation, conflicts, omissions, errors, or regulatory violations within the contract documents.

1.11.2. Review

1.11.2.1. Review all RFIs prior to submission to the Government's Designated Inspector. The General Contractor is responsible to have a thorough and working knowledge of the entire contract documents and to review subcontractor's and in-house RFIs for legitimacy and reasonableness. Do not forward questions to the Government's Designated Inspector that are easily answerable from a cursory review of the contract documents.

1.11.2.2. Form a review committee composed of the general contractor's superintendent, quality control manager, and project manager.

a. When source of RFI is from the contractor's staff:

(1) Assign independent members (not the originator of the RFI) of the contractor's management team to review the question and contract documents for potential answers available within the documents.

b. When source of RFI is from subcontractor's or suppliers:

(1) Assign management members of the contractor's staff to review information requester's question and the entire contract documents for potential answers available within the documents.

1.11.2.3. For RFIs determined as reasonable and a change to the contract price or time is not involved, submit to the government using the transmittal processes described hereafter.

1.11.3. Transmittal

1.11.3.1. On the project website enter the following information:

a. Include brief synopsis.
b. State a precise question.
c. List the specification section.
d. List the drawing page number.
e. Suggest a recommendation(s) to solve the issue. Include:

(1) The specific [line item(s)] impact to the schedule.
(2) The impact to the contract (if any).
(3) A technical solution recommendation.

1.11.4. Response

1.11.4.1. Response time.

a. Allow 14 calendar days for government review of the RFI. The Government will respond to all RFI's on the project website only. The Contractor will be able to print out a hardcopy of the response from the website for its files.

1.11.4.2. If the response to the RFI does not involve a change to the contract, after receipt of the government response, proceed as if the answer to the RFI existed within the contract documents.

1.11.5. Changes To Contract

1.11.5.1. For RFIs where the government determines a change to the contract price or time is appropriate, officially close the RFI and refer thereafter as a pending modification. Comply with the modification requirements of Division 1 Section "Fiscal Matters and Related Data."

1.11.6. Refer to Division 1 Section "Information Management", for project website related requirements.

1.12PROJECT MEETINGS

1.12.1. Pre-Performance Conference

1.12.1.1. The government will schedule a Pre-performance conference before construction begins, at a time convenient to the Government and the contractor. The conference will be at or near the project site. The meeting will include the review of responsibilities and personnel assignments.

a. Attendees: Authorized representatives of the Government, Contracting Officer, and their consultants; the contractor (project manager, CQC, and his superintendent); major subcontractors; manufacturers; suppliers; and other concerned parties.
b. Agenda: Discuss items of significance that could affect progress, including the following:

(1) Preliminary construction schedule.
(2) Critical work sequencing/phasing.
(3) Designation of responsible personnel.
(4) Procedures for processing field decisions and changes to the contract.
(5) Procedures for processing applications for payments.
(6) Distribution of contract documents.
(7) Submittal of shop drawings, product data, and samples.
(8) Preparation of record documents.
(9) Use of the premises.
(10) Availability of parking.
(11) Office, work, and storage areas.
(12) Equipment deliveries and priorities.
(13) Security.
(14) Housekeeping.
(15) Working hours.
(16) Request for Information (RFI) process.
(17) Significant contractual terms and conditions.
(18) Adequacy of Temporary Storage of Government Furnished Equipment
(19) Other relevant matters

1.12.2. LEED Coordination Conference: Schedule and conduct a LEED coordination conference before starting construction, at a time convenient to Government's Designated Inspector.

1.12.2.1. Attendees: Authorized representatives of Government, Government's Designated Inspector, Commissioning Authority, Architect and Engineers of Record; Contractor and its superintendent and LEED coordinator; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

1.12.2.2. Agenda: Discuss items of significance that could affect meeting requirements for LEED Silver Certification, including the following:

a. LEED Project Checklist\
b. General Requirements for LEED-related procurement and documentation.
c. Project closeout requirements and LEED certification procedures.
d. Role of LEED coordinator.
e. Construction waste management.
f. Construction operations and LEED requirements and restrictions.

1.12.2.3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

1.12.3. Progress Meetings

1.12.3.1. Attendees: Provide representative(s) of entities concerned with the current progress, or involved in planning, coordination, or performance of future activities of the Work. In addition to the representative of the Contracting Officer, mandatory attendees include the contractor's staff Superintendent, CQC, and on-site Project

Manager (if so staffed)], every major subcontractor (as determined by the Government's Designated Inspector), and other Government representatives as deemed necessary by the Government (for example: Commissary Store Director, DPW Engineering Representative). Have all participants at these conferences familiar with the project and authorized to conclude matters relating to the work.

1.12.3.2. Agenda: Review and correct or approve minutes of previous progress meetings. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the project.

a. Review the present and future needs of each entity present, including the following:

(1) Interface requirements.
(2) Time.
(3) Sequences.
(4) Status of submittals.
(5) Deliveries.
(6) Off-site fabrication problems.
(7) Access.
(8) Site utilization.
(9) Temporary facilities and services.
(10) Hours of work.
(11) Hazards and risks.
(12) Housekeeping.
(13) Quality and work standards.
(14) Changes to the contract.
(15) Documentation of information for payment requests.
(16) Short Interval Schedule (SIS).
(17) Status of RFI's.
(18) Safety
(19) Other topics as required

1.12.3.3. Reporting: Provide minutes for the prior week's progress meeting prior to each new weekly meeting. No later than 3 days after each meeting, distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

1.12.4. Red Zone Meeting

1.12.4.1. An initial Red Zone meeting will be held to build a schedule of events necessary to achieve project and fiscal completion within 120 days of the project Beneficial Occupancy Date (BOD). The initial meeting identifies key project milestones, responsibilities, and target task completion dates. Particular attention must be given to the BOD and Grand Opening (or Re-Opening) dates. The initial Red Zone meeting is held approximately 60 days prior to BOD.

a. There are three objectives to the initial meeting:

(1) Representatives responsible for specific remaining tasks must be identified and be in attendance at the meeting.
(2) Representatives in attendance must be able to fully identify remaining work necessary to complete their portion of the scope.
(3) Representatives must commit to finishing the task they are responsible for by the agreed date.

1.12.4.2. The objective of each follow on weekly meeting is to discuss and record actual progress of each task. If a specific task appears to be slipping or occurs earlier than the completion date; means methods and

resources will be discussed, identified, and committed to maintain the Red Zone Schedule. The impact to related activities is determined and discussed. The entire team is notified of the potential impact to the remaining work.

1.12.4.3. ATTENDEES: At a minimum, the following attendees shall participate in the initial Red Zone Meeting.

a. NEXCOM Exchange representatives.
b. DeCA Project Manager: Chair of the Red Zone Meeting, Responsible for Design and Construction of the Project
c. DeCA Operations Monitor: Responsible for the operations activities related to the project.
d. DeCA Store Director: Responsible for Operational aspects of the Project
e. DeCA Zone Manager
f. DeCA Region Engineer
g. DeCA Communications
h. CARTS-DeCA POSM Personnel
i. DeCA Equipment Personnel
j. DeCA Contacting Branch / Contracting Officer: Authority for Construction Contract
k. Annapolis Public Works Construction Technical Representative
l. Construction Contractor:
    (1) Superintendent
    (2) Quality Control Manager
    (3) Major Sub-Contractor Representatives
    (4) Installation Personnel:
        (a) Fire Department Representative
        (b) Civil Engineer or Public Work Representative
        (c) Environmental Representative
        (d) Safety Representative
        (e) Security Representative
        (f) Communications Representative
    (5) Program Management Assistance Contractor (PMAC):
        (a) PMAC Program Manager
        (b) PMAC Technical Inspector
        (c) Specialty Inspectors (As required per specific project requirements)
    (6) Commissioning Agent
    (7) Architect of Record (As required per specific project requirements)

1.12.4.4. At a minimum, the following attendees shall participate in the follow on weekly Red Zone Meetings. All other attendees from the initial meeting that are not listed below will attend as required and shall receive copies of all weekly red zone meeting discussions.

a. NEXCOM Exchange representatives.
b. DeCA Store Director:
c. Annapolis Public Works Director
d. Construction Contractor:
    (1) Superintendent:
    (2) Quality Control Manager:
    (3) Major Sub-Contractor Representatives:
e. Program Management Assistance Contractor (PMAC):
    (1) PMAC Technical Inspector:

1.12.4.5. INITIAL RED ZONE MEETING PROCESS

a. Initial Red Zone Meeting Date: The PMAC technical inspector will notify the DeCA Project Manager and NEXCOM Exchange representatives of an estimated initial Red Zone Meeting date. This date will be based on the construction contractor's CPM schedule and shall be estimated as

approximately 60 days prior to the construction contractor's scheduled BOD date. The DeCA Project Manager will coordinate with the DeCA Operations Monitor and a final date will be determined.

b. The DeCA PM and NEXCOM Exchange representatives; in conjunction with the PMAC TI will invite attendees related to the construction portion of the project to the meeting and the DeCA Operations Monitor will invite the required attendees related to the operational activities of the project. Invitations to the meeting shall be distributed no later than 30 days prior to the established initial Red Zone meeting date.

c. The DeCA PM chairs the initial Red Zone Meeting. The meeting discussions will focus on the following three major areas:
   (1) Construction Activities and Milestones
   (2) Operation Activities and Milestones (incorporate the P-Plan into the Red Zone schedule)
   (3) Fiscal Activities and Milestones

1.12.4.6. Initial Red Zone Meeting Discussions: The group discusses remaining construction activities and reaches a consensus on percent complete and remaining durations required for each to include the agreed completion date. Operational activities are identified and estimated durations and responsibilities are assigned to include the agreed completion date. Participants build a schedule for completing each task in a logical sequence, and assign responsibility for actions to reach financial completion. The technical inspector records key project milestones, responsibilities and dates and provides distribution to all team members prior to the close of the meeting. The TI shall prepare minutes of the meeting to include all agreed dates, milestones, durations and represented attendees. The team shall:

a. Plan to finish on schedule
b. Identify and emphasize the importance of the key milestones, especially Grand Opening
c. Identify outstanding modifications and obstacles to closure
d. Identify outstanding activities, whose responsible and scheduled completion
e. Review contract and contingency balance for all operational and construction requirements remaining
f. Discuss Warranty plan implementation
g. Commitment to finish the DD Form 1354
h. Discuss transfer from Construction Contractor maintenance to DeCA and NEXCOM Exchange Maintenance contractor

1.12.4.7. FOLLOW ON WEEKLY RED ZONE MEETING PROCESS: The PMAC technical inspector holds a weekly construction meeting. Following the initial red zone meeting, the inspector will add the red zone update to the weekly meeting agenda. Each member identified as a mandatory attendee will provide input as to the status of each Red Zone activity/milestone. The technical inspector will update the red zone schedule template during the meeting. If any activity/milestone duration is different than originally planned, the TI will identify the impact to remaining activities through the schedule software tool. The TI will discuss with the Construction Contractor available options to maintain the original agreed upon schedule. Emphasis shall be placed on maintaining the original schedule. The TI shall review each impact and record the new status in the minutes. The minutes shall be distributed to all responsible parties with specific attention brought to any critical changes to the agreed upon schedule. If required, the DeCA PM and NEXCOM Exchange representative will establish a special meeting to help mitigate any problem that has the potential to extend the project end date and determine measures required to recover any lost time and bring the activities back on schedule.

1.12.4.8. SUGGESTED ACTIVITIES/MILESTONES LISTED BY RESPONSIBILITY

CONSTRUCTION ACTIVITIES/MILESTONES

CONSTRUCTION ISSUE

General Contractor

Communication System PA/Sound Installation	As-Built Delivery
Lock and Key Plan	Warranty Documents to Owner
Landscaping Complete	Government Punchlist Complete
Test and Balance Systems	User Training
Commissioning	O & M Manual Submittal
GC Punchlist Complete	DD 1354
Final Cleaning	Construction Contract Complete
Pre-Final Inspection	Release of Claims
Beneficial Occupancy Date (BOD)	

Commissioning Agent

Commissioning

Installation

Fire System Inspection	Installation Fire Department
Safety Inspection	Installation Safety Department
Security Inspection	Installation Security Department

PMAC

Run Weekly Meetings with Red Zone Discussion	PMAC TI
Update Red Zone Schedule	PMAC TI
Photographer	PMAC and/or Government
PMAC TI leaves site	

DeCA Project Manager

Chair Red Zone Meeting	DD 2626 Contractor Evaluation
Red Zone Process	DD 2631 AE Performance Evaluation
Final Inspection	DeCA Site Visit

Operations Monitor

Order GFGI

Order Vendor Contracts

Store Directors

Furniture Installation/GFGI Installation	User Move-in
Store Set	Grand Opening
Final Cleaning for Opening	

Government Contractor

Communication Phone System Installation

POS Installation

DeCA Contacting Branch / Contracting

Final Payment	DeCA Contacting Branch / Contracting Officer
Return of Un-obligated Funds	DeCA Contacting Branch / Contracting Officer
Refrigeration/HVAC Maintenance Meeting	DeCA Contacting Branch / Contracting Officer-Maintenance
Refrigeration/HVAC Maintenance Transfer	DeCA Contacting Branch / Contracting Officer-Maintenance

1.13 PROJECT REGISTER

1.13.1. Register

1.13.1.1. Maintain Registers of proposal requests, supplemental instructions, RFIs, submittals, and contract modifications in electronic version at the jobsite that accurately reflects current status of all pertinent data.

1.13.1.2. Make register available to the Contracting Officer for review when requested.

1.13.1.3. Develop and provide a project roster to the Government's Designated Inspector within 30 days of mobilization. Include contractor's staff, subcontractors, and suppliers. Include names, titles, addresses, phone numbers, email addresses of management personnel and emergency contacts associated to the project for each firm involved.

1.14 CONTRACTOR PRODUCTION REPORT:

1.14.1. Submit reports for each day that Contractor performs work to the Government's Designated Inspector by 10 AM (local) the following workday. Account for each calendar day throughout the life of the contract. Use the same terminology used in the construction schedule. The project superintendent must prepare, sign, and date the Contractor Production Reports and include the following information:

1.14.1.1. Date of report, report number, name of contractor, Contract number, title and location of contract and superintendent present.

1.14.1.2. Weather in the morning and in the afternoon including maximum and minimum temperatures.

1.14.1.3. The site conditions and its suitability for performing work.

1.14.1.4. A list of contractor and subcontractor personnel on the work site, their trades, work classification (e.g., journeyman, labor, etc.), employer, work location, number of employees, description of work performed, hours worked, and etc.

1.14.1.5. Did Contractor release hazardous material/waste into the environment? (If YES, attach a description of meetings held and actions taken.)

1.14.1.6. Safety events or inspections.

1.14.1.7. A list of equipment/material received each day.

1.14.1.8. A list of construction and plant equipment on the work site including the number of hours used, idle and down for repair.

1.14.1.9. Include a "remarks" section in this report to document pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety incidents, instructions given and corrective actions taken, delays encountered, and a record of visitors to the work site.

1.14.1.10. Refer to the example at the end of this section for other information required.

1.14.2. Include a Government's Designated Inspector "comments" section with signature block.

1.14.3. Provide electronically via the project website. Refer to Section 01310, Information Management, for other requirements.

1.14.4. RECORD PHOTOGRAPHS.

1.14.4.1. Prior to starting construction, coordinate with and accompany the Government's Designated Inspector to the project site and take photographs depicting existing site conditions as the Government's Designated Inspector may direct.

1.14.4.2. Take a minimum of 100 digital color photographs.

1.14.4.3. Deliver two 125mm x 175mm (5-inch by 7-inch) prints each of the photographs and .jpg data (maximum quality) copies on CD-ROM media to the Government's Designated Inspector within 15 days of the shoot. Identify the filenames on the back of each print.

1.14.4.4. Photographic work shall be of a quality that illustrates conditions clearly. Take the photographs from various positions at the camera's highest quality jpg setting and at a resolution no less than five megapixels in size.

1.14.4.5. Identify each photograph to show the date made, contract title and number, and include a brief description of what each photograph depicts.

1.14.4.6. Insert each photograph in its own individual "see-through" plastic pouch (don't arrange prints back-to-back) and enclose the two sets in two separate vinyl covered "D-ring" binders for submission.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

Example Production Report:

CONTRACTOR PRODUCTION REPORT (ATTACH ADDITIONAL SHEETS IF NECESSARY)			DATE
CONTRACT NO.	TITLE AND LOCATION		REPORT NO.
CONTRACTOR		SUPERINTENDENT	
AM WEATHER	PM WEATHER	MAX TEMP: ° F	MIN TEMP: ° F

WORK PERFORMED TODAY

WORK LOCATION AND DESCRIPTION	EMPLOYER	NO.	TRADE	HOURS

PART 1 - JOB

WAS A JOB SAFETY MEETING HELD THIS DATE? o YES o NO
(If YES attach a copy of the meeting minutes)
WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? o YES o NO
(If YES attach copy of completed OSHA report)
WAS TRENCHING/SCAFFOLD/HV ELECTRICAL/HIGH WORK DONE? o YES o NO
(If YES attach statement or checklist showing inspection performed)
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT
(If YES attach description of incident and proposed action) o YES o NO

TOTAL WORK HOURS ON JOB SITE THIS DATE	
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	
TOTAL WORK HOURS FROM START OF CONSTRUCTION	

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED		SAFETY REQUIREMENTS HAVE BEEN MET

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INCLUDE NUMBER OF HOURS USED TODAY

REMARKS

CONTRACTOR/SUPERINTENDENT DATE

FORM 01400-1 6/91

SHEET OF

SECTION 01310

CRITICAL PATH METHOD SCHEDULE

PART 1 - GENERAL

1.1 GENERAL

1.1.1. This section specifies administrative and procedural requirements for scheduling. Failure to maintain the Construction Schedule in an accepted status may result in the Contracting Officer withholding a monetary penalty against the Contractor until the schedule is accepted.

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.3 SUBMITTALS

1.3.1. Refer to specification Division 1 Section “Administrative Requirements” for procedures.

1.3.2. Submittal Schedule:

1.3.2.1. Provide the indicated quantity. Note that the Government will retain two copies and the electronic file.

1.3.3. Submittal Action by reviewer:

1.3.3.1. R: Review each submittal, mark to indicate action taken, and return.

1.3.3.2. I: Submittal is for information or record purposes only. No other action will occur.

1.3.4. Submittal requirements for this section are as follows:

Action	Reference Para.	Submittal	Quantity Required
R	1.6	Preliminary Project Schedule	4+CD
R	1.7.6	Project Schedules and Tables, Monthly Progress Updates, and Major revisions to Project Schedule	4+CD
R	1.7.13	Changes	4+CD
I	1.8	Short Interval Schedules	For each weekly meeting attendee

1.4 DEFINITIONS:

1.4.1. Non-excusable Delay: Any delay caused by events within the control of the Contractor

1.4.2. Excusable Delay: Any delay beyond the control of the Contractor or Government, caused by events such as strikes, acts of God, unusually severe weather, fires, floods, acts of Government, etc.

1.4.3. Critical (Prejudicial) Delay: a delay to any activity that impacts the project completion date (a delay to the critical path)

1.4.4. Non-Critical (Non-prejudicial) Delay: a delay to any activity that does not exceed the available float time, and thus, does not impact the project completion date (a delay to non-critical work)

1.4.5. Compensable Delay: Any delay beyond the control of the Contractor, but within the control of the Government, such as changes, differing site conditions, suspension of work, late approval of shop drawings, late delivery of Government Furnished Equipment, etc.

1.4.6. Concurrent Delay: Two or more delays that occur simultaneously or overlap in some way.

1.5 CONTRACTOR'S RESPONSIBILITY FOR COMPLETION

1.5.1. All schedules provided for herein shall be based on the Contract Time and shall show Beneficial Occupancy within the Contract Time, measured in calendar days after the effective date of the Notice to Proceed.

1.5.1.1. The Commissary and the Exchange construction including customer parking and truck delivery pavements shall be completed and ready for building occupancy (BOD) on the same calendar date.

1.5.2. Furnish such manpower, materials, facilities, and equipment and work hours, including night shifts, overtime operations, to include Sundays and holidays as necessary to ensure completion of the Work in accordance with the approved Project Schedule. If the Contractor through non-excusable delay, misses a scheduled milestone by 14 days, a critical path activity start or completion date, or forecasts a delay to the overall project, the Contracting Officer may require the Contractor to take the following recovery actions:

1.5.2.1. Reschedule activities to achieve maximum practical concurrence of activities.

1.5.2.2. Increase manpower in such quantities and crafts as will substantially eliminate the backlog of work to the satisfaction of the Contracting Officer.

1.5.2.3. Increase the number of working hours per shift, shifts per working day, working days per week, or the amount of equipment utilized. Perform any combination, subject to the following:

a. Approval from the Contracting Officer.
b. Accommodate the Contracting Officer's representative for required inspections.
c. If any work is accomplished outside of normal working hours that requires inspection and or approval, then the work shall not be covered up unless the Contractor:
(1) Pays all costs for additional Government inspections to include Government per diem rates, and all costs for transportation to and from the project site.

1.5.2.4. Submit a revised Project Schedule demonstrating the Contractors proposed plan to make up the lag in schedule progress and to ensure completion of work within the contract time. Refer to paragraph 1.7.14.

1.6 PRELIMINARY PROJECT SCHEDULE

1.6.1. Submit within 20 calendar days from the Notice to Proceed a preliminary computer generated network defining the Contractor's planned operations during the first 120 calendar days. Indicate the general approach for the balance of the project. Include cost of activities expected to be complete or partially complete before submission and approval of the project schedule.

1.6.2. The Government will provide the Contractor with a Primavera or a Suretrak schedule template with all default program settings, codes, etc. Use the approved preliminary schedule for payment purposes not to exceed (120) calendar days.

1.7 PROJECT SCHEDULE AND REQUIREMENTS FOR MAINTAINING PROGRESS

1.7.1. CONTRACT TIME: Warrant and represent that the Work shall be complete within the Contract Time. Perform all work in an orderly and closely coordinated sequence and in conformance with the Contract Milestones and the Project Schedule. The Contract Time includes allowances for time lost due to foreseeable adverse weather conditions other than floods, hurricanes, tornadoes, and the like.

1.7.2. Effect of Schedules. Acknowledge that no Progress Schedule or any other update of any schedule (whether accepted by the Contracting Officer or not) shall extend the Contract Time, adjust the Contract Milestones or modify the Project Schedule unless and until such change is approved by the Contracting Officer in a written Contract Modification. If the Contracting Officer determines that the Contractor is not entitled to an extension of Contract Time or an adjustment of the Contract Milestones, comply with the then current Contract Milestones and achieve Beneficial Occupancy within the Contract Time. Take such action as necessary to bring the general progress of the Work into compliance with the Project Schedule. Bear entirely the cost and expense of such overtime, or any additional measures, including any costs or damages incurred by the Government; such as the Contracting Officer's representative, or Government Contractors.

1.7.3. GENERAL FORMAT

1.7.3.1. Base schedules on the critical path method using the Precedence Diagram Method format ("PDM").

a. For contracts greater than $7,500,000 in value: Use Primavera Project Planner (P3) Software, Version 3.01 or later for Windows Operating Systems.
b. For contracts $7,500,000 or lower in value: Use P3 or Suretrak Project Manager (current Version) for Windows Operating Systems.

1.7.3.2. Use the schedule template provided, including all default program settings, codes, calendars, etc. during all Project Schedule development.

1.7.3.3. The schedule is a requirement to assure adequate planning and execution of the work and to assist the Government in appraising the reasonableness of the schedule and evaluating progress of the work both before and during construction.

1.7.3.4. Schedule activity durations to allow for normal weather conditions such as precipitation, high or low temperature, wind, etc. Any activity duration, potentially impacted by normally anticipated weather shall include an adjustment for the anticipated weather effect. The Contractor shall anticipate the weather effect by referring to the government’s projected number of days the contractor will be affected by weather delays. The projected average number non-work weather delays for NSA Annapolis, MD, based on the National Oceanic and Atmospheric Association's (NOAA) historical monthly averages for the NOAA location for this site, is the NOAA Station closest to the project site – typically the military installation’s flight-line. Using this data, the Contractor will reflect the number of anticipated weather delays allocated to an activity in the activity's calendar. A lost workday caused by weather, is defined as a day in which the Contractor's workforce cannot work at least 50 percent of the day on the

impacted activity(s) because of weather. The Contractor shall immediately notify the Contracting Officer when a lost day has occurred due to weather and will record on the Daily Reports the occurrence of the weather and the resultant impact to the normally scheduled work. If the number of actual lost workdays caused by weather exceeds the number of days anticipated, the Contracting Officer will convert any qualifying lost workdays to calendar days, giving full consideration for equivalent fair weather workdays and issue a modification in accordance with the contract clauses.

1.7.4. Schedule Submittal Formats:

1.7.4.1. Submit tabular reports on 8-1/2-inch by 11-inch sheets.

1.7.4.2. Submit graphic reports on 11-inch by 17-inch sheets with the exception of the logic diagrams, in which case submit on 30-inch by 42-inch sheets.

1.7.4.3. Provide two (2) copies per submittal. On each page, clearly identify the project, Contractor name, filename, and the data date of each project

1.7.4.4. Submit schedule back-up information electronically.

a. Each electronic file shall contain the Project Schedule (initial submittal), or the latest updated Progress Schedule (subsequent monthly submittals).
b. Properly label each electronic file identifying the project, Contractor's name, filename, and the data date.

1.7.5. CONTRACTOR'S SCHEDULING REPRESENTATIVE: Before starting the Work, designate, in writing to the Contracting Officer, an individual, with previous experience of at least five (5) years creating and reviewing construction schedules, as the Contractor's Scheduling Representative. This representative shall monitor and maintain the Project Schedule and scheduling as defined in this section and shall be able to revise, update, and recommend logic revisions to the Project Schedule as necessary for closely monitoring progress of the work. Include in the written designation the name, qualifications and experience of the individual and request the Government's acceptance, which will not be unreasonably withheld. The Scheduling Representative shall be responsible for the coordination and implementation of all Contractor activities and responsibilities relating to the Project Schedule and scheduling as set forth in the Contract Documents.

1.7.6. PROPOSED BASELINE PROJECT SCHEDULE: Within ninety (90) calendar days after the effective date of the Notice to Proceed, provide the Contracting Officer with a schedule to cover the entire Contract Time (Project Schedule). Prepare schedule in detail and format required by the items set forth below. The Project Schedule shall show the order, interdependence of activities, and the sequence of the plan to accomplish the work.

1.7.6.1. Review of Project Schedule: All submitted Schedule(s) shall be subject to the review by the Contracting Officer, and when accepted by the Contracting Officer, shall be identified as the Baseline Project Schedule. Allow the Contracting Officer fourteen (14) calendar days for review of each submittal. Within twenty-one (21) calendar days of the Project Schedule submittal, the Contracting Officer will conduct a teleconference with the DeCA PM, Government's Designated Inspector, Government Scheduler, and Contractor to discuss any review comments issued. The Government will provide an advance set of comments to the Contractor three ~~(4)~~ calendar days prior to the meeting. The PCO will return the disposition of the schedule to the Contractor on an AF Form 3000 one calendar day prior to the teleconference. If the Project Schedule is approved as submitted, a teleconference is not required.

1.7.6.2. By accepting the submitted Schedule(s) as the Baseline Project Schedule, the Contracting Officer is not assuming any of the Contractor's responsibility for the timely and orderly completion of the Work or the coordination of the performance of the Contractor's Work or its subcontractors with that of other Contractors. Any adjustments made in the Project Schedule necessitated by any error or inconsistency, or by reason of the requirements for the orderly performance of the Work, shall be made and the Work performed by the Contractor without additional compensation or extension of time.

1.7.6.3. The final proposed Project Schedule accepted by the Contracting Officer shall be identified as the Project Schedule and shall be the Project Schedule used by the Contractor and Government for monitoring progress of the work.

1.7.6.4. Clearly indicate any special sequencing, predetermined use of multiple shifts or overtime, all costs of which deemed included in the Contract Sum. Unless otherwise indicated, work hours shall be Monday through Friday, 8 hours per day (day shift). Schedule the work by days in the proposed Project Schedule to accurately reflect project activities occurring other than day shift such as, weekends, holidays, second or third shifts. In addition, request information from major subcontractors before completing the proposed Project Schedule. The proposed Project Schedule submittal shall include, at a minimum, the following items:

a. Provide a minimum of 80 activities per $1,000,000 of actual work. Each piece of equipment shall have a separate activity assignment. DO NOT consider refrigeration system as one piece of equipment. Each activity's assignment shall be identifiable to a single responsible party. This includes all procurement, design, submittal review, fabrication, and delivery activities. The Project Schedule shall indicate durations for all activities in working days, with durations of no less than one (1) nor more than twenty (20) days per activity, with the exception of activities such as design, submittals, fabrication, or deliveries.
b. Include identification of all precedence relationships between the design, submittal, fabrication, delivery and Contractor's activities, as well as those of Subcontractors. Base the Project Schedule on a thorough review of the Contract Documents, showing the interface between separate Contractor's and subcontractor's work. Insure all definable features of the work are identified in the Project Schedule.

(1) Procurement Activities: Include tasks related to the procurement of materials or equipment as separate activities. Examples of procurement process activities include, but are not limited to: submittals, approvals, procurement, fabrication, and delivery. Assign procurement activities to a 7-day calendar. DO NOT use fabrication and Delivery activities as "Stored Material" items. Stored Materials are allowed for specific items meeting the criteria listed in Division 1 Section “Fiscal Matters and Related Data.”
(2) Critical Activities: List the following activities as separate line activities on the Project Schedule:

(a) Submission and approval of:

(1) Contractor Quality Control Plan
(2) Safety Plan
(3) CPM Schedule
(4) Mechanical/electrical layout drawings.
(5) O & M manuals.
(6) As-built drawings.
(7) DD1354 data and installed equipment lists.
(8) Refrigeration submittal.
(9) Structural steel shop drawings.
(10) Fire protection shop drawings.
(11) Testing and balancing of HVAC, plus commissioning plans and data.
(12) Security System.

(b) Implementation and termination of each temporary utility
(c) Implementation and termination of each temporary support facility.
(d) Relocation dates
(e) GFCI item dates
(f) GFGI item dates
(g) Air and water balance dates.
(h) HVAC commissioning dates.
(i) Controls testing plan.
(j) Controls testing.

(k) Performance Verification testing.
(l) Other systems testing, (Commissioning).
(m) Training
(n) Beneficial Occupancy/Move-in.
(o) Move-out.
(p) Pre-final inspection.
(q) Correction of punch list from pre-final inspection.
(r) Final inspection.
(s) Notice to Proceed.
(t) Project Completion.

c. Government Activities: Show Government and other agency activities that could impact progress. These activities include, but are not limited to: approvals, inspections, utility tie-ins, Government Furnished Equipment (GFE). "Logically link" government activities to the schedule.
d. Contract Milestones: In addition to any Contract Milestones set out in the Bid Documents, indicate on the Project Schedule no fewer than three and no more than eighteen Contract Milestones for the completion of various components of the Work. The Contract Milestones shall be confirmed by Contract Modification and cannot thereafter be changed except by Contract Modification.
e. Suggested Milestones:

(1) HVAC start-up
(2) Telecommunications and IT systems installation
(3) POSM/Data installation
(4) Refrigeration 100% ready for inspection
(5) Security system complete
(6) Fire Alarm system complete
(7) Government Furnished Equipment (GFE)

f. Constrain contractually specified milestones to show negative float if the early finish date of the last activity in that phase falls after the milestone date.
g. Date/time constraint(s), other than those required by the contract, is not allowed unless accepted by the Contracting Officer. Identify all non-contractual constraints proposed (if any) and provide an explanation for the purpose of the constraint in the Narrative Report. The Government reserves the right to delete any such constraint when evaluating the effects of delays. Constrain contractually specified milestones to show negative float if the early finish date of the last activity in that phase falls after the milestone date.
h. All activities shall have at least one predecessor and successor except for two activities (the first and last).
i. All activities shall have a maximum float of 80 days.
j. Start and Finish dates: DO NOT automatically update by default mechanisms that may be included in scheduling software systems.
k. Actual Start and Finish dates on the schedule shall match those dates provided from Contractor Quality Control Reports or Contractor Daily Reports. Record the Actual Start and Finish dates on the Daily Reports or Quality Control Reports for every in-progress, or completed activity for the day of record.
l. Out-of-Sequence Progress: Activities that have posted progress without all preceding logic being satisfied (Out-of-Sequence Progress) is allowable on a case-by-case basis with the approval of the Contracting Officer. Propose logic corrections to eliminate all out-of-sequence progress, or justify not changing the sequencing, prior to submitting an updated Project Schedule for approval. Provide explanation in the Monthly Narrative.
m. Lag activities: Durations for Lag Activities shall not have a negative value. In conditions where start-to-start relationships exist, lag time shall not exceed the original duration of the preceding activity. Do not use lags when the creation of an activity will perform the same function (e.g., concrete cure time).
n. Critical Path Activities: Limit critical (0-day float) activities to 30%, and near-critical (<5-day float) activities to 40% or less. Minimize the use of Finish-to-Start relationships.

o. Log Comments: Comments inserted into the Project Schedule shall be for the Contractor's use only. Failure by the Government to address those comments is not an acceptance or rejection of such comments.

1.7.6.5. Provide a coding system that clearly identifies (as a minimum) the following items per each activity:

a. Responsibility code: to identify General Contractor, Suppliers, Purchasing, Subcontractors, Government, etc. Identify all activities in the Project Schedule by the party responsible for that activity. Responsibility includes, but is not limited to, the subcontracting firm, Contractor work force, or Government agency performing a given task. Activities shall not belong to more than one responsible party. Identify the responsible party for each activity by the Responsibility Code.
b. Area/Phase code: defining major areas and locations of Work. Work Areas: Identify all activities in the Project Schedule by the work area (key plan) and Phase in which the activity occurs. DO NOT allow activities to cover more than one work area. Identify work area of each activity by the Area/Phase Code.
c. The appropriate CLIN code item for each activity.
d. A Type of activity (submittal, fabrication, delivery, contract milestone, etc.) code.
e. Activity descriptions, durations and coding for preparation and processing of submittals, Shop Drawings, Product Data and Samples, fabrication, delivery and installation/erection/assembly of products, materials and equipment.
f. Work Breakdown Structure (WBS) code: Adjust the provided code to the specific project. Add or delete headings or sub-tiers as necessary.

1.7.6.6. All construction activities in the Project Schedule shall be cost loaded. The assigned dollar values for all activities shall cumulatively equal the total Contract Price and include the costs for mobilization,, bonds and insurance. General requirements, overhead and profit, and other costs not attributable to specific activities shall be prorated throughout all construction activities shown in the Project Schedule.

1.7.6.7. Tabular reports shall contain the following: All reports in this paragraph shall contain activity identification, the original duration, remaining duration, percent completion, activity description, early dates, late dates, total float, added or deleted activities, and changes to logic and durations. An exception is the cost report which shall have the activity identification, activity description, original duration, remaining duration, the percent completion, values, total budget value, previous total value, this month value and remaining values per each item. This cost report total shall be the contract amount including approved Contract Modifications. In addition, the report should be subtotaled by Contract Modifications.

a. Cost Report: Contains columns providing activity ID numbers and activity descriptions for each activity, previous percent complete by activity, percent completed this period by activity, percent completed to date by activity, original budgeted amount by activity, earnings this period by activity, and earned to date by activity. This report shall be organized by CLIN item and sorted by activity ID numbers. Project and CLIN item totals shall be clearly displayed at the top of CLIN item group and project total.
b. Activity Report: Contains columns displaying activity ID numbers, activity descriptions, original durations, actual durations, remaining durations, early start, late start, early finish, late finish, actual start, actual finish, suspend dates, resume dates and percent complete for each activity. This report is to be organized by project, phase and area. Project shall be sorted by early start. Percent complete to date shall be displayed for each phase, area and activity.
c. Total Float Report: A list of all incomplete activities sorted in ascending order of Total Float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates. Completed activities shall not be shown on this report.

1.7.6.8. Graphic diagrams of the following: All reports in this paragraph shall contain an activity identification, the original duration, remaining duration, percent completion, activity description, early dates, late dates and total float for each activity.

a. A logic diagram showing a continuous activity flow from left to right (11 inches by 17 inches and 30 inches by 42 inches). Show activity numbers, description, duration, and total float on the diagram. Graphically and clearly identify contract milestones and critical path.
b. A short interval schedule (3-week look ahead) chart as described in paragraph 1.8.

1.7.7. Monthly Reports: Contractor shall submit monthly, those reports detailed in paragraphs 1.7.6.6 and 1.8 with the exception of the logic diagrams. These diagrams shall be submitted for approval when major logic changes are made to the Project Schedule or when the Contracting Officer deems necessary.

1.7.8. Revisions to Project Schedule: If Contractor requires major changes to the Project Schedule, by no fault of the Government, Contracting Officer or Contracting Officer's representative, the Contractor shall submit those changes for review and acceptance by the Contracting Officer, and shall follow the procedures outlined in the Articles above, at no cost to the Government. Contractor shall allow the Contracting Officer fourteen (14) calendar days for review. No changes to the Project Schedule or out-of-sequence work are allowed without a written authorization from the Contracting Officer.

1.7.9. Progress Schedules: On the 25th of each month, the Government representative and the Contractor shall inspect the work to determine percent complete for each activity in the Project Schedule. Generate the monthly Progress Schedule from the current month's accepted Project Schedule, in the retained logic mode, and shall show the actual progress of the Work (through the end of the current month). Throughout the term of the Contract, deliver a monthly Progress Schedule to the Contracting Officer on or before the 1st of the following month or as otherwise required by Contracting Officer. Record progress for each activity by entering the actual start and finish dates and ~~,~~ the percent complete for all activities worked for that period. In the event that the Contracting Officer and Contractor cannot agree on the monthly update, the Contracting Officer will direct the Contractor, at no cost to the Government, to update the schedule as the Contracting Officer deems necessary. The Contractor acknowledges that the Contracting Officer may not accept or process a payment request until the Contractor provides an updated Progress Schedule which is accepted by the Government.

1.7.10. Set the software's calculation method so that percent complete will determine remaining duration is not automatically calculated from the reported percent complete. All approved Contract Modifications shall be incorporated into the monthly update of the Progress Schedule. The latest accepted Progress Schedule shall become the current Project Schedule. Allow 5 calendar days for Government review of the Project Schedule Update. Sequentially number each monthly Progress Schedule and date for identification, in the form and substance requested by the Contracting Officer. The monthly Progress Schedule shall include all tabular and graphic reports and electronic media indicated above.

1.7.11. Progress Payment. At the discretion of the Contracting Officer, payment may be withheld without an approved Project Schedule. Use the Project Schedule to generate the monthly payment application based on actual work installed (percent complete). Base progress and earned value on work-in-place and project through the end of the month. Use this information to generate a Progress Payment Application. Submit the payment application no later than the 1st day of each month. Activities that do not have an approved budget line item are not payable.

1.7.12. Monthly Schedule Meetings: Cooperate with the Contracting Officer in all matters concerning the Project and/or Progress Schedules, and attend a monthly schedule review meeting with the Contracting Officer or Government’s Designated Inspector. In the meeting describe on an activity-by-activity basis the following:

1.7.12.1. All proposed revisions and adjustments to the Project Schedule reflecting the status of the Project.

1.7.12.2. Actual start and actual finish dates for all activities in progress or completed, as appropriate.

1.7.12.3. The estimated percent complete for each activity in progress.

1.7.12.4. All logic changes pertaining to Project Modification activities sequencing or durations, and corrections to schedule logic to avoid out of sequence progress.

1.7.12.5. The purpose of this meeting is for evaluating the updated Progress Schedule and not for modifying previously reviewed durations or percentages. Do not make any changes to the schedule without a written acceptance by the Contracting Officer.

1.7.12.6. The monthly meeting described in this paragraph is in addition to the "weekly progress meetings" described in Division 1 Section “Coordination."

1.7.13. CHANGES

1.7.13.1. When changes in the work are necessary, submit for review by the Government a fragnet analysis along with a proposal for each individual change.

1.7.13.2. Illustrate in the fragnet how the Contractor proposes to incorporate the changed work and the time impact of the change into the overall completion date.

1.7.13.3. Additionally, demonstrate in the fragnet the time impact (based on the forecast Notice to Proceed date provided by the government and the status of construction at that point in time) and the event time computation of all affected activities using the latest approved Progress Schedule.

1.7.13.4. In cases where the Contractor does not submit a fragnet for a specific change or alleged delay then it is mutually agreed that the particular change or alleged delay has no time impact on the Contract completion date and no time extension is required.

1.7.13.5. In the event that the Contractor and the Contracting Officer cannot agree on the extension or reduction of time for a particular change, the Contracting Officer will have the option to provide suggested logic and/or duration times in all subsequent reports. The suggested logic and/or duration times shall remain in effect until the Contract Modification is executed or until the logic and durations are superseded.

a. If the Contractor has any objections to the data furnished by Contracting Officer, so advise the Contracting Officer, in writing, fully supporting the objections with an alternate plan no later than 10 calendar days after receiving the information from the Contracting Officer.
b. Use the data provided by the Contracting Officer until the alternate plan is reviewed and accepted by the Contracting Officer.
c. If the Contractor does not submit an alternate plan in the stipulated time, the Contracting Officer will deem that the Contractor has concurred with the Contracting Officer’s suggested logic/duration time changes to the Project Schedule.

1.7.13.6. The approved fragnet shall be the basis of time performance of the work.

1.7.13.7. Include only Contract Modifications approved by the Contracting Officer in the Project Schedule submission.

1.7.13.8. The Monthly Progress Payment Narrative, as required in Division 1 Section “Fiscal Matters and Related Data,” shall specifically reference, on an activity-by-activity basis, all changes made since the previous period and relate each change to documented, approved Project Schedule changes.

1.7.14. SCHEDULE DELAYS:

1.7.14.1. If the Contractor determines that it will not be able to perform the Work in accordance with the Contract Milestones and achieve Beneficial Occupancy within the Contract Time, and:

a. is behind in the Work based on the Progress Schedule and/or
b. is, in the opinion of the Contracting Officer, delaying or failing to prevent delay by it or it's Subcontractors in the progress of the Work, then:

1.7.14.2. Promptly submit to the Contracting Officer a plan (no later than seven (7) calendar days after such determination), including proposed adjustments to the Progress Schedule, if any, showing how the Contractor plans

a. to mitigate impact upon other portions of the Work and the Project
b. and how it plans to bring the Project back on the Project Schedule

1.7.14.3. If the Contracting Officer finds the proposed plan is not acceptable, submit a new plan. If the actions taken by the Contractor on the second proposed plan are not satisfactory to the Contracting Officer, take the actions set forth in paragraph 1.5.2, without additional costs to the Government, to make up the lag in schedule progress.

1.7.14.4. If the Contractor feels that it is necessary to revise its critical path logic in order to achieve the Contract Milestones and Beneficial Occupancy within the Contract Time, submit a revised recovery plan for approval prior to commencing Work on said activities.

1.7.14.5. Unapproved out-of-sequence Work in the critical path is not allowed. The Government will not make payment for unapproved out-of sequence Work on the critical path. DO NOT start work until such alternate plan is approved by the Contracting Officer.

1.7.14.6. The Contracting Officer has the right to immediately order the Contractor to finish completion of late activities, and any activities which have been delayed by the late activities, by whatever means necessary, without any additional cost to the Government. Comply with the order.

1.7.14.7. If the Contractor works multiple shifts, extended overtime, Saturdays, Sundays or holidays as a means to recover lost time and/or to finish the Work for its own benefit, the Contractor will be responsible for the resultant costs incurred by the Government.

1.7.15. SCHEDULE FLOAT: The Contractor and Contracting Officer agree that float available in the schedule, at any time, is not for the exclusive use of either the Government or the Contractor. Use of Zero Free Float and Zero Total Float constraints is not allowed. Negative float is not allowed without a recovery plan to bring the project back to the current contract completion date. Use of float suppression techniques, such as; preferential sequencing (arranging critical path through activities more susceptible to Government caused delay), lag logic restraints, zero total or free float constraints, extended activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates. The use of Resource Leveling (or similar software features) used for the purpose of artificially adjusting activity durations to consume float and influence the critical path is expressly prohibited.

1.7.16. EXPEDITED WORK: The Government may request the Contractor to work overtime to expedite the completion of the Work or a portion of the Work at a time when the Contractor is otherwise in conformance with the Contract Documents and the Project Schedule. If such a situation should occur, a price for the expedited work shall be negotiated prior to commencement and covered in a contract modification.

1.7.17. TIME EXTENSIONS: For consideration of a time extension, the following criteria must occur:

1.7.17.1. The event in question impacts the critical path.

1.7.17.2. The event must change the contract end date.

1.7.17.3. There is an absence of a concurrent Contractor event causing impact to the critical path.

1.7.17.4. The Contractor is responsible for burden of proof (fragnet) and supplies such proof in writing.

1.7.17.5. The Contractor is not entitled to an extension of time or additional compensation for delays (of whatever nature) to non-critical path activities or for a schedule delay that does not extend the completion date beyond the Original Contract Completion Date. This applies regardless of whether the Contractor could have completed the Work prior to the Original Contract Completion Date or the Contractor submitted a schedule showing completion of the Work prior to the Original Contract Completion Date. A compensable delay is applicable only for government-caused delays extending the Contract Completion Date.

1.8 SHORT INTERVAL SCHEDULES

1.8.1. Short Interval Schedules: Submit Short Interval Scheduling (SIS) or 3-week look-a-head for each Weekly Construction Meeting. Generate these reports using Primavera Filter, or the Tabular Report function from the current approved Progress Schedule.

1.8.2. The interval is a three-week projection that includes the week submitted and the following two weeks thereafter.

1.8.3. Provide sufficient detail to evaluate milestones and identify/tie into the current schedule. Detail this schedule to include all activities scheduled for the 3-week period. The short interval schedule shall reflect actual work planned for the three week time.

1.8.4. Submit in bar chart format on a daily scale, sorted by early start and responsibility, covering all activity work for the following 3 weeks.

1.8.5. The Contracting Officer will review the SIS, or 3 week look-a-head, and if necessary require revision.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01312

INFORMATION MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Manage forms, submissions, and correspondence as set forth below to assist the Government in its monitoring and administration of this contract. Use this system to record, maintain, and submit information throughout the contract period. This joint Government-Contractor use will facilitate electronic exchange of information and overall management of the contract. This approach provides the means for the Contractor to input, track, and electronically submit and or share information with the Government in the following areas:

1.1.1.1. Administration

1.1.1.2. Finances

1.1.1.3. Requests for Information (Project Website)

1.1.1.4. Price Proposals and background data

1.1.1.5. Quality Control

1.1.1.6. Submittal Monitoring (Project Website)

1.1.1.7. Transmittals (Project Website)

1.1.1.8. Scheduling

1.1.1.9. Import/Export of Data

1.1.1.10. Deficiency Tracking

1.1.1.11. Accident/Safety Tracking

1.1.1.12. Daily Activity / Production Reporting

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section

1.2.2. Specific Reference:

1.2.2.1 Division 1 Section “Fiscal Matters and Related Data”

1.2.2.2 Division 1 Section “Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination”

1.2.2.3 Division 1 Section “Administration Requirements”

1.2.2.4 Division 1 Section “Critical Path Method Schedule”

1.2.2.5 Division 1 Section "Quality Control"

1.2.2.6 Division 1 Section "Mobilization and Temporary Controls"

1.2.2.7 Division 1 Section "Environment Protection"

1.2.2.8 Division 1 Section "Contract Closeout"

1.2.2.9 Division 1 Section "Fire Protection, Safety and Security"

1.3 PROJECT WEBSITE - FACTSdocs

1.3.1 General: The government will provide the Contractor access to a web based application "FACTSdocs", which will be utilized in submitting, transmitting, reporting, and uploading project documents and data as indicated in the Contract Documents. The project management software will be accessible to the project team members designated by the Contractor and the Government. The Government will provide training in the use of this project management software to the designated project team.

1.3.2 The primary function of the project management software is to ensure timely processing and approval of all documentation in coordination with the project schedule. The Contractor shall use the "FACTSdocs" software to complete, submit, update and upload the following data. Request for Information (RFIs), Daily Construction Quality Control and Contractor Production Reports Submittals, Transmittals, Weekly, Schedules to include Preliminary, Baseline, Progress, Weekly Short Interval, Phasing Plans, Submittal Register, Project Register, Test Reports, QCM Meeting Minutes, Safety Meeting Minutes and all other documentation and correspondence specified in the contract documents and as deemed necessary by the Government.

1.3.3. The Government will require the following naming convention format be used for all files uploaded: Project Name-YY-MO-DD-File Name and/or description. Example: Keesler 08-06-16 Submittal 001 Quality Control Plan.

1.3.4. Project RFIs: The Contractor shall enter and transmit all Requests for Information (RFIs) through the Project Management software. The Government will then answer the RFIs through the Project Management software only. The project team will be able to print record copies of the RFIs from the Project Management software.

1.3.5. Project Submittals: The Contractor shall enter submittals into the FACTSdocs software. Copies of the product data and shop drawings shall be hand delivered to the Technical Inspector as required and entered and/or uploaded into the project management software as a PDF file and/or native format as required and/or indicated in this document.

1.3.6. Daily Quality Control Reports and Daily Contractor Production Reports: The Contractor shall submit these reports daily into the Project Management software and sign them electronically The Technical Inspector will then add any comments and sign electronically. The daily reports may be printed as separate files or in "Log Format" as a report for use by the "Project Team".

1.3.7. Application for Payment: In addition to submittal requirements and in accordance with the Contract Documents, the Contractor shall itemize construction versus equipment elements as listed in Section 01027 for progress payment, and final payment and as deemed necessary by the Government in PDF format into the Project Management software.

1.3.8. Transmittals: The Contractor shall log the transmittal of all documentation and correspondence to the Government using the Project Management software. Likewise, the Government will log the transmittal of all correspondence and documentation to the Contractor into the Project Management software.

1.3.8 Weekly Progress Meeting Minutes: The TECHNICAL INSPECTOR will chair the Weekly Progress Meeting and will upload the meeting minutes in the Project Management Software where they can be viewed / printed by the project team

1.3.9. Quality Control and Safety Meeting Minutes: In accordance with the Contract Documents, the Contractor shall enter and/or unload Quality Control and Safety Meeting Minutes into the Project Management software.

1.3.10. Preliminary, Baseline, Progress, Fragnet and Weekly Short Interval Schedules: In addition to submittal requirements, the Contractor shall upload Preliminary, Baseline, Progress, Fragnet Schedules and the Weekly Short Interval schedules in accordance to time periods as listed in the Contract Documents into the Project Management software in both PDF and their native formats.

1.3.11. Submittal Register and Project Register; In addition to submittal requirements and in accordance with the Contract Documents, the Contractor shall upload their submittal register and project register/schedules into the Project Management software.

1.3.12. Test reports, Rework Logs and Punchlists: In addition to submittal requirements and in accordance with the Contract Documents, the Contractor shall enter and/or upload all required test reports, outstanding rework items, and Punchlists into the Project Management software.

1.3.13. Pre-Performance Inspections, Photos, Inspections, and Reports: In accordance with the Contract Documents, the Contractor shall enter and/or upload Pre-Performance Inspections and Photos, on-going inspections and reports into the Project Management software.

1.3.16. Training: The Government shall provide training on use of the Project Management software to the entire project team as soon as practical and or the construction trailers are in place and a broadband internet connection is established. The FACTSdocs Administrator offers training via web and teleconference formats for the convenience of the project team members. Scheduling of these sessions should occur at the pre-performance conference. Initial training sessions may be performed onsite by a competent person. The FACTSdocs Administrator will provide additional sessions and/or follow-up training and/or training for any team member unable to attend the onsite session via teleconference, webex, and or webinar style meeting. The contractor must provide the following information to the Government for each person requesting access to the FACTSdocs software. Employee Name, Company they Represent, Contact Phone Number, and Company Email Address.

1.3.17. Printing: All components-RFI's, submittals, daily quality control reports, transmittals, weekly meeting minutes, modification information, project logs etc., shall be available in print through the FACTSdocs software.

1.4 CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS

1.4.1. For ease and speed of communications, both the Government and Contractor shall exchange correspondence and other documents in electronic format. As required by the Contracting Officer, the Contractor shall provide correspondence, pay requests, requests for information, and other documents comprising the official contract record in paper format, with original signatures and dates. Paper documents shall govern, in the event of discrepancy with the electronic version. The Technical Inspector shall store all paper documents after submittal and approval.

1.4.2. Format and File Naming Convention for electronic files: The government requires use of the following file naming convention for all electronic file uploads. Project Name-Date-File Name-version

1.4.3. Start file name with abbreviated job name. For example, abbreviate Ord Military Community to “Ord”, abbreviate Dyess AFB to Dyess, and Camp Pendleton MCB to Pendleton. Do not use special characters in the filename. ! @ # $ % ^ & * . Follow the name with the date YY-MM-DD. Always use two digits. Always use one space between the name and the date. A good example is as follows 08-08-13. Follow the date with a brief description such as this example, “Bakery-Deli Floor Tile”.

1.4.4. Use the following sequencing when uploading photos of the same subject: add a space then a number such as 1, 2, or 3, etc. after the description. A good example is “West Point 08-05-12, Produce 1.jpg” and “West Point 08-05-12 Produce 2.jpg”. Always use one space between the date and the description.

1.4.5. Submit all correspondence and document attachments in Adobe Acrobat’s• Portable Document Format (PDF) and schedules in native formats as well as PDF.

1.4.6. Provide password-protected electronic signatures in all signature blocks requiring Contractor representative signatures to correspond with actual signatures in the duplicate companion paper documents.

1.4.7. Provide fillable PDF data blocks where appropriate on all forms and correspondence requiring further action by the Government.

1.4.8. When specifically requested by the Contracting Officer, provide additional data files in native formats, e.g. spreadsheet (Microsoft Excel (.xls)) and word processing (Microsoft Word (.doc)) files.

1.4.9. Identification: Identify all Contractor correspondence to the Government with a serial number. Prefix correspondence initiated by the Contractor's site office separately from that initiated by the Contractor’s home office. Start serial numbering format from 0001.

1.5 PROJECT WEBSITE AVAILABILITY

1.5.1 The FACTSdocs software shall be available during all normal working hours in all CONUS time zones. Expect only minimum downtime of the FACTSdocs software for maintenance and or repairs.

1.5.2 FACTSdocs Software Maintenance: Performance of all periodic maintenance shall occur during non-working hours for the project.

1.5.3 The name and contact information of the FACTSdocs Administrator will be provided by the government at the pre-performance conference. This person will issue passwords and access rights to all project participants, resolve site maintenance issues, and act as primary point of contact for the duration of the project. This person shall be available to respond to technical or functional questions or issues with the site operations during all normal business hours or a minimum of 40 hours per week Mondays through Fridays.

1.5.4 In accordance with the Contract Documents, the Contractor shall enter and/or upload information in FACTSdocs by routing the information to the Technical Inspector and Government Team as follows: Route All documentation and required correspondence first to the Technical Inspector.

1.5.5 The Project Website shall be accessible via the internet by all project members.

1.5.6 The project data maintained by the FACTSdocs software shall be accessible to the Government for a period of five years after the Date of Beneficial Occupancy (BOD).

1.5.7 The Government will determine Access to specific data fields and reports in the FACTSdocs software.

1.6 DATA SUBMISSION VIA ELECTRONIC MEDIA

1.6.1 Whenever possible the contractor is to provide all electronic file submissions in Adobe Acrobat .PDF format and unless otherwise specified only .PDF format.

a. Where electronic files are required to be delivered on data disk use the following: minimum 750 MB CR-R capable of running Microsoft Windows XP or newer. Alternatively, DVD-ROMs may be used. As an option 210MB CD-R medium may be used for small files. Ensure they conform to industry standards used in the United States. Provide all data in English.

1.6.2 Disk or CD/DVD-ROM Labels: Affix a permanent exterior label to each diskette and CD/DVD-ROM submitted. Indicate in English the file name(s), full contract number, project name, project location, data date, name and telephone number of person responsible for the data

1.7 OTHER FACTORS

1.7.1 Direct particular attention to Contract Clause listed under paragraph 1.2 in this document, all of which have a direct relationship to the reporting requirements of this contract and this specification.

1.7.2 Note, there is no separate payment for establishing and maintaining these requirements. Include all costs associated there within the contract pricing for the work.

1.8 IMPLEMENTATION: Contractor shall use electronic format as described in the preceding paragraphs. Contractor shall ensure that sufficient resources are available to maintain supporting data and databases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.1 GENERAL

1.1.1. The following items apply to this section:

1.1.1.1. Quality Control

1.1.1.2. Field Engineering

1.1.1.3. Sample Forms and Reports

1.1.2. References

1.1.2.1. The publications listed below form a part of this specification to the extent referenced. The publications refer to the text by the basic designation only.

a. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
b. ASTM C 1077-08a Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
c. ASTM D 3666-07a Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials.
d. ASTM D 3740-08 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
e. ASTM E 329-08 Specification for Agencies Engaged in Construction Inspection and/or Testing.
f. ASTM E 543-08a: Specification for Agencies Performing Nondestructive Testing.

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.3 SUBMITTALS

1.3.1. Refer to specification Division 1 Section “Administrative Requirements” for procedures.

1.3.2. Submittal Schedule:

1.3.2.1. Provide the indicated quantity by the delivery date.

1.3.3. Submittal action by reviewer:

1.3.3.1. R: Review each submittal, mark to indicate action taken, and return.

1.3.3.2. I: Submittal is for information or record purposes only. No action will occur.

Action	Reference Paragraph	Submittal
R	1.4	Quality Control Plan
R	1.4	Complete Submittal Register and Schedule
I	1.4	Quality Control Report
I	1.4	Testing Plan and Log
I	1.4	Monthly Summary Report of Field Tests
I	1.4	QC Meeting Minutes
I	1.4	Rework Items List
I	1.4	QC Certifications
I	1.4	CQC Punch List

1.4 QUALITY CONTROL

1.4.1. QC Program Requirements.

1.4.1.1. Establish and maintain a QC program as described in this Section. The QC program consists of a QC Organization, a QC Plan, a Coordination and Mutual Understanding Meeting, QC meetings, three phase of control, submittal review and approval, and QC certifications and documentation. The program provides materials, equipment, workmanship, fabrication, construction, and operations which comply with the requirements of this contract. The QC program covers project construction operations on-site and off-site.

1.4.2. QC Organization.

1.4.2.1. QC Manager:

a. Duties: Provide a QC organization and on-site Manager at the work site to manage and implement the QC program. Restrict the only duties and responsibilities of the QC Manager to managing and implementing the QC program. Require the QC Manager to attend the Coordination and Mutual Understanding Meeting, conduct the QC meetings; perform the three phases of control, perform submittal reviews and approval. This is for all submittals including those designated for Contracting Officer approval. Perform required testing, prepare QC certifications and documentation required in this contract. The QC manager shall be on site all times work is being performed. The QC Manager shall report directly to an officer or other top level official of the firm. The QC Manager shall not be the same individual as, nor be subordinate to, the project superintendent, the project Manager or any other on-site personnel.

(1) Qualifications: The on-site QC manager from this firm must have a minimum of 5 years experience as engineer, QC Manager, Project Manager, or architect on similar size and type construction contracts.
(2) Provide resume. Submit to Contracting Officer for approval.

1.4.2.2. Alternate QC Manager Duties and Qualifications: Designate an alternate for the QC Manager at the work site to serve in the event of the designated QC Manager's absence. The QC Manager's period of absence may not exceed two weeks at any one time, and not more than 30 work days during a calendar year. The qualification requirements for the alternate QC Manager are the same as for the QC Manager.

a. Indicate qualification, experience in area of responsibility, and frequency as alternate QC Manager.

(1) Provide resume. Submit to Contracting Officer for approval.

1.4.3. Quality Control (QC) Plan.

1.4.3.1. Requirements: Within ten (10) from Notice to Proceed, provide for approval by the Contracting Officer, a QC plan that covers both on-site and off-site work and includes the following:

a. A chart showing the QC organizational structure and its relationship to the production side of the organization.
b. Names and qualifications, in resume format, for each person in QC organization.
c. Duties, responsibilities, and authorities of each person in the QC organization.
d. A listing of outside organizations such as, architectural, consulting engineering, and testing lab firms employed by the contractor and a description of the services these firms will provide.
e. A letter signed by an officer of the firm appointing the QC Manager and Alternate Manager and stating that he/she is responsible for managing and implementing the QC program as described in this contract. Include in this letter the QC Managers' authority to direct the removal and replacement of non- conforming work.
f. Procedures for reviewing, approving, and managing submittals. Provide name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval.
g. Testing laboratory information required by paragraph entitled "Accredited Laboratories" or "Testing Laboratory Requirements," as applicable.
h. A Testing Plan and Log that includes the tests required, referenced by the specifications paragraph number requiring the test, the frequency, and the person responsible for each test.
i. Procedures to identify, record, track, and complete rework items.
j. Documentation procedures, including proposed report formats.
k. A list of the definable features or work. A definable feature of work is a task that is separate and distinct from other tasks and requires separate control requirements. As a minimum, if approved by the Contracting Officer, consider each section of the specifications as a definable feature of work. However, at times, there may be more than one definable feature of work in each section of the specifications.
l. A submittal register and schedule.

1.4.3.2. Preliminary Work Authorized Prior to Approval: The only work authorized to proceed prior to the approval of the QC Plan is mobilization of storage and office trailers and surveying subject to Section 01500 "Mobilization and Temporary Controls."

1.4.3.3. Approval: Obtain approval of the QC Plan prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary to ensure the specified quality of work. The Contracting Officer reserves the right to interview any member of the QC organization at any time to verify his/her submitted qualifications.

1.4.3.4. Notification of Changes: Notify the Contracting Officer, in writing, of any proposed changes, including changes in the QC organization personnel, a minimum of seven calendar days prior to a proposed change. The Contracting Officer must approve proposed changes and reserves the right to deny the proposed change.

1.4.4. Construction Management Plan.

1.4.4.1. Participate in the development of a Construction Management Plan, which will aid all project participants by detailing the communication and administrative procedures used to implement this contract.

1.4.4.2. The plan will include forms and formats to be used and appropriate instructions, specific addresses for mailing and delivery, and identification of expected decision points in the project. Nothing in the plan will replace the contract.

1.4.4.3. At the Pre-performance Conference, the Contracting Officer will furnish a draft of the plan to the Contractor for his review, markup, and comment. The Contractor and the Government's Designated Inspector will meet to review suggested revisions.

1.4.4.4. The Contracting Officer or his designated representative will furnish one copy of the final approved plan for the Contractor's use.

1.4.5. Coordination And Mutual Understanding Meeting

1.4.5.1. After submission of the QC Plan, but prior to the start of construction, meet with the Contracting Officer to discuss the QC program required by this contract. The purpose of this meeting is to develop a mutual understanding of the QC details. This includes forms used for documentation, administration for on-site and off-site work, and the coordination of the contractor's management, production, and QC personnel with the Contracting Officer. As a minimum, the contractor's personnel required to attend include the Project Manager, Project Superintendent, QC Manager, Assistant QC Manager, and QC Specialist. The QC Manager prepares the minutes of the meeting, and both the Contractor and the Contracting Officer signs this document.

1.4.6. QC Meetings

1.4.6.1. After the start of construction, the QC Manager conducts weekly QC meetings at the work site with the project superintendent. The QC Manager prepares minutes of the meeting. Provide a copy to the Contracting Officer within 2 working days after the meeting. The Contracting Officer or representative may attend these meetings. Notify the Contracting Officer at least 48 hours before each meeting. This meeting requirement is solely for quality control and is in addition to the weekly construction meeting held by the Government's Designated Inspector or Contracting Officer and the CQC manager's preparatory meetings. As a minimum, accomplish the following at each meeting:

a. Review the minutes of the previous meeting.
b. Review the schedule and the status of work:

(1) Work or testing accomplished since last meeting.
(2) Rework items identified since last meeting.
(3) Rework items completed since last meeting.
(4) Review the status of submittals:
(5) Submittals reviewed and approved since last meeting.
(6) Submittals required in the near future.

c. Review the work scheduled in the next week and documentation required. Schedule the three phases of control and testing:

(1) Preparatory phases required.
(2) Initial phases required.
(3) Follow-up phases required.

(4) Testing required.
(5) Status of off-site work or testing.
(6) Documentation required.
(7) Establish completion dates for rework items.

d. Resolve QC and production problems.
e. Address items that may require revising the QC Plan.

(1) Changes in QC organization personnel.
(2) Changes in procedures.

1.4.7. Three Phases of Control.

1.4.7.1. The QC Manager performs the three phases of control to ensure that work complies with contract requirements. The three phases of control covers both on-site and off-site work and includes the following for each definable features of work:

1.4.7.2. Attendees: The CQC, Superintendent, Contracting Officer's representative, installer, representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials. Advise the on-site Contracting Officer representative and Contracting Officer of scheduled conference dates.

a. Record significant discussions, agreements and disagreements of each conference. Promptly distribute the record of the meeting to everyone concerned, including the Contracting Officer.
b. Proceed with the installation only after successfully concluding the conference. Initiate whatever actions are necessary to resolve impediments to performance of work and reconvene the conference at the earliest feasible date.
c. Preparatory Phase: Notify the Contracting Officer at least 2 work days before each preparatory phase. Conduct the preparatory phase with the QC specialist, the superintendent, and the foreman responsible for the definable feature. The Contracting Officer or representative may attend. The QC Manager prepares minutes of the meeting. Provide a copy to the Contracting Officer within 2 working days after the meeting. This meeting requirement is solely for quality control and is in addition to other quality meetings. Perform the following prior to beginning work on each definable feature of work:
d. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:

(1) Contract documents.
(2) Options.
(3) Related changes to the contract.
(4) Interface requirements.
(5) Sequences.
(6) Status of submittals.
(7) Off-site fabrication issues.
(8) Housekeeping.
(9) Status of RFI's.
(10) Purchases.
(11) Deliveries.
(12) Shop drawings, product data, and quality-control samples.
(13) Possible conflicts.
(14) Compatibility problems.
(15) Time schedules.
(16) Approved construction schedules

(17) Weather limitations.
(18) Manufacturer's recommendations.
(19) Warranty requirements.
(20) Compatibility of materials.
(21) Acceptability of substrates.
(22) Temporary facilities.
(23) Space and access limitations.
(24) Governing regulations.
(25) Inspecting and testing requirements.
(26) Required performance results.
(27) Recording requirements.
(28) Protection.

e. Review each paragraph of the applicable specification sections.

(1) Review the contract drawings.
(2) Submittal and approval of appropriate shop drawings and submittals for materials and equipment. Verify receipt of approved factory test results, when required.
(3) Review the testing plan and provide the required QC testing.
(4) Examine the work area to ensure the completion of the required preliminary work.
(5) Examine the required materials, equipment, and sample work to ensure that they are on hand and conform to the approved samples, shop drawings and submitted data.
(6) Review the safety plan and appropriate activity hazard analysis to ensure the compliance of applicable safety requirements and the submittal of required Material Safety Data Sheets (MSDS).
(7) Discuss construction methods.

f. Initial Phase: Notify the Contracting Officer at least 2 work days before each initial phase. When construction crews are ready to start work on a definable feature of work, conduct the initial phase with the QC specialist, the superintendent, and the foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with contract requirements. Document the results of the initial phase in the daily Contractor Quality Control Report. Repeat the initial phase for each new crew to work on site, or when specified quality is below acceptable levels. Perform the following for each definable feature of work:

(1) Establish the quality of workmanship required.
(2) Resolve conflicts.
(3) Review the Safety Plan and the appropriate activity hazard analysis and ensure compliance to applicable safety requirements.
(4) Ensure that the approved laboratory performs the required tests.

g. Follow-up Phase: Perform the following for on-going work daily, or more frequently as necessary until the completion of each definable feature of work and document in the daily Contractor Quality Control Report:

(1) Ensure the work is in compliance with contract requirements.
(2) Maintain the quality of workmanship required.
(3) Ensure that the approved laboratory performs the required testing. Notify the Contracting Officer or on-site representative within 48 hours prior to performance of the test.
(4) Ensure that rework items are being corrected.
(5) Additional tests directed by the Contracting Officer to establish materials and installation comply with the contract documents.

h. Notification of three phases of control for off-site work: Notify the Contracting Officer at least two weeks before the start of the preparatory and initial phases.

1.4.8. Testing.

1.4.8.1. Except as stated otherwise in the specification sections, perform sampling and testing required under this contract.

a. Testing Laboratory Requirements: Provide an independent testing laboratory or establish a laboratory qualified to perform sampling and tests required by this contract. When the proposed testing laboratory lacks accreditation by an acceptable accreditation program, as described by the paragraph entitled "Accredited Laboratories," submit data to the Contracting Officer for approval. Provide certified statements signed by an official of the testing laboratory attesting that the proposed laboratory meets or conforms to the following requirements:

(1) Perform sampling and testing under the technical direction of a Registered Professional Engineer (P.E.) with at least 5 years of experience in construction material testing.
(2) Laboratories engaged in testing of concrete and concrete aggregates meet the requirements of ASTM C 1077.
(3) Laboratories engaged in testing of bituminous paving materials meet the requirements of ASTM D 3666.
(4) Laboratories engaged in testing of soil and rock, as used in engineering design and construction, meet the requirements of ASTM D 3740.
(5) Government will evaluate laboratories engaged in inspection and testing of steel, stainless steel, and related alloys according to ASTM A 880. Laboratories shall meet the requirements of ASTM E 329.
(6) Laboratories engaged in nondestructive testing (NDT) meet the requirements of OSHA and EPA.

b. Accredited Laboratories: Acceptable accreditation programs are the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO) program and the American Association for Laboratory Accreditation (A2LA) program. Furnish to the Contracting Officer, a copy of the Certificate of Accreditation, Scope of Accreditation and latest directory of the accrediting organization for accredited laboratories. The scope of the laboratory's accreditation must include the test methods required by the contract.
c. Inspection of Testing Laboratories: Prior to approval of non-accredited laboratories, the proposed testing laboratory facilities and records may be subject to inspection by the Contracting Officer. Records subject to inspection include equipment inventory, equipment calibration dates and procedures, library of test procedures, audit and inspection reports by agencies conducting laboratory evaluations and certifications, testing and management personnel qualifications, test report forms, and the internal QC procedures.
d. Capability Check: The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing.
e. Test Results: Cite applicable contract requirements, tests, or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. A testing laboratory representative authorized to sign certified test reports must sign test results. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month.

1.4.9. Special Inspections.

1.4.9.1. Retain third-party quality assurance agencies to conduct the special inspections required by the Project Building Code indicated in Division 1 Section "Description of Work." The inspecting agency shall provide reports of the special inspections directly to the Contracting Officer. These inspections are in addition to the inspections specified elsewhere in the Contract Documents.

a. The quality assurance agencies shall supervise qualified personal who are Registered Professional Engineers and demonstrate competence, to the satisfaction of the Contracting Officer, for inspection of the particular type of construction or operation requiring special inspection. Quality assurance agencies and professional engineers are subject to written approval of the Contracting Officer.
b. Quality assurance agencies shall conduct special inspections indicated in Statement of Special Inspections as indicated on Drawings and in individual Specification Sections, and as follows:

(1) Verify that manufacturer maintains detailed fabrication and quality-control procedures and review the completeness and adequacy of those procedures to perform the Work.
(2) Notify Contracting Officer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
(3) Submit a certified written report of each special inspection and similar quality-control service to Contracting Officer with copy to Contractor.
(4) Submit a final report of special inspections at Substantial Completion, which includes a list of unresolved deficiencies.
(5) Interpret inspections and state in each report whether inspected work complies with or deviates from the Contract Documents.
(6) Re-inspect corrected work.

1.4.10. QC Certifications.

1.4.10.1. Contractor Quality Control Report Certification: Each Contractor Quality Control Report must contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report."

1.4.10.2. Invoice Certification: Furnish a certificate to the Contracting Officer with each payment request, signed by the QC Manager, attesting that as-built drawings are current and attesting that the work for which Contractor requests payment, including stored material, is in compliance with contract requirements.

1.4.10.3. Completion Certification: Upon completion of work under this contract, furnish a certificate to the Contracting Officer signed by the QC Manager attesting that "Contractor has completed, inspected, tested the work and is in compliance with the contract."

1.4.11. Documentation.

1.4.11.1. Contractor Quality Control Report: Provide reports for each day of work and for every seven consecutive calendar days of no-work and on the last day of a no-work period. Submit to the Government's Designated Inspector by 10 AM (local) the first workday following the date of the report. Account for each calendar day throughout the life of the contract. Report the work using terminology consistent with the construction schedule. QC Manager must prepare, sign, and date Contractor Quality Control Reports and include the following information:

a. Identify the control phase and the definable feature of work.

b. Results of the Preparatory Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report for this definable feature of work the topics listed in the paragraphs and subparagraphs titled “Three Phases of Control.”
c. Results of the Initial Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report for this definable feature of work Indicate in the report for this definable feature of work the topics listed in the paragraphs and subparagraphs titled “Three Phases of Control.”
d. Results of the Follow-up Phase inspections held including the location of the definable feature of work. Indicate in the report for this definable feature of work that the work complies with the contract as approved in the Initial Phase and Contractor performed required testing. Include a list of who performed the tests.
e. Results of the three phases of control for off-site work, if applicable, including actions taken.
f. List the rework items identified, but not corrected by close of business.
g. List the rework items corrected from the rework items list along with the corrective action taken.
h. Include a "remarks" section in this report to document pertinent information including directions received, quality control problem areas, deviations from the QC plan, construction deficiencies encountered, QC meetings held, acknowledgment of as-built drawings updates, corrective direction given by the QC Organization and corrective action taken. Notify the Contracting Officer or on-site representative of any construction deficiencies immediately upon discovery.
i. Contractor Quality Control Report certification.

(1) Provide in the project website, electronically signed by the Contractor’s QA representative and the Government’s Designated Inspector. Refer to Section 01312, INFORMATION MANAGEMENT, for other requirements.

1.4.11.2. Testing Plan and Log: As Contractor performs tests, record on the "Testing Plan and Log" the date the test results sent to the Contracting Officer. Include remarks and acknowledgment of use of an accredited or approved testing laboratory. Attach a copy of the updated "Testing Plan and Log" to the last daily Contractor Quality Control Report of each month.

1.4.11.3. Rework Items List: Maintain a list of work that does not comply with the contract, identifying what items Contractor needs to rework, the date the item discovered, and the date Contractor corrected the item. There is no requirement to report a rework item corrected on the same day of discovery. Attach a copy of the "Contractor Rework Items List" to the last daily Contractor Quality Control Report of each month. Take responsibility for items on this list needing rework including those identified by the Contracting Officer.

1.4.11.4. Record (“As-Built”) Drawings: The QC Manager shall review the as-built drawings as required by Section 01720. Ensure as-built drawings are kept current on a daily basis and marked to show deviations made from the contract drawings. Initial each deviation and each revision. Upon completion of work, furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

1.4.11.5. Sample Report Forms:

a. Contractor Quality Control Report.
b. Contractor Quality Control Report Continuation Sheet.
c. Government Quality Assurance Report.
d. Testing Plan and Log.

1.5 FIELD ENGINEERING

1.5.1. Summary.

1.5.1.1. This section specifies administrative and procedural requirements for field engineering services.

1.5.2. Examination.

1.5.2.1. Verify layout information shown on the drawings, with existing benchmarks, before proceeding to lay out the work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

1.5.2.2. Existing utilities and equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of underground utilities and other construction.

1.5.2.3. Coordinate between trades.

1.5.3. Performance.

1.5.3.1. Work from lines and levels established by the drawings. Establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to locate each element of the project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale drawings to determine dimensions.

a. Advise entities engaged in construction activities of marked lines and levels provided for their use.
b. As construction continues, check control lines for every major element for line, level, and plumb.

1.5.3.2. Building lines and levels: Locate and lay out batter boards for structures, building foundations, column grids, and locations, and control lines and levels required for mechanical and electrical work.

1.5.3.3. Existing utilities: Furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, service, or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

CONTRACTOR PRODUCTION REPORT (ATTACH ADDITIONAL SHEETS IF NECESSARY)		DATE
CONTRACT NO.	TITLE AND LOCATION	REPORT NO.

CONTRACTOR	SUPERINTENDENT

AM WEATHER	PM WEATHER	MAX TEMP: ° F	MIN TEMP: ° F

WORK PERFORMED TODAY

WORK LOCATION AND DESCRIPTION	EMPLOYER	NO.	TRADE	HOURS

JOB SAFETY

WAS A JOB SAFETY MEETING HELD THIS DATE? o YES o NO
(If YES attach a copy of the meeting minutes)
WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? o YES o NO
(If YES attach copy of completed OSHA report)
WAS TRENCHING/SCAFFOLD/HV ELECTRICAL/HIGH WORK DONE? o YES o NO
(If YES attach statement or checklist showing inspection performed)
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT
(If YES attach description of incident and proposed action) o YES o NO

TOTAL WORK HOURS ON JOB SITE THIS DATE	
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	
TOTAL WORK HOURS FROM START OF CONSTRUCTION	

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED		SAFETY REQUIREMENTS HAVE BEEN MET

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INCLUDE NUMBER OF HOURS USED TODAY

REMARKS

CONTRACTOR/SUPERINTENDENT DATE

FORM 01400-1 6/91

SHEET OF

CONSTRUCTION ISSUE

CONTRACTOR QUALITY CONTROL REPORT (ATTACH ADDITIONAL SHEETS IF NECESSARY)			DATE
PHASE	Y-YES, N-NO, SEE REMARKS BLANK - NOT APPLICABLE	IDENTIFY DEFINABLE FEATURE OF WORK, LOCATION AND LIST PERSONNEL PRESENT	
PREPARATORY	THE PLANS AND SPECS HAVE BEEN REVIEWED.		
	THE SUBMITTALS HAVE BEEN APPROVED.		
	MATERIALS COMPLY WITH APPROVED SUBMITTALS.		
	MATERIALS ARE STORED PROPERLY.		
	PRELIMINARY WORK WAS DONE CORRECTLY.		
	TESTING PLAN HAS BEEN REVIEWED.		
	WORK METHOD AND SCHEDULE DISCUSSED.		
INITIAL	PRELIMINARY WORK WAS DONE CORRECTLY.		TESTING PERFORMED & WHO PERFORMED TEST
	SAMPLE HAS BEEN PREPARED/APPROVED.		
	WORKMANSHIP IS SATISFACTORY.		
	TEST RESULTS ARE ACCEPTABLE.		
	WORK IS IN COMPLIANCE WITH THE CONTRACT.		
FOLLOW-UP	WORK COMPLIES WITH CONTRACT AS APPROVED IN INITIAL PHASE.		TESTING PERFORMED & WHO PERFORMED TEST
REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)			REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)

REMARKS

On behalf of the contractor, I certify that this report is complete and correct and equipment and materials used and work perfomed during the reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report.

AUTHORIZED QC MANAGER AT SITE DATE

GOVERNMENT QUALITY ASSURANCE REPORT	DATE

QUALITY ASURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT

GOVERNMENT QUALITY ASSURANCE REPRESENTATIVE DATE

FORM 01400-1 6/91 *(Back)* Sheet Of

(Sample of Typical Contractor's Test Report)

TEST REPORT

STRUCTURE OR BUILDING: _____

CONTRACT NO.: _____

DESCRIPTION OF ITEM, SYSTEM, OR PART OF SYSTEM TESTED:

_____
_____
_____
_____
_____
_____

DESCRIPTION OF TEST:

_____
_____
_____
_____
_____
_____

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME: _____

TITLE: _____

SIGNATURE: _____

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM, OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR
QUALITY CONTROL INSPECTOR: _____

DATE: _____

REMARKS:

_____
_____
_____
_____
_____
_____

CONSTRUCTION ISSUE

STANDARD REPORT FORMS AND USE

Form Number	Form Title	Form Use
-------	Compaction Test Data Sheet	Soil compaction tests. [1]
-------	Field Water Content and Density Tests, Data Sheet	Field density tests and respective moisture contents.
-------	Field Density and Grading Analysis Test (Washington Dens-o-Meter Method)	Field density tests and gradation.
DD 1206	Sieve Analysis Data	Sieve analysis data sheet for soils.
-------	Mechanical Analysis Test Data	Sieve analysis data sheet and hydrometer data sheet for soils.
-------	Gradation Curves	Gradation graph for soils and aggregates. (To include specification limits)
-------	Soil Moisture Content	Moisture content sheet for soils and/or aggregates.
-------	Specific Gravity and Absorption Test Data Sheet	Specific gravity and absorption test for soil and aggregates.
-------	Atterberg Limits Determinations	Test and graph for Atterberg limits tests.
DD 1209	Gradations of Blended Aggregate	Aggregate blending computation work sheet.
-------	Bituminous Mix Design - Aggregate Blending	Aggregate blending sheet for asphaltic concrete.
DD 1217	Asphaltic Concrete Mix Design Report	Asphaltic mix design and aggregate grading.
-------	Extraction Text, Hot Mix Asphalt and Concrete	Extraction test and grading sheet (include fracture face tests if specified).
-------	Marshall Method - Computation of Properties of Asphalt Mixtures	Marshall Test form.
DD 1218	Daily Plant Inspection Report - Asphalt	Asphalt plant production form (self-carboning).
-------	Screen Analysis of Concrete Aggregates	Gradation test form for aggregates (self carboning).
-------	Mortar Strength of Fine Aggregate Data Sheet	Flexural and compressive strength test form for mortar.
-------	Report of Concrete Mixture Design	Mix design sheet for contractor mix submittal.
-------	Transit Mix Concrete Control Record	Transit or plant mix concrete report (can be substituted by other report with Contracting Officer's approval).
-------	Concreting Operations Record	Daily report for concrete placing and batch information (self carboning).
-------	Data Sheet - Compressive and Flexural Strengths of Concrete	Compressive and/or flexural strength testing (include averages per specification).
-------	Concrete Cylinder Test Record	Compressive strength testing for standard cured and field cured samples.
-------	Statistical Evaluation of Concrete Compression Tests	Summary sheet of concrete tests. Form can be used for flexural strengths if revised to conform with proper days specified. A separate sheet is to be used for each mix design.
-------	Test Data on Absorption and Moisture Condition of Masonry Blocks.	Absorption and moisture condition tests of masonry units.

Material	Test	Minimum Sampling and Testing Frequency
Backfills, Subgrade, Subbase, and Base Course Material		
Backfill for foundations and walls, trenches, streets, roads, and sidewalks	Gradation[1]	1 every 380 m^3 (500 CY) or 1 per day for quantities exceeding 20 m^3 (25 CY)/lift.
	In-Place Density[2/12]	1 every 380 m^3 (500 CY) or 1 per day for quantities exceeding 20 m^3 (25 CY).
	Moisture-Density Relationship[3]	1 prior to start of backfilling operations, 1 every 20 densities and any time material type changes.
Pipe Bedding	Gradation[1]	1 every 75 m^3 (100 CY)
Subgrade	In-Place Density[2/12]	1 every 1670 m^2 (2000 sy) of each type subgrade material.
	Moisture-Density Relationship[3]	1 for every 20 densities for each material.
	Gradation	1 for every moisture-density.
Subbase and Base	Gradation[1]	1 sample every 750 m^3 (1000 CY).
	In-Place Density[2/12]	1 sample every 750 m^3 (1000 CY).
	Moisture-Density Relationship[3]	1 initially and every 20 density tests.
Asphaltic Concrete and Pavements		
Mix Design (by Contractor)	Submittal	Design Mix (include test results)[4]: Blended Aggregate: 45 kg (100 lbs.) Asphalt: 3.9 L (1 gal.) Mineral Filler: 4.5 kg (10 lbs.)
Asphalt (including and prime and tack coat)	Sample and certification. (viscosity, flash point, penetration)	Submit a 1 quart sample material certification with test results for each shipment or lot of asphalt. Retain a duplicate 1 quart sample until completion of Work.
Aggregates (from bins or source not to exceed 1/2")	Gradation	1 test prior to start of paving operation and every 360 t (1500 tons) or 750 m^3 (1000 CY).
	Fractured Faces	Same as gradation.
	LA Abrasion	1 test prior to start of paving and 1 test every 9070 t (10,000 tons) thereafter.
	Specific Gravity	Same as gradation.
Asphaltic concrete (including asphalt treated base)	Marshall Method Test	1 test (set of 2 specimens) per day for more than 90 t (100 tons) and 1 per 2720 t (3000 tons) thereafter.

Material	Test	Minimum Sampling and Testing Frequency
	Specific Gravity	1 per each Marshall Test.
	Extraction	1 test per day for more than 90 t (100 tons) and every 900 t (1000 tons) thereafter. 1 test for each Marshall Method.
	Gradation[5]	1 per each extraction test.
	Fracture Faces[5]	1 per each extraction test.
Cored or sawed specimens	Perform complete test (thickness, percent voids - total mix, percent voids - total filled with bitumen, in-place density and bulk specific gravity) on each cored or sawed sample.[12]	Take 1 set of 3 cored sawed specimens from locations in the pavement of each test batch from which Marshall specimens were prepared. Where joints were formed with previously placed new pavement, take one specimen from longitudinal joint. If no longitudinal joints, take specimen from transverse joint. Specified density - not more than 20% of all tests may fall below the specified density.
	Portland Cement Concrete	
	Submittal[6]	For each class of concrete submit:
Mix Design (by Contractor)	Submittal	Mix design for each class of concrete in accordance with ACI 211. Include all material, tests, and certifications below. Also, include proportions, slump, air content, and water cement ratio (include certification of compatibility for more than one admixture). Strength tests at 7, 28, and 90 days and for paving mixes include flexural strengths at 7, 14, 28, and 90 days if specifications require for control. Plant Data - include compressive strength data used to establish the standard deviation for each class of concrete with a minimum of 30 tests each, if available. Refer to ACI 214.
Portland Cement and Pozzolan	Chemical and Physical tests	Manufacturer's certificate of compliance with a test report for each delivery or lot. Submit a 4.5 kg (10 lb.) sample for every other certification.
Admixtures	Certification of compatibility and samples	Submit 1 quart samples during progress of Work upon request by Contracting Officer. Submit certification including test results for each lot.
Water	Sample and test	Sample and/or water quality test if

Material	Test	Minimum Sampling and Testing Frequency
		requested by the Contracting Officer.
Coarse Aggregate (for each grading size)[7]	Gradation	1 test every 380 m^3 (500 CY) of concrete.
	Deleterious	1 test initially and thereafter when appearance makes the material suspect. (For concrete pavements see Technical Provisions.)
	Abrasion	1 every 4540 t (5,000 tons) of aggregate.
	Moisture, specific gravity and absorption[8]	1 initially and every 190 m^3 (250 CY) thereafter. Conduct 1 moisture prior to any batching and more frequently if hauling and storage does not provide a consistent moisture content.
Fine Aggregate[7]	Gradation and fineness modules	1 every 190 m^3 (250 CY) of concrete.
	Deleterious Substances	(same as coarse aggregate).
	Moisture, specific gravity and absorption[8]	(same as coarse aggregate).
Concrete	Slump	Conduct test every 40 m^3 (50 CY) and more frequently if batching appears inconsistent. Conduct with strength tests.
	Entrained Air	Conduct with slump test.
	Ambient and concrete temperatures	Conduct with slump tests.
	Unit weight, yield, and water cement ratio	Conduct with strength tests. Check unit weight and adjust aggregate weights to insure proper yield.
	Flexural strength and evaluation of results.	For concrete pavements, take one set of 8 beams every 230 m^3 (300 CY) of concrete with a minimum of 1 set per day. Test two beams at 7 days, two at 14 days, two at 28 days, and two at 90 days. Evaluate per specifications.
	Compressive strength and evaluation of results per ACI 214. (includes unit weight of each cylinder)	For all concrete over 8 m^3 (10 CY), take one set of 3 cylinders every 115 m^3 (150 CY) for each class concrete. Test one cylinder at 7 days and two at 28 days. Maintain a plot and statistical evaluation in accordance with ACI 214 for compressive strength results. Make field cure cylinders when in-situ strengths need be ascertained.
Batching and mixing equipment tests	Contract Compliance	Contractor compliance with ASTM C

Material	Test	Minimum Sampling and Testing Frequency
		94 "Standard Specifications for Ready Mix Concrete", with documentation, reports, and certification of compliance.
Curing Compound	Certification and submittal	Initially submit a 1 gallon sample with certification and test results for each lot and type of curing compound.
Vibrators	Frequency and amplitude	Check frequency and amplitude initially and at any time vibration is questionable.
	Masonry	
Concrete Masonry Units[9]	Dry shrinkage[10]	1 set of 3 per 10,000 units and manufacturer's certification and test report.
	Airdry condition[11]	Same as dry shrinkage.
	Absorption	Same as dry shrinkage.
	Compressive strength	Same as dry shrinkage.
	Unit Weight	Same as dry shrinkage.
Mortar and grout	Gradation	1 test every 2,000 units (daily).
	Compressive	1 set of 3, every 2,000 units (1 test at 7 days and 2 tests at 28 days).

NOTES:

[1] All acceptance tests shall be conducted from in-place samples.

[2] Additional tests shall be conducted when variations occur due to the contractors operations, weather conditions, site conditions, etc.

[3] Classification (ASTM D-2487), moisture contents, Atterberg limits and specific gravity tests shall be conducted for each compaction test if applicable.

[4] Materials to be submitted only upon request by the Contracting Officer.

[5] Tests can substitute for same tests required under "Aggregates" (from bins or source), although gradations will be required when blending aggregates.

[6] Increase quantities by 50 percent for Paving mixes and by 100 percent for Government testing of admixtures. Include standard deviation for similar mixes from the intended batch plant and data from a minimum of 30 tests, if available. Refer to ACI 214.

[7] A petrographic report for aggregate is required with the sample for source approval. If the total amount of all types of concrete is less than 150 m^3 (200 CY), service records from three separate structures in similar environments which used the aggregates may substitute for the petrographic.

[8] Aggregate moisture tests are to be conducted in conjunction with concrete strength tests for w/c calculations.

[9] For less than 1,000 units, the above test may be waived at the discretion of the Contracting Officer and acceptance based on manufacturers certification and test report.

Material	Test	Minimum Sampling and Testing Frequency

[10] Additional tests shall be performed when changes are made either in the manufacturing processes or in materials used in the production of the masonry units.

[11] If adequate storage protection is not provided at the jobsite, additional tests shall be made to determine that the allowable moisture condition has not been exceeded before the blocks can be placed in the structure.

[12]The nuclear densimeter, if properly calibrated, may be used but only to supplement the required testing frequency and procedures. The densimeter shall be calibrated and is recommended for use when the time for complete results becomes critical.

CONSTRUCTION ISSUE

SECTION 01450

SEQUENCE OF FINISH INSTALLATION

PART 1 - GENERAL

1.1 SUMMARY

1.1.1 This section defines special construction scheduling/sequencing requirements and procedures necessary to assure achievement of designed Indoor Air Quality (IAQ) levels for the completed project required by the EPA IAQ Program.

1.1.1.1 Scheduling: Special construction scheduling involves defined and controlled sequencing of finishes applications to ensure dissipation of emissions from finishes that off-gas significant quantities of deleterious material during curing, to separate these effects from the installation of adsorptive materials that would act as a "sink" for storage and subsequent release of these unwanted substances into building spaces and mechanical systems after project occupancy.

1.1.1.2 Procedures: Special procedures involve provision of ventilation during construction.

1.2 RELATED WORK

1.2.1. Division 1 "Sustainable Design Requirements" for additional indoor air quality requirements.

1.2.2. Baseline testing for Indoor Air Quality is specified in Division 15 Section "Testing, Adjusting, and Balancing".

1.3 DEFINITIONS

1.3.1. Type 1 Finishes: Materials and finishes which have a potential for short-term levels of off gassing from chemicals inherent in their manufacturing process, or which are applied in a form requiring vehicles or carriers for spreading which release a high level of particulate matter in the process of installation and/or curing. Type 1 Finishes include, but are not limited to the following:

1.3.1.1 Composite wood products, specifically including particleboard from which millwork, wood paneling, doors or furniture may be fabricated.

1.3.1.2 Adhesives, sealants, and glazing compounds, specifically those with petrochemical vehicles or carriers.

1.3.1.3 Wood preservatives, finishes, and paint.

1.3.1.4 Control and/or expansion joint fillers.

1.3.1.5 All hard finishes requiring adhesive installation.

1.3.1.6 Gypsum board and associated finish processes.

1.3.2. Type 2 Finishes: "Fuzzy" materials and finishes which are woven, fibrous, or porous in nature and tend to adsorb chemicals off-gassed by Type 1 finishes or may be adversely affected by particulates. These materials become "sinks" for deleterious substances which may be released much later, or collectors of contaminants that may

promote subsequent bacterial growth. Type 2 Finishes include, but are not limited to the following:

1.3.2.1 Carpet and padding.

1.3.2.2 Fabric wall covering.

1.3.2.3 Insulation exposed to the airstream.

1.3.2.4 Acoustic ceiling materials.

1.3.2.5 Fabric covered acoustic wall panels.

1.3.2.6 Upholstered furnishings.

1.3.3. Materials that can be categorized as both Type 1 and Type 2 materials shall be considered to be Type 1 materials.

1.4 SUBMITTALS

1.4.1. Supplementary Construction Schedule: Submit a schedule of construction showing compliance with requirements of this section as a supplement to the schedule in accordance with applicable requirements of Division 1 Section "Critical Path Method Schedule."

1.4.1.1 Show sequence of finishes applications and allowances for curing times. Within each air zone identify finishes, indicating their type classifications.

a. An air zone is that part of any floor area served by a single air handling unit.

1.4.1.2 Indicate and schedule types and durations of temporary ventilations proposed. Show schedule for commissioning procedures and all temporary usages of building mechanical systems, identifying types of filtration used and schedule of filter replacement and change outs.

1.4.2. Material Safety Data Sheets (MSDSs): Requirements for submittal of MSDSs are specified in the individual specification sections of this Project Manual as required.

1.5 OUALITY ASSURANCE

1.5.1. General: Perform the work of this section as a supplement to and in accordance with applicable requirements of Division 1 Section "Quality Control."

1.5.2. Finishes Installation Scheduling: As part of the Coordination and Mutual Understanding Meeting, discuss the Supplementary Construction Schedule required under this section. The purpose of this agenda item is to assure understanding of the importance of sequencing of finishes to the overall Indoor Air Quality of the facility and to secure preliminary approval of the Contracting Officer for scheduling and installation requirements for on-site work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1. Certify in writing to the Government's Designated Inspector that interior environmental control has been implemented as specified below and that required conditions are being maintained, and obtain the Government's Designated Inspector approval before starting installation of interior finishes.

3.1.2. Coordination: The Contractor is responsible to schedule and coordinate the work of all finishes installers to assure compliance with the requirements of this specification section.

3.2 INTERIOR ENVIRONMENTAL CONTROL

3.2.1. Provide and maintain controlled interior environment in accordance with the following requirements before beginning installation of interior finish materials in order to dilute and exhaust vapors produced by solvents and other carriers from liquid applied materials, and particulate matter from residual manufacturing chemicals contained in solid products.

3.2.2. Supply 100 percent outside air 24 hours a day. Supply airflow at 6 air changes per hour when outside temperatures are between 55 deg F and 85 deg F and humidity is between 30 percent and 60 percent. Supply a minimum of 1.5 air changes per hour when conditions are not within this range. (See Division 15 "Testing, Adjusting, and Balancing".)

3.2.2.1 The supply air system must have filters in place. Filtration of 30 percent efficiency should be maintained.

3.2.2.2 The HVAC system may be used to move both supply and return air with the following exceptions:

(1) Permanent return air ductwork must be cleaned per National Air Duct Cleaning Association standards upon completion of all construction and finish installation work.
(2) No recirculating air is permitted. Temporary exhaust systems may be used to exhaust air directly to the outside from the construction area.

3.2.3. Begin construction ventilation when the building is substantially enclosed.

3.2.4. Pre-commissioning and commissioning procedures for HVAC systems, including duct cleaning and filter replacement prior to release of the project to the Government for occupancy are specified in Division 15 sections.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01500

MOBILIZATION AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 GENERAL

1.1.1. This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection. Use of alternative construction facilities and temporary controls is contractor's option, subject to Contracting Officer's acceptance.

1.1.2. Regulations: Comply with industry standards and applicable laws and Installation regulations and authorities having jurisdiction.

1.1.3. The following apply to this section:

1.1.3.1. Fire, Safety, and Security

1.1.3.2. Temporary Utilities

1.1.3.3. Temporary Support Facilities

a. Government's Designated Inspector Trailer.
b. Temporary Field Offices and Sheds.
c. Temporary Enclosures and Barriers.
d. Temporary Project Identification Signs and Bulletin Boards.

1.1.3.4. Temporary Security and Protection Facilities

1.1.3.5. Environmental Protection

1.1.3.6. Operation, Termination, and Removal

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.2.2. Specific Reference:

1.2.2.1. Division 1 Section "Notice to Proceed."

1.2.2.2. Division 1 Section "Coordination."

1.2.2.3. Division 1 Section "Sustainable Design Requirements" for air quality control during construction.

1.2.2.4. Division 1 Section "Mechanical, Refrigeration, Food Service Equipment, and Electrical Coordination."

1.2.2.5. Division 1 Section "Work Restrictions."

1.2.2.6. Division1 Section "Administrative Requirements."

1.2.2.7. Division 1 Section "Critical Path Method Schedule."

1.2.2.8. Division 1 Section "Information Management."

1.2.2.9. Division 1 Section "Quality Control."

1.2.2.10. Division 1 Section "Environmental Protection."

1.2.2.11. Division 1 Section "Contract Closeout."

1.2.2.12. Division 1 Section "Fire Prevention, Safety and Security."

1.2.2.13. Division 10 Section "Signs" for temporary Project construction sign.

1.3 SUBMITTALS

1.3.1. Refer to specification Division 1 Section "Administrative Requirements" for procedures.

1.3.2. Submittal Schedule:

1.3.2.1. Provide the indicated quantity.

1.3.3. Submittal action by reviewer:

1.3.3.1. R: Review each submittal, mark to indicate action taken, and return.

1.3.3.2. I: Submittal is for information or record purposes only. No action will occur.

Action	Reference Para.	Submittal
R	1.5.5.1	Temporary Utilities Plan
R	1.6.2.1	Temporary Support Facilities Plan
R	1.7.	Temporary Security and Protection Facilities Plan

1.4 MOBILIZATION AND TEMPORARY CONTROLS

1.4.1. Provide new materials. Provide new equipment. If acceptable to the Contracting Officer, the contractor may use undamaged, previously used equipment in serviceable condition for temporary use. Provide equipment suitable for use intended.

1.4.2. Use qualified personnel for installation of temporary facilities. Coordinate with the Contracting Officer on locating facilities where they will serve the project adequately and result in minimum interference with performance of the work.

1.4.3. Provide each facility ready for use to avoid delays. Maintain and modify as required. Do not remove until facilities are no longer necessary or replaced by authorized use of completed permanent facilities.

1.4.4. Protection of Property Markers and Official Datum Points: Protect from damage during construction. Remove only if necessary for construction and with approval of the Contracting Officer.

1.4.5. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire prevention measures. Do not allow hazardous, dangerous, unsanitary conditions, or public nuisances to develop or persist on-site or off-site.

1.4.5.1. Protection of Existing On-site and Off-site Facilities:

a. Protect on-site and off-site facilities, utilities, streets, and curbs from damage, dust, and dirt. Restore affected areas to original state or better at no expense to the Government.
b. Protect and preserve, in operating condition, active utility services that traverse or border the project site. Repair damage resulting from this work at no expense to the Government.

1.4.6. Verify areas available for access, parking, and material storage before starting work.

1.4.6.1. The construction documents indicate staging areas.

1.4.6.2. Barricades, Warning Signs, and Lights: Comply with standards for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard protected against. Where appropriate, provide lighting including flashing red or amber lights.

1.4.6.3. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people and animals from easily entering the enclosure.

1.4.6.4. Covered Walkway: Where required for protection of persons accessing the commissary, erect a structurally adequate, protective covered walkway for passage of persons. Coordinate with entrances, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction. Provide handrails, barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage. Extend the back wall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the Contracting Officer.

1.5 TEMPORARY UTILITIES

1.5.1. Temporary utilities include, but are not limited to, the following:

1.5.1.1. Water service and distribution.

1.5.1.2. Temporary electric power and light.

1.5.1.3. Temporary heat.

1.5.1.4. Ventilation.

1.5.1.5. Telephone service.

1.5.1.6. Sanitary facilities, including drinking water.

1.5.2. General: Where only part of utility services are available, provide the remainder with matching, compatible materials and equipment. Comply with installation recommendations.

1.5.2.1. Arrange with the Contracting Officer for service interruptions and connections for temporary services.

1.5.2.2. Use Charges: The contractor is responsible for all temporary utility fees and their connection, removal, and restoration (e.g., electricity, gas, telephone, and water). Provide metering devices with programmable use rates, appropriate for the utility being used, and acceptable to the Contracting Officer.

1.5.3. Standards: Comply with NEC Electrical Design Library "Temporary Electrical Facilities."

1.5.4. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5.5. Submittals:

1.5.5.1. Provide a Temporary Utilities plan which identifies, but is not limited to, plans and procedures for the following:

a. Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
b. Implementation and Termination Schedule: Include in the CPM schedule (refer to Section 01310) a sub-schedule indicating implementation and termination of each temporary utility.
c. Proposed utility connection and termination plan.
d. Items identified in subparagraphs of paragraph 1.5.

1.5.6. Water Service and Distribution

1.5.6.1. Water Service: Install distribution piping of sizes and pressures adequate for construction operations.

1.5.7. Temporary Electric Power and Light

1.5.7.1. Temporary Electric Power: Provide weatherproof, grounded electric power distribution system of sufficient size, capacity, and power characteristics during the construction period.

1.5.7.2. Temporary Lighting: Provide temporary lighting with local switching. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

a. For new construction maintain a minimum of 10 foot candles (or more if required by regulatory agencies) in all areas. Increase the lighting levels to a minimum of 75 foot candles when drywall, painting, and other finish operations begin.

1.5.7.3. Electrical Outlets: Provide properly configured, NEMA polarized outlets to prevent insertion of 110 to 120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

1.5.7.4. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

1.5.7.5. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide moisture resistant exterior fixtures.

1.5.8. Temporary Heat

1.5.8.1. Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on existing installation, newly completed installations, and elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

1.5.8.2. Heating Units: Provide temporary heating units tested and labeled by UL, FM, or another recognized trade associated related to the type of fuel being consumed.

1.5.8.3. Heating Facilities: Except where the Government authorizes use of the permanent system, provide vented, self-contained, LP gas or fuel oil heaters with individual space thermostatic control.

a. Prohibit the use of open flame, salamander, or burning space heating units.

1.5.9. Ventilation

1.5.9.1. Temporary Ventilation: Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, and gases. Locate exterior exhausts away from entrances and air intake equipment.

1.5.10. Telephone Service

1.5.10.1. Temporary Telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities. Install telephone on a separate line for each temporary office.

a. At each telephone, post a list of operational and emergency telephone numbers.

1.5.11. Sanitary Facilities, Including Drinking Water

1.5.11.1. Sanitary facilities include temporary toilets, wash facilities, and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the project needs (verify locations acceptable to the Contracting Officer before proceeding).

a. Toilets: Use of the Government's existing sanitary facilities is not permitted.

1.5.11.2. Water: Provide potable water approved by local health authorities.

1.5.11.3. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type for construction personnel. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar non-absorbent material.

1.6 TEMPORARY SUPPORT FACILITIES

1.6.1. Provide any other equipment, facilities, or materials necessary to house office operations and protect stored construction materials or building equipment from the elements. This includes, but is not limited to: storage trailers, crating, etc. Support facilities include, but are not limited to, the following:

1.6.1.1. Field offices and storage sheds.

1.6.1.2. Temporary enclosures.

1.6.1.3. Temporary project identification signs and bulletin boards.

1.6.1.4. Waste disposal services.

1.6.1.5. Rodent and pest control.

1.6.2. Submittals:

1.6.2.1. Provide a Temporary Support Facilities plan which identifies, but is not limited to, plans and procedures for the following:

a. Implementation and Termination Schedule: Include in the CPM schedule, (refer to Division 1 Section "Critical Path Method Schedule") a sub-schedule indicating implementation and termination of each temporary support facility.
b. Proposed staging area plan.
c. Proposed site layout for temporary facilities and offices.
d. Floor plan for Government's Designated Inspector facility.
e. Other items identified in subparagraphs of paragraph 1.6

1.6.3. Government's Designated Inspector Field Office:

1.6.3.1. Provide a temporary office trailer (new or like new condition) for the use of Government's Designated Inspector. Physically detach the office from the contractor's structure.

1.6.3.2. Government's Designated Inspector Field Office: Install the office complete with utilities within three weeks after Notice to Proceed (NTP) in a location and orientation approved by the Government's Designated Inspector. Strap down the office to prevent shifting or dislocation by wind. Maintain office, including utilities and sanitary facilities, until completion of all punch list work at the end of the contract. This may require relocation, at contractor's expense, of the office and utilities to allow completion of the project. Place utilities to support office occupancy at any time of the day or night. Field office shall be "Williams Scottsman" model 46'x10', model 44'x12', "GE Capital" model GS-1260, or equal. Furnish and equip the office as follows:

a. Furnish separate offices for representatives of the DeCA Contracting Officer and the Nexcom Contracting Officer with the following for room:

(1) Two each 60 inch by 30 inch double pedestal desks with lockable drawers.
(2) One each 72 inch by 36 inch plan table.
(3) Two each legal size 4 drawer metal lockable file cabinets.
(4) Two desk type swivel chairs with arm rests.
(5) One stool to match plan table height.
(6) One waste basket.
(7) Electric water cooler including scheduled delivery of bottled drinking water and drinking cups, quantities on an as-needed basis.
(8) Twelve inch wide shelving and a minimum of 20 LF for reference books (installed by contractor at direction of the Government's Designated Inspector.
(9) Small conference table (minimum of 30 x 96 inches) and four chairs.
(10) One plan storage rack (Minimum capacity of six sets of full size project plans).
(11) Outside security light operated by photocell

b. Equip each office with:

(1) Fluorescent lighting with minimum of 550 lux at desk tops and plan table, incandescent lighting acceptable in restroom.
(2) Restroom complete with functional toilet, sink, and toilet accessories; with hot and cold potable water and connected to nearest water supply and sanitary sewer system. Insulate and heat trace water, sewer line, and holding tank (if applicable) to protect from freezing in cold climate areas.
(3) A minimum of 6 duplex 120 volt convenience outlets, distributed versus ganged.
(4) Two commercial telephone line (voice and data transmission quality without call waiting) and service with jacks in the office and the general room (cost of the monthly service charge and long distance call to be borne by the Government's Designated Inspector; installation paid by the contractor).
(5) One high speed internet connection.

(6) Window in general area and in the office areas.
(7) Blinds on all windows.
(8) Automatic heating and cooling sufficient to maintain 75 degrees F annually.
(9) Utilities inclusive of electricity, potable water, sewage collection and disposal, and telephone service. Make all utility connections and connection charges. Pay all monthly utility service charges except for the Government's Designated Inspector monthly telephone and long distance service.
(10) Security in the form of steel bars on the windows and steel (versus sheet metal) hasp capable of receiving a padlock on doors.
(11) Sturdy and safe access to the building free from water, mud, and other obstacles, with mud scraper outside entrance.

c. Meet all contract codes. All furnishings new or like new condition.

1.6.3.3. Late Provision of Government's Designated Inspector Field Office: Failure to provide the facility within the time period allotted shall subject the contractor to a deductive modification to the contract for all reasonable costs incurred by the Government for the provision of a temporary office facility for each Government's Designated Inspector for each day of contractor delay in providing the facility on site. Additionally, the deductive modification will cover temporary office facilities (leased motel room, 7 days per week), mileage, cellular communication, reproduction, and datafax costs incurred in the course of business by each Government's Designated Inspector during the applicable period of contractor delay. The Government's Designated Inspector will maintain mileage logs, phone logs, datafax logs, and receipts.

1.6.4. Temporary Field Offices and Sheds

1.6.4.1. Field Offices: Within 21 days from notice to proceed, provide insulated, weather tight temporary offices of sufficient size to accommodate required office personnel at the project site. Keep the office clean and orderly for use for small progress meetings, etc.

a. Provide prefabricated or mobile units with lockable entrances, operable windows, and serviceable finishes. Provide heated and air conditioned units on foundations adequate for normal loading.

1.6.4.2. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.

a. Coordinate and obtain approval of location of field offices and storage sheds with the Contracting Officer.

1.6.5. Temporary Project Identification Signs and Bulletin Boards

1.6.5.1. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.

a. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with requirements contained in Section 10431.
b. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
c. No other signs permitted without the Contracting Officer's permission except those required by law.

1.6.5.2. Plywood: For signs and directory boards, provide exterior-type, Grade B-B high density concrete form overlay plywood, unless otherwise indicated, of size and thickness indicated.

1.6.5.3. Paint: For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer unless otherwise indicated.

1.6.6. Waste Disposal Services

1.6.6.1. Collection and Disposal of Waste: Collect waste from the construction areas and elsewhere on a daily basis.

1.6.7. Rodent and Pest Control

1.6.7.1. Rodent and Pest Control: Retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures at regular intervals so the project will be free of pests and their residues at completion of the project. Perform control operations lawfully, using environmentally safe materials.

1.6.8. Grounds Maintenance

1.6.8.1. Perform routine grounds maintenance to prevent accumulation of debris and overgrowth of grounds cover and vegetation. Mow as required when weeds and grasses reach 3" in height.

1.7 TEMPORARY SECURITY AND PROTECTION FACILITIES

1.7.1. Security and protection facilities include, but are not limited to, the following:

1.7.1.1. Temporary fire protection.

1.7.1.2. Barricades, warning signs, and lights.

1.7.1.3. General lighting.

1.7.1.4. Enclosure fence for the site.

1.7.1.5. Covered walkways.

1.7.1.6. Security enclosure and lockup.

1.7.1.7. Environmental protection.

1.7.2. Submittals:

1.7.2.1. Provide a Temporary Security and Protection Facilities plan which identifies, but is not limited to, procedures for the following:

a. Implementation and Termination Schedule: Include in the CPM schedule (refer to Division 1 Section "Critical Path Method Schedule") a sub-schedule indicating implementation and termination of each temporary facility.
b. Proposed layout and construction materials for items in paragraph 1.7.

1.7.3. Temporary Fire Protection

1.7.3.1. Fire Extinguishers: Provide hand carried, portable, UL rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand carried, portable, UL rated, Class ABC, dry chemical extinguishers or a combination of extinguishers of NFPA recommended classes for the exposure.

a. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

1.7.4. Barricades, Warning Signs, and Lights

1.7.4.1. Tarpaulins: Provide waterproof, fire resistant, UL labeled tarpaulins with a flame spread rating of 15 or less. For temporary enclosures, provide translucent, nylon reinforced, laminated polyethylene or polyvinyl chloride, fire retardant tarpaulins.

1.7.4.2. Lumber and Plywood:

a. For vision barriers, provide minimum 3/8 inch thick exterior plywood.
b. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8 inch thick exterior plywood. Paint sides facing sales area two coats gloss white.

1.7.4.3. Wind Damage Control: Provide properly designed and constructed temporary bracing of adequate strength to prevent damage to project and component parts due to normal and excessive wind forces. Replace or repair damaged portions of project and component parts at no additional cost to the Government.

1.7.5. Enclosure Fence for the Site

1.7.5.1. Site Limit Barrier: Provide a site limit barrier constructed of a temporary chain link fence, at least 6 feet high, on steel posts with a steel top rail and bottom tension wires.

1.7.5.2. Open-Mesh Fencing 6 Foot High: Provide 0.120 inch thick, galvanized 2 inch chain link fabric fencing and galvanized steel pipe posts, 1 ½ inch I.D. for line posts and 2 inch I.D. for corner posts. Provide gates of similar construction.

1.7.6. Covered Walkways

1.7.6.1. Provide walkway roofs with adequately braced 2" x 4" wood or metal studs with 5/8 inch plywood on the exterior side.

1.7.7. Security Enclosure and Lockup

1.7.7.1. Security Dust Barriers: Provide security dust barriers as required, similar in all respects to the dust barrier, except that the security dust barrier has, in addition to the tarpaulin, a layer of 5/8 inch plywood attached full height to the opposite side of the studs from the tarpaulin.

1.7.7.2. Security Weather tight Temporary Enclosure: Where security weather tight temporary enclosures are required, provide a temporary framework with 5/8 inch plywood on the exterior side and 5/8 inch gypsum wallboard or plywood on the interior. Install a tarpaulin over exterior surfaces subject to the weather, taped and secured to provide a weather tight enclosure. Construct to comply with wind load requirements. Maintain weather tight throughout the time in use.

1.7.7.3. Provide doors in temporary enclosures for access to the work, of similar construction to the temporary enclosure in which it occurs. Provide doors with hinges, braces, and locks.

a. Security Weather tight Barriers: Where security Weather tight barriers are required, provide a temporary framework with 5/8 inch plywood on the exterior side and 5/8 inch gypsum board or plywood on the interior side. Provide one layer of polyethylene fiberglass reinforced film on exterior surfaces subject to the weather. Tape and secured to provide a weather tight enclosure. Maintain weather tight throughout the construction period.

1.8 OPERATION, TERMINATION, AND REMOVAL

1.8.1. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

1.8.2. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by the elements.

1.8.3. Maintain support facilities until near project final acceptance. Remove prior to project final acceptance.

1.8.3.1. Maintain operations of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24 hour basis where required to achieve indicated results and to avoid possibility of damage.

1.8.3.2. Protection: Prevent water-filled piping from freezing.

1.8.4. Termination and Removal: Unless the Contracting Officer requests longer maintenance, remove each temporary facility when the need ends or when replaced by authorized use of a permanent facility. Complete or, if necessary, restore permanent construction delayed because of interference with the temporary facility. Repair damaged work, clean exposed surfaces, and replace irreparable construction.

1.8.4.1. Materials and facilities that constitute temporary facilities are the contractor's property. The government reserves the right to take possession of project identification signs.

1.8.4.2. For areas intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01560

ENVIRONMENTAL PROTECTION

PREFACE

The following Attachments are included at the end of this Section:

1. Certification of Completed Abatement
2. Environmental Certification Accompanying Completion of New Construction
3. Environmental Permits Status Matrix

Where environmental requirements differ from each other, only the Contracting Officer or his representative shall provide clarification.

PART 1 - REFERENCES

1.1 APPLICABLE REFERENCES ARE LISTED IN THE FOLLOWING ARTICLES

1.2 DEPARTMENT OF DEFENSE INSTRUCTIONS, POLICIES, GUIDANCE DOCUMENTS, MEMORANDA, INSTALLATION REGULATIONS AND ASSOCIATED GUIDANCE DOCUMENTS:

1.2.1. COE document EP 1165-2-314 (Flood Proofing Regulations).

1.2.2. Section 404 and Section 10 of Clean Water Act.

1.2.3. Department of Defense, Measure of Merit, Solid Waste Management.

1.2.4. US Department of Housing and Urban Development Guidelines for Evaluation and Control of Lead-based Paint Hazards in Housing.

1.2.5. DoD Guidance Document 4715.5-G “Overseas Environmental Baseline Guidance Document.”

1.2.6. DoD Directive 6050.7 “Environmental Effects Abroad of Major Department of Defense Actions.”

1.2.7. AFI 32-4002, “Hazardous Material Emergency Planning and Response Program.”

1.2.8. AFI 32-7042, “Solid and Hazardous Waste Compliance.”

1.2.9. AFI 32-7080, “Pollution Prevention Program.”

1.2.10. AFI 32-7086, “Hazardous Materials Management.”

1.2.11. SECNAVINST 5090.6A “Environmental Planning for Department of the Navy Actions.”

1.2.12. SECNAVINST 5090.8 “Policy for Environmental Protection, Natural Resources and Cultural Resources Programs.”

1.2.13. OPNAV Instruction 5090.1B “Navy Environmental and Natural Resources Program Manual.”

1.2.14. UFGS 13280A, “Asbestos Hazard Control Activities”

1.2.15. UFGS 13281N, “Engineering Control of Asbestos Containing Materials”

1.2.16. UFGS 13283N, “Removal/Control and Disposal of Paint with Lead

1.3 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY(EPA) REGULATIONS:

1.3.1. Resource Conservation and Recovery Act (RCRA) - 40 Code of Federal Regulation (CFR) Parts 148, 260, 261, 263, 264, 265, 266, 268, 270, 271, 272, 273, 279, 280, 281, 282, and 355.

1.3.2. Clean Water Act – 40 CFR Parts 112, 122, 123, 124, 125, 129, 130, 131, and 401–471.

1.3.3. EPA Document 832-R-92-005, Stormwater Management for Construction Activities.

1.3.4. Clean Air Act – 40 CFR Parts 50, 52, 61, 63, 68, 70, 71, 86-89, 745.

1.3.5. EPCRA – SARA Title III Sections 301, 302, 303, 304, 311, 312, and 313.

1.4 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) REGULATIONS:

1.4.1. Hazard Communication – 29 CFR 1910.1200.

1.4.2. Hazardous Waste Operations and Emergency Reponses (HAZWOPER) – 29 CFR 1910.120.

1.4.3. Material Handling – 29 CFR 1910.176.

1.4.4. Toxic and Hazardous Substances – 29 CFR 1910.1030.

1.5 DEPARTMENT OF TRANSPORTATION (DoT) REGULATIONS

1.5.1. 49 CFR Parts 171 – 173.

1.6 OTHER FEDERAL REGULATIONS

1.6.1. National Historic Preservation Act.

1.6.2. Archeological and Historic Preservation Act.

1.6.3. Endangered Species Act.

1.6.4. The American Indian Religious Freedom Act.

1.6.5. Archeological Resources Protection Act.

1.6.6. The Native American Graves Protection and Repatriation Act.

1.6.7. National Environmental Policy Act.

1.6.8. Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management, dated 24 JAN 2007

1.7 OTHER STATE, REGIONAL, LOCAL AND INSTALLATION PLANS, POLICIES, REGULATIONS, AND PERMITTING PROCEDURES TO CONSIDER

1.7.1. Installation Plans, Policies, and Procedures

1.7.1.1. Installation Asbestos Management Strategy.

1.7.1.2. Installation Hazardous Waste Management Plan.

1.7.1.3. Installation Compliance Assurance Through Pollution Prevention Plan.

1.7.1.4. Installation Integrated Natural Resource Management Plan.

1.7.1.5. Installation Endangered Species Management Plan.

1.7.1.6. Installation Cultural Resources Management Plan.

1.7.1.7. Installation Spill Prevention and Response Plan.

1.7.1.8. Installation Storm Water Pollution Prevention Plan.

1.7.1.9. Installation Stormwater Training Manual.

1.7.1.10. Installation Air Quality Management Plan.

1.7.2. State Regulations

1.7.2.1. Air Pollution Prevention and Control Act.

1.7.2.2. Hazardous Waste Regulations.

1.7.2.3. Water Quality and Wastewater Regulations.

1.7.2.4. Tank Regulations.

1.7.2.5. Oil and Petroleum Spill Prevention Regulations.

1.7.2.6. Solid Waste Regulations.

1.7.2.7. Special Pollutants.

1.7.2.8. Pesticides, Herbicides, and Fungicides.

1.7.3. Local and Regional Plans, Policies, and Regulations

1.7.3.1. Local Policy Plan.

1.7.3.2. Drainage Criteria Manual.

1.7.3.3. Department of Health Fugitive Dust Regulations.

1.7.3.4. Floodplain Management.

1.7.3.5. Coastal Zone Management Regulations

1.7.3.6. Stormwater Discharge and Stormwater Pollution Prevention Regulations]

PART 2 - DEFINITIONS

2.1 ACRONYMS

A/E	Architecture/Engineering Firm
ACM	Asbestos Containing Material
AFJMAN	Air Force Joint Manual
AFOSH	Air Force Occupational Health and Safety
AFI	Air Force Instruction
APCD	Air Pollution Control Division
APEN	Air Pollutant Emissions Notice
AST	Above Ground Storage Tank
BMP	Best Management Practice
CEV	Civil Engineering Environmental Flight
CFR	Code of Federal Regulations
COE	United States Army Corps of Engineers
DOD	Department of Defense
DODI	Department of Defense Instruction
DOT	Department of Transportation
DPHE	Department of Public Health and Environment
EO	Executive Order
EPA	Environmental Protection Agency
HAZMAT	Hazardous Material
HAZWOPER	Hazardous Waste Operations and Emergency Response
HW	Hazardous Waste
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
LBP	Lead-based Paint
MSDS	Material Safety Data Sheet
NAF	Non-Appropriated Fund
NAVFAC	Navy Facilities Engineering Command
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
ODC	Ozone Depleting Chemicals
OS	Operating Support
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
PLS	Pure Live Seed
POC	Point of Contact
POL	Petroleum, Oil, and Lubricants
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SPRP	Spill Prevention and Response Plan
SPCC	Spill Prevention Control and Countermeasure

SWPPP	Stormwater Pollution Prevention Plan
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

2.2 TERMS

2.2.1. Containment: The act of stopping the spread or propagation of hazardous substances spilled or released into the environment.

2.2.2. Contractor: Any company or individual contracted to work on the project site.

2.2.3. Cleanup: The act of removing hazardous substances from the scene of a spill release in accordance with established federal, state, local, and Installation procedures.

2.2.4. Construction Contractor: Any person or agency providing a material or a service to DeCA by authority of a contract. Includes the prime contractor and all subcontractors.

2.2.5. Contingency Plan: A document containing an organized, planned, and coordinated course of action designed to prevent pollution incidents and limit pollution in the event of fire, explosion, or spill/release of hazardous substances.

2.2.6. Discharge: The release of hazardous waste/materials into the environment.

2.2.7. Disposal: The thermal destruction or permanent land filling of hazardous waste.

2.2.8. Environment: The natural surroundings that allow life to exist.

2.2.9. Environmental Service Provider: Environmental Consulting Firm contracted by the A/E or A/E Firm if environmental professionals are in-house.

2.2.10. Fugitive Particulates: Solid airborne particulate matter emitted from any source that channels the flow of air pollutants directly into the atmosphere by natural forces or by mechanical processes such as crushing, grinding, milling, drilling, demolishing, shoveling, conveying, covering, bagging, or sweeping.

2.2.11. Generator: Any person or agency that produces, creates, or discovers hazardous waste.

2.2.12. Hazardous Chemical: In relationship to laboratories, a chemical for which there is statistically significant evidence, based on at least one study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed employees (29 CFR 910.1450(b)).

2.2.13. Hazardous Material (HAZMAT)

a. Any item or chemical that is a “health hazard” or “physical hazard” as defined by OSHA in 29 CFR 1910.1200 or by the EPA at 40 CFR 370, 372, and 100-180, including the following:
(1) Chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes;
(2) Chemicals which are combustible liquids, compressed gases, explosives, flammable liquids, flammable solids, organic peroxides, oxidizers, pyrophorics, unstable (reactive) or water reactive;
(3) Chemicals which in the course of normal handling, use, or storage operations may produce or release dusts, gases, fumes, vapors, mists or smoke which may have any of the above characteristics;

(4) Any item or chemical which is reportable or potentially reportable as inventory under the reporting requirements of the hazardous chemical reporting section of 40 CFR (40 CFR part 370), or as an environmental release under the reporting of the toxic chemical release reporting community right-to-know (40 CFR part 372), including chemicals with special characteristics which in the opinion of the manufacturer can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other receptacles).
(5) Any item or chemical which, when being transported or moved, is a risk to public safety or is an environmental hazard and is regulated as such by one or more of the following:

(a) Department of Transportation HAZMAT Regulations (40 CFR 100-180)
(b) Dangerous Goods Code of the International Maritime Organization(IMO)
(c) Dangerous Goods Regulations of the International Air Transport Association (IATA)
(d) Technical Instructions of the International Civil Aviation Organization (ICAO)
(e) US Air Force Joint Manual (AFJMAN), Preparing HAZMAT for Military Shipments (AFJMAN 24-2204)

2.2.14. Hazardous Substance: A material and its mixtures or solutions that is identified by the letter “E” in column (1) of the Hazardous Materials Table, 49 CFR Sec. 172.101:

a. When offered for transportation in one package, or in a transport vehicle if not packaged, and when the quantity of the material therein equals the reportable quantity;

b. Any substance designated pursuant to Section 311 (b)(2)(A) of the Federal Water Pollution Control Act, and any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act;

c. Any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act;

d. Any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

e. Any hazardous air pollutant listed under Section 112 of the Clean Air Act.

2.2.15. Hazardous Waste: Any HAZMAT or hazardous chemical that has been used, contaminated, spilled, and recovered, and is impossible to reuse, recycle or treat. This term also refers to residues generated as a result of recycling activities and empty containers whose previous contents were hazardous.

2.2.16. Incompatible: Any two materials, which create a violent reaction when combined.

2.2.17. Installation: The military base, post, depot, etc. on which the project is located.

2.2.18. Landfill: The disposal of waste by land burial.

2.2.19. Material Safety Data Sheet: A report detailing the hazardous characteristics and dangers of a specific material.

2.2.20. NAF Work Force: NAF employees or their contractors who perform projects on the Installation.

2.2.21. Permitted: An activity approved by an authority with official control over the activity.

2.2.22. On-site: Presence within the boundaries of the work-site.

2.2.23. Pollution: Contamination in the environment.

2.2.24. Reportable Quantity: The quantity of spilled or released hazardous substances requiring notification as defined by federal, state, and local regulations.

2.2.25. Resource Conservation and Recovery Act (RCRA: The Federal Act, which gives the EPA environmental protection regulation and enforcement authority concerning hazardous waste (HW) and associated activities.

2.2.26. Safety: Freedom from man-equipment-material-environmental interactions that result in injury or illness.

2.2.27. Solid Waste: Any discarded material in any physical state.

2.2.28. Spill: An unintentional release to the environment.

2.2.29. Training: Formal instruction, in addition to existing job knowledge, designed to protect human health and the environment by increased awareness and improved job proficiency.

2.2.30. User/Owner: Any person, organization, or agency that stores or uses a hazardous material is classified as a user/owner of such hazardous materials.

PART 3 - PURPOSE

3.1 The following Parts provide construction contractor specifications to provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility of contamination, pollution, or other undesirable effects.

3.2 All applicable specifications and accompanying documentation should be included in bid documents provided to construction contractors.

3.3 Permitting: The Contractor shall notify Installation Environmental Representatives when a permit is required and requested as part of this construction contract. The Construction Contractor shall also notify the Installation Environmental Representative when the permit has been received.

PART 4 - AIR QUALITY

4.1.1. There are specific air quality permitting restriction notices. Refer to the Environmental Permit Status Matrix.

4.1.2. Contractors shall ensure all company-owned and employee owned gasoline and diesel vehicles driven on the Installation comply with the emissions inspection requirements of the Department of Public Health and Environment (DPHE) Motor Vehicle Emissions Inspection Program and Reduction of Diesel Vehicle Emissions.

4.1.3. The contractor shall restrict emissions of all smoke and fugitive particulates, to levels less than 20 percent opacity at the point of emission, and to levels that do not visibly disperse beyond the Installation's property boundaries unless exempt.

4.1.4. The contractor shall ensure any equipment containing ozone-depleting chemicals (ODC) are operated and maintained in accordance with State's Control of Emission of Ozone-Depleting Compounds requirements. Train and certify all contractors and subcontractor employees servicing ODC containing equipment.

4.1.5. The contractor shall take active steps to prevent evaporation of all solid or liquid materials that have potential to become airborne including but not limited to fuels, solvents, paints, and other volatile chemicals under the contractor's control. Close all containers holding solid or liquid materials that have potential to become airborne at all times, except when adding product to or removing product from the container.

4.1.6. The contractor shall fully comply with the conditions of all applicable air quality permits and applicable air quality requirements. Local and State Regulations of Air Pollution Prevention and Control Act.

4.1.7. The contractor shall comply with all requirements of Fugitive Particulate Control Plans required by and prepared for DPHE.

4.2 When a Fugitive Particulate Control Plan is not required, the contractor shall perform all fugitive particulate control measures necessary to prevent emissions of over 20 percent opacity or visible emissions that cross the Installation's property boundaries.

4.2.1. The contractor shall maintain a daily log of fugitive particulate emissions that exceed 20 percent opacity or that cause visible emissions crossing the Installation's property boundaries. The contractor shall maintain a copy of this log on site at all times and shall make it available for review to the Installation upon request.

4.2.2. The contractor shall not utilize cutback asphalt or any coating included in the definition of cutback asphalt during the months of March through September unless the cutback asphalt is used solely as a penetrating prime coat or if the user can demonstrate to DPHE Air Pollution Control Division that under the conditions of its intended use, there shall be no emissions of volatile organic compounds to the ambient air.

4.2.3. Contractors shall not apply sand or gravel to Installation roads without obtaining prior written approval from the Contracting Officer.

4.2.4. The contractor shall submit copies of all fugitive particulate emission logs, and any other logs required by Fugitive Particulate Control Plans, to the Contracting Officer no later than seven working days after completion of work.

4.2.5. The contractor shall properly re-vegetate all disturbed land to prevent fugitive particulate emissions following the completion of work.

PART 5 - WASTEWATER AND STORMWATER

5.1 The construction contractor is expected to be familiar with and comply with regulations including but not limited to 40 CFR 122.26 (EPA NPDES Permit Regulations), state and local wastewater regulations, COE document EO 1165-2-304 (1976 Flood Plain Regulations for Flood Plain Management), EPA document 832-R-92-005 (Storm Water Management for Construction Activities), state and local Stormwater regulations), the County Drainage Plan and the City/County Drainage Criteria Manual.

5.2 Concerning wastewater discharges, the contractor shall:

a. Be familiar with all relevant requirements of permits held by the Installation. Refer to the Environmental Permit Status matrix.

b. Not discharge wastewater or water (including surface discharges and underground injection) that could impact the quality of the surface water or groundwater of the state without prior approval of the Installation Environmental Office.

c. Implement basic housekeeping provisions of the applicable wastewater discharge permit including monitoring and sampling, inspections, reporting, and record keeping.

5.3 Concerning construction projects that shall disturb greater than or equal to one (1) acres, contractor shall:

a. Complete, submit and obtain all necessary stormwater approvals from the State prior to staging any facilities, equipment, or materials onsite. A draft Construction Storm Water Pollution Prevention Plan (SWPPP) has been prepared for the Contractor's use on this project. Completion of the plan shall be the responsibility of the Contractor. It may be necessary for the Contractor to retain the services of a Professional Engineer registered in the state of where the project is located to complete and certify the SWPPP. The SWPPP shall include appropriate Best Management Practices (BMPs) to minimize the discharge of pollutants from the site. The draft SWPPP is available as part of the solicitation package for this project.

b. Submit a State approved Notice of Intent (NOI), a blank copy of which is contained in the SWPPP, to the Contracting Officer prior to staging any facilities, equipment, or materials onsite. The NOI includes a certification that the activity shall not impact endangered or threatened species.

c. Install and operate all BMPs.

d. Review the Installation Storm Water Training Manual and complete and submit the associated test to the Contracting Officer or, if approved by the Contracting Officer and available, attend an annual 60-minute training class on storm water pollution prevention.

e. Maintain and post a copy of the SWPPP, NOI, and training certificates at the construction site.

f. Submit a Notice of Termination (NOT) (EPA Form 3510-7) to the Contracting Officer after:

(1) all construction debris, equipment, materials, and facilities are removed
(2) the construction areas are inspected,
(3) all temporary storm water BMPs are removed
(4) ground cover is at 70 percent or when final stabilization of the site has been achieved as defined by the permit, and
(5) the final inspection is performed.

g. Once approved by the Installation, the NOT shall be co-signed by the Installation and the contractor, and the Installation shall submit it to the EPA or state permit authority.

5.4 Concerning construction projects that shall disturb less than one acre, the contractor shall:

a. Comply with the requirements of the Installation’s SWPPP.

b. As required, obtain a separate discharge permit (based upon an evaluation of contractor proposed operations and the Installation’s NPDES permit). Site activities disturbing less than 1 acre are also regulated as small construction activity if they are part of a larger common plan of development or sale with a planned disturbance of equal to or greater than 1 acre and less than 5 acres, or if the NPDES permitting authority designates them. The NPDES permitting authority may designate construction activities disturbing less than 1 acre based on the potential for contribution to a violation of a water quality standard or for significant pollutants to waters of the United States.

5.5 Regardless of the size of the project, storm water runoff from the project site shall be restricted to historical flows during and after construction. The contractor shall submit for approval devices/designs to comply with this condition to the Contracting Officer. Structural BMPs may include but are not limited to mulch, grass, stockpile covers, silt fences, inlet protection, check dams, stabilized construction entrances, and sediment traps. Non-structural BMPs may include but are not limited to minimizing disturbances, preserving natural vegetation, and good housekeeping practices.

5.6 Following each storm event of 0.1 inch or greater or at least weekly, the contractor shall inspect erosion and pollution control devices and correct any deficiencies immediately. Record these inspections and records maintained onsite.

5.7 To ensure compliance with other Clean Water Act requirements, the construction contractor:

a. Shall not discharge any domestic, construction and/or industrial waste (including any hazardous material or hazardous waste) to the sanitary sewer system without first securing the approval of the Installation. This applies to glycol type wastes drained from heating, ventilation, and air conditioning facilities.

b. Shall not discharge any domestic, construction, and/or industrial waste (including any hazardous material or hazardous waste) to the ground, drainage areas, local bodies of water, or by underground injection.

c. Shall not use surface or underground water supplies for any contract-related activities without approval from the Contracting Officer.

d. 4. Shall not dispose of dredged materials in wetlands, dispose of excavated materials into waters of the U.S., use fill for road crossings, or dispose of similar dredge or fill materials in the waters of the U.S. without a permit obtained in coordination with the Contracting Officer.

e. Shall not discharge groundwater from trenches during construction without a dewatering permit from the EPA.

PART 6 - HAZARDOUS MATERIAL

6.1 All hazardous materials brought on-site by the construction contractor shall be subject to pre-approval by the Installation. The Installation reserves the right to prohibit the use of hazardous materials it deems to be especially hazardous to human health or the environment. The Installation also reserves the right to prohibit the use of hazardous materials due to the type and/or quantity of hazardous wastes potentially generated from the materials. In the event of disapproval of a hazardous material for use on the Installation, the Installation may provide the construction contractor a list of suitable substitutes; however, the construction contractor shall retain responsibility for finding an acceptable substitute. The Installation promotes waste minimization and pollution prevention practices and all contractors shall take appropriate actions to comply with this policy.

6.2 Hazardous materials requirements are designed to ensure the Installation meets and maintains compliance with:

a. State and Local Hazardous Waste Regulations for Generators.

b. State and Local Hazardous Waste Regulations for Transporters.

c. AFI 32-7032, Solid and Hazardous Waste Compliance.

d. AFI 32-7080, Compliance Assurance through Pollution Prevention Program.

e. AFI 32-7086, Hazardous Materials Management.

f. AFI 32-4002; Hazardous Material Emergency Planning and Response Program.

g. OSHA Hazard Communication Regulation – 29 CFR Part 1910.1200.

h. OSHA General Handling Material Requirements – 29 CFR Part 1910.176.

6.3 Current Conditions

6.3.1. Review of the site and of Installation documentation has identified that the following hazardous material conditions are currently present at the project location: **None.**

6.4 Hazardous Material Reporting Requirements

6.4.1. A minimum of ten working days prior to commencement of work on site, the construction contractor shall submit to the Contracting Officer a listing of hazardous materials on site during the performance of the contract. The listing shall include estimated usage and estimated quantities for each hazardous material. The contractor shall identify any "extremely hazardous substances" (40 CFR Part 355, Appendix A and B) to be used during the execution of the contract and indicate if the amount of the chemical exceeds the threshold planning quantity. The construction contractor shall also supply a Material Safety Data Sheet (MSDS) for each hazardous material. The construction contractor shall give a brief description of use of the hazardous material. The MSDS shall be OSHA Form 174 or equivalent, as directed by OSHA Hazard Communication requirements (29 CFR 1910.1200).

6.4.2. The construction contractor shall, at all times, maintain a complete written hazard communication program including labels and forms of warning for chemicals, an up-to-date hazardous material inventory with copies of MSDSs for all materials used on the job site, and employee information and training on hazardous chemicals in their work area. If the construction contractor transports any hazardous wastes or hazardous materials, the contractor shall classify the hazardous materials (Class 1 through Class 9) and comply with DOT requirements. Applicable requirements may include packing and repacking, labeling, marking, and placarding, handling, vehicle routing, and the manufacturing of packaging and transportation containers. The construction contractor shall transport all hazardous materials in accordance with all applicable Federal, state and local regulations. Transporters of hazardous wastes that operate and have a transfer facility are required to obtain an EPA identification number and comply with additional requirements cited at 6 CCR 1007-3, Part 263.

6.5 Hazardous Materials Usage Reports

6.5.1. Contracts with a performance period of less than or equal to ninety (90) days: Construction contractors shall immediately report hazardous materials used at any time during the execution of the contract to the Contracting Officer. The report shall include a listing of the total amount hazardous materials used while performing work on site and a description of the disposition of each hazardous material (e.g., fully consumed during contract/project execution, saved for future use, or disposed of as hazardous waste in accordance with state and local hazardous waste regulations for generators, transporters, and treatment, storage, and disposal facilities).

6.5.2. Contracts with a performance period of greater than ninety (90) days: Every 90 days from the start of work on site, the construction contractor shall report to the Contracting Officer hazardous materials used in the previous 90 day period. The report, submitted ten (10) working days after the end of each ninety (90) day period, shall

include a listing of all hazardous materials used while performing work on site, the total amount of each hazardous material used, and a description of the disposition of each hazardous material (e.g., fully consumed during contract/project execution, saved for future use, or disposed of as hazardous waste in accordance with state hazardous waste regulations for generators, transporters, and treatment, storage, and disposal facilities).

6.6 Final Report

6.6.1. The construction contractor shall submit a final inventory of all hazardous materials used since the last hazardous usage report no later than ten working days after completion of work. The final inventory shall list all hazardous materials used, total amount of each used, and a description of the disposition of any remaining hazardous materials (e.g., fully consumed during contract/project execution, saved for future use, or disposed of as hazardous waste in accordance with state hazardous waste regulations for generators, transporters, and treatment, storage, and disposal facilities).

6.7 Hazardous Material Handling

6.7.1. Construction contractors shall transport and store all known or potentially hazardous materials in original containers with manufacturer labels meeting the OSHA Hazard Communication requirements (29 CFR 1910.1200). Repackage or place bulk materials and materials into different containers at the job site and clearly label in accordance with OSHA Hazard Communication requirements (29 CFR 1910.1200). Do not bring materials without proper, legible labeling to the Installation.

6.7.2. The construction contractor shall only use and store hazardous materials in areas that are free from obstructions or hazards such as tripping hazards, fire, standing water, or pests. All hazardous materials shall be separated in accordance with OSHA Material Handling requirements (29 CFR 1910.176[c]) and OSHA Hazard Communication requirements (1910.1200[b], and 1910.1200[f]).

6.7.3. The construction contractor shall store hazardous materials in containers that are in good condition, with no leaks or rust.

PART 7 - WASTE MANAGEMENT AND DISPOSAL

7.1 Construction and demolition debris consists of the materials generated during the construction, renovation, and demolition of buildings, roads, and bridges. Construction and demolition debris often contains bulky, heavy materials that include:

a. concrete,

b. wood (from buildings),

c. asphalt (from roads and roofing shingles),

d. gypsum (the main component of drywall),

e. metals,

f. bricks,

g. glass,

h. plastics,

i. salvaged building components (i.e. doors, windows, and plumbing fixtures)

j. trees, stumps, earth, and rock from clearing sites.

7.2 Reducing and recycling construction and demolition debris conserves landfill space, reduces the environmental impact of producing new materials, creates jobs, and can reduce overall building project expenses through avoided purchase/disposal costs.

7.3 The waste requirements are designed to ensure the Installation meets and maintains compliance with:

a. OSHA's Toxic and Hazardous Substances requirements for bloodborne pathogens – 29 CFR 1910.1030.

b. State Solid Waste Regulations.

7.4 If the construction contractor generates solid wastes during the execution of a contract, the construction contractor shall prepare a Solid Waste, Construction, and Demolition Debris Waste Management plan utilizing an outline provided by CEV and provide this plan to the Contracting Officer ten (10) working days before commencement of construction activities. Among other things, this plan shall document the extent to which waste materials can be recycled and identify the disposal/recycling pathway. In-house and troop forces shall comply with all the requirements contained in the Installation Solid Waste, Construction, and Demolition Debris Waste Management plan and do not need to write a separate plan.

7.5 The construction contractor shall integrate generated solid waste into the Installation recycling process as appropriate. The construction contractor shall utilize local sources for recycling as much as possible.

7.6 As applicable, the construction contractor shall provide Installation with a plan for the disposal of medical waste.

7.7 The construction contractor shall prepare and submit to the Contracting Officer a "Solid Waste Disposal Report" on a quarterly basis. This report shall itemize the type and amount of solid waste, by disposal category (e.g., recycled, land filled, reused) that was disposed of during the previous quarter.

7.8 The construction contractor shall dispose of bulky wastes and demolition debris properly (e.g., automobile bodies, furniture, and appliances are required to be salvaged or crushed so as to minimum the volume of waste). Scrap tires may only be disposed of at approved solid waste disposal facilities.

7.9 The construction contractor shall place all solid waste in a solid waste dumpster or roll-off provided by the construction contractor.

7.10 Contaminated reusable sharps and other regulated wastes are required to be placed in puncture resistant, color coded, leak proof containers, as soon as possible after use and until properly reprocessed. Place specimens of blood

or other potentially infectious materials in a container that prevents leakage during collection, handling, processing, storage, transport, or shipping. Specific labeling and handling requirements are to be followed (29 CFR 1910.1030[d]). The construction contractor must also comply with the packaging, storage and labeling requirements specified in State's solid waste regulation if the contractor generates infectious wastes.

7.11 To the extent practicable and as applicable, the construction contractor shall collect compost materials (organics, vegetation, grass, wood debris, etc.) and arrange with the Installation to utilize the material in its composting program. To the extent practicable and as applicable, the contractor shall sort and, if economically feasible, recycle wood debris by three categories: painted, pressure treated, or creosote treated.

7.12 The construction contractor shall dispose of sewage through existing connections to the Installation sanitary sewage system. Where such connections are not available, use chemical toilets or comparably effective units; periodically, have these toilets serviced by a licensed contractor in accordance with all applicable regulations. Do not dispose of sanitary waste into the sewage system without approval of the Installation.

7.13 For projects requiring offsite disposal of solid waste, disposal shall be to land fills holding a valid State Waste Disposal Permit.

7.14 The Installation does not have disposal facilities available for use by the construction contractor.

PART 8 - HISTORIC AND CULTURAL RESOURCES

8.1 The National Historic Preservation Act of 1966 (NHPA) Title 16 United States Code (U.S.C.) Section 470, establishes the role of the Federal government, in cooperation with other nations and in partnership with the States, local governments, Indian tribes, and private organizations and individuals regarding significant cultural resources. These specific roles are outlined in Sections 402, 110, 111, and 106. Among these are standing architectural features (districts, buildings, structures, and objects) and archaeological sites.

8.2 The Installation has determined that no historic or cultural resources exist within the project site.

8.3 If any artifacts over 50 years old are discovered during construction activities, the construction contractor should cease work and contact the Contracting Officer for further instructions.

PART 9 - NATURAL RESOURCES

9.1 General

9.1.1. Construction activities impacting wildlife habitat should be planned outside of the primary breeding and nesting periods whenever possible. Impacts to aquatic resources should be planned during low flow periods and outside of primary spawning seasons.

9.1.2. Workers shall not harm or harass any wildlife species.

9.1.3. Pesticide use should be in accordance with the Installation's Pesticide Management Plan and according to all product labels. The Pesticide Management Plan may have restrictions not found on labels that protect sensitive habitats or endangered species.

9.1.4. The construction contractor shall return the staging area to its original condition upon completion of the work. Returning the staging area to its original condition may require, among other things, revegetation and remediation. Perform the work at the construction contractor's expense.

9.1.5. Construction contractors shall minimize, to the extent possible, the creation of new roads and trails around project areas. Any such trails/roads shall be rehabilitated and re-vegetated by the construction contractor when the project is completed

9.2 Wetlands and Other Waters of the United States

9.2.1. Section 404 and Section 10 of the Clean Water Act regulate dredge and fill operations within Waters of the United States. The United States Army Corps of Engineers (USACE) has jurisdiction over activities affecting Waters of the United States including special aquatic areas such as wetlands.

9.2.2. There are no wetlands or Waters of the United States within or adjacent to the project site. It was not necessary to obtain a USACE Permit for this project. Should it be determined over the course of the project that wetlands or Waters of the United States are impacted by the project, the Contracting Officer shall be notified and the following conditions shall be met.

9.2.3. All water crossings and wetland impacts should be limited to the least amount possible.

9.2.4. Mats should be used for large equipment working in wetlands. This will limit vegetation and soil disturbances.

9.2.5. Construction areas and staging areas near wetlands and streams should contain ample storm water controls to avoid sediment or other pollutants from reaching these waters.

9.2.6. Construction within a designated 100-year floodplain is required to adhere to any local floodplain permits or ordinances.

9.3 Threatened and Endangered Species

9.3.1. The Endangered Species Act of 1973, as amended, requires all federal actions be assessed for potential impacts to species designated as threatened or endangered by the Department of the Interior.

9.3.2. The Installation has not identified that any protected species are present within the project area. Should it be determined over the course of the project that protected species are impacted by the project, the Contracting Officer shall be notified and the following conditions shall be met. If identified, the following restrictions and protective measures must be taken to ensure that construction activities do not affect any protected species.

a. All site personnel shall be instructed by the Installation as to the reason for, and importance of, limiting impacts to vegetated habitat outside the work area.

b. The Installation familiar with the habitat needs and identification of the species of concern may supervise Work at all times. This type of monitoring is usually only necessary for new construction projects and when the species of concern are likely to enter the work zone.

c. The area of proposed impacts for any construction, maintenance, or repair actions shall be fenced with aesthetically pleasing fence or a similar visible barrier to prevent inadvertent impacts to habitat outside the construction footprint.

d. In the unlikely event that a threatened or endangered species (dead, injured, or hibernating) is located during any activities, the USFWS, and Installation Natural Resources Point of Contact (POC) shall be contacted immediately.

9.4 Construction Timber

9.4.1.1. All projects on the Installation for which removal of trees is a requirement shall be coordinated with and approved by the Installation's Natural Resource POC. In accordance with Department of Defense Instruction (DODI) 4715.3, DODI 7310.1, and AFI 32-7064 Section 8.3, forest products shall not be given away, abandoned, destroyed, or used to offset contract costs.

9.4.1.2. All merchantable wood products [i.e. stems and limb wood equal to or greater than 4 (four) inches in diameter] that result from projects on the Installation proper shall have all limbs removed and be delivered to the Installation's wood yard if one exists. Such deliveries shall be coordinated with the Installation's Natural Resource POC to allow access to the wood yard. Leaving wood outside the wood yard fence is strictly prohibited.

9.4.1.3. All limb wood (to include stem wood) less than four inches in diameter produced in the completion of projects on Installation shall be delivered to the Installation's compost yard. Responsible parties shall contact the Installation's Natural Resource POC to coordinate delivery. Leaving limb wood outside of the compost yard fence is strictly prohibited. However, projects involving small amounts of limb wood may dispose of the wood by broadcasting it at the site if prior coordination has been made with the Natural Resource POC. In such cases, the limbs shall be lopped so as not to exceed twelve inches above ground level.

9.4.1.4. If no compost or wood yard exists on the Installation, the contractor should coordinate proposed off-site disposal methods and locations with the Installation's Natural Resource POC.

9.4.1.5. Any and all stumps that are to remain on site shall be cut as close to ground level as practical, not to exceed six (6) inches above ground level. Tree branches that obstruct the movement of equipment shall be cut flush to the trunk. The remaining portions of limbs broken by the passage of equipment shall be cut back flush to the trunk.

9.4.1.6. Any and all stumps with attached root masses shall be disposed of off Installation property to an approved landfill unless specifically authorized by the Installation's Natural Resource POS. Proper disposal of such stumps is the exclusive responsibility of the contractor responsible for the project.

9.4.1.7. In the event of a bona fide emergency outside of normal duty hours, trees may be removed if absolutely necessary without consulting the Installation's Natural Resource POC. All other provisions, however, remain in effect with regard to disposal of wood products at the earliest opportunity.

9.4.1.8. Removal of forest products without a permit from the Installation constitutes theft of government property.

9.5 Native Revegetation of Disturbed Areas

9.5.1. Consult the Installation's Vegetation Management Plan and Integrated Natural Resource Management Plan for seed mixes for re-vegetating disturbed areas. Construction contractors or government workers shall consult with the Installation's natural resources staff to develop a Restoration Plan for project areas. If such plans are not in existence and the Installation does not have a natural resource staff the local Natural Resource Conservation Commission (NRCS) should be contacted for their recommendations. The goal of the Restoration Plan is to restore disturbed areas to their original natural condition unless otherwise stipulated by landscape designs.

9.5.2. Plant Materials: Special seed mixes may need to be developed for unique sites such as wetlands and riparian areas. Any modification of the recommended seed mixes shall be coordinated with the Contracting Officer and/or natural resource staff. All seed mixes shall use certified varieties, be free of noxious weeds, and have been tested for purity and germination within one year of the planting date. If possible, all seed should originate from sources not more than 250 miles south, 150 miles north, and 200 miles east or west of the Installation.

9.5.3. Special consideration should be taken on rangeland areas. For range management areas, contractors shall use only certified weed-free hay on Installation property.

9.5.4. Site Preparation: Soil Preparation. Prior to disturbance activities every attempt should be made to stockpile topsoil from disturbed areas for later use in restoration activities. The disturbed site shall be tilled to a minimum depth of six inches, then harrowed or raked to produce a firm seedbed for planting. Some sites may not require tillage to provide a suitable seedbed, but this determination will only be made by Installation personnel. Sites without suitable surface soils for plant growth shall be covered with 4-6 inches of weed-free native topsoil that shall be incorporated by disking. Large rocks (>6 inch diameter) and other debris shall be cleared from the site. Any necessary structures (e.g., water bars, turnouts) to reduce runoff and prevent soil erosion shall be constructed prior to seeding.

9.5.5. Seeding and Mulching

a. Seeding Dates. The type of seed mixtures to be used will be affected by the planting season. Normal seeding shall occur during seasons with ample rainfall and temperature to promote growth. If planting during the dry season supplemental irrigation of 0.5 inches/week shall be provided during the first growing season to promote seedling survival, unless otherwise stated by the Installation.

b. Seeding Methods. Drill seeding or broadcast seeding shall be used depending on the slope of the disturbed site and the size of the area.

(1) Slopes less than 3:1 – Seed shall be drilled using a rangeland or grass drill with a small seed/legume box and an agitator box for fluffy or bulky seed. Seed rows shall be spaced 7-10 inches apart, and planted 0.5 to 0.75 inches deep. The drill shall have double disk furrow openers with depth bands and packer wheels. Seeding shall be accomplished by following the contour of the slope. The drill shall be calibrated each day or whenever changing seed mixes to ensure even seed distribution.

(2) Slopes greater than 3:1 and areas less than 0.5 acre – Seed shall be broadcast by hand, mechanical spreader, or hydraulic equipment. Broadcast seeded areas shall be raked or harrowed to incorporate the seed into the soil at a depth not exceeding 0.75 inches. Seed shall not be mixed in a tank with hydromulch and broadcast.

(3) Mulching. Weed-free native hay, weed-free straw, virgin wood fiber hydromulch, or erosion control blankets shall be used to promote germination and seedling establishment. Native hay, straw, or hydromulch shall be applied at 2000 pounds/acre on slopes less than 3:1. Native hay or straw shall be crimped into the soil to a depth of 3-4 inches, and shall protrude above the ground 3-4 inches. Hydromulch shall be applied using the recommended rate of an organic tackifier. Erosion control blankets shall be used whenever reclaiming slopes greater than 3:1 or along drainage areas where erosion is probable.

c. Reseeding. If a partial or total seeding failure is apparent after the second growing season, unvegetated areas shall be reseeded in the same manner described above. Appropriate site preparation practices shall be used to create a suitable seedbed for planting, but any established native vegetation shall be undisturbed. Areas that erode and lose seed before establishment can occur shall be immediately reseeded.

9.5.6. Trees and Shrubs:

a. Protection: Protect existing trees which are to remain from injury, bruise, defacing, or other damage from construction operations. Remove displaced rocks. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.

b. Replacement: Remove trees and other landscape features scarred or damaged by construction operations, and replace with equivalent, undamaged trees and landscape features. Obtain Contracting Officer's approval before replacement.

c. On February 3, 1999, the President issued Executive Order 13112 to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts. All landscaping should consist of native, non-invasive species.

PART 10 - POLYCHLORINATED BIPHENYLS

10.1 Polychlorinated Biphenyls (PCBs) are mixtures of synthetic organic chemicals with the same basic chemical structure and similar physical properties ranging from oily liquids to waxy solids. Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics and rubber products; in pigments, dyes and carbonless copy paper and many other applications. More than 1.5 billion pounds of PCBs were manufactured in the United States prior to cessation of production in 1977.

10.2 Concern over the toxicity and persistence in the environment of PCBs led Congress in 1976 to enact §6(e) of the Toxic Substances Control Act (TSCA) that included among other things, prohibitions on the manufacture, processing, and distribution in commerce of PCBs. Thus, TSCA legislated true "cradle to grave" (i.e., from manufacture to disposal) management of PCBs in the United States.

10.3 Construction contractors shall provide certification that all persons or entities under contractor control have had awareness training to recognize the potential presence of PCBs that may be encountered during conduct of service or construction contracts.

10.4 Construction contractors shall prepare a written procedure outlining the notification process between their employees/subcontractors/agents and contractor management and to the Contracting Officer informing of the presence of PCBs not identified beforehand.

10.5 Construction contractors shall be responsible for ensuring equipment or materials brought on the Installation do not contain PCBs. The construction contractor shall be required to obtain prior approval from the Contracting Officer for an exemption to this requirement.

10.6 Should the contractor encounter previously unidentified or unanticipated suspect PCB items, that must be disturbed, the contractor shall cease that work which would disturb the suspect items and shall immediately notify the Contracting Officer. The Installation shall evaluate the extent to which there are cost impacts to abatement and disposal and take steps as necessary to resolve the issue.

PART 11 - RADON

11.1 Radon (chemical symbol Rn) is a naturally occurring radioactive gas found in soils, rock, and water throughout the U.S. It has numerous different isotopes, but radon-220, and -222 are the most common. Radon causes lung cancer, and is a threat to health because it tends to collect in homes, sometimes to very high concentrations. As a result, radon is the largest source of exposure to naturally occurring radiation.

11.2 The Radon requirements are designed to ensure the Installation meets and maintains compliance with 40 CFR Part 61, Subpart I.

11.3 The project site does not have Radon concerns.

PART 12 - LEAD-BASED PAINT

12.1 It is not expected that lead based paint will be encountered as part of this work. If material suspected of containing lead based paint are encountered, proceed in accordance with the following sections:

12.2 The lead based paint specification covers the requirements for limiting occupational and environmental exposure to lead when removing/controlling lead-based paint or paint with lead (LBP/PWL). In additions to the following specifications any LBP/PWL abatement activities should conform to Unified Facilities Guide Specification UFGS 13283N (February 2002).

12.3 These specifications are intended for use in projects where LBP/PWL must be removed/controlled (including paint film stabilization) or lead-based paint hazards abated as defined by Public Law 102-550 Title X - Residential Lead-Based Paint Hazard Reduction Act of 1992. Local requirements may be substantially restrictive for the conduction of LBP or LBP hazard abatement projects.

12.4 State or local regulations may have specific requirements for written project designs. Research specific State or local requirements for public, commercial buildings or structures. Consider the bracketed occupant protection plan for high profile sensitive work such as present in family housing, childcare facilities, administrative buildings, kitchens, etc.

12.5 The requirements for Lead-based Paint are designed to ensure the Installation meets and maintains compliance with EPA's LBP regulations – 40 CFR 745 and local and state LBP regulations.

12.6 The construction contractor shall be responsible to comply with state requirement for state certification of all individuals who perform lead-based paint. The construction contractor shall provide the Contracting Officer with copies of all lead-based paint activities, licenses, and certifications of competent persons.

12.7 The construction contractor is responsible for submitting a detailed job-specific plan of the work procedures to be used in the removal/control of LBP/PWL. The plan shall include a sketch showing the location, size, and details

of lead control areas, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, controls and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and paint debris disposal plan, air sampling plan, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside the lead control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training, sampling methodology, frequency, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multi-contractor worksites to inform affected employees and to clarify responsibilities to control exposures.

12.8 The construction contractor shall test construction debris for lead using the Toxicity Characteristic Leaching Procedure and submit analytical results to the Contracting Officer, as applicable. The construction contractor shall utilize sampling procedures and analytical methods consistent with EPA guidance. File the results of the analysis into the project folder and send to the Contracting Officer for review. Dispose of any waste streams identified as hazardous of under applicable federal and state regulations.

12.9 The construction contractor shall be responsible to comply with state's LBP regulations, EPA's LBP regulations codified at 40 CFR 745, and the US Department of Housing and Urban Development Guidelines for Evaluation and Control of Lead-based Paint Hazards in Housing.

PART 13 - ASBESTOS

13.1 It is not expected that asbestos materials will be encountered in the Work. If materials suspected of containing asbestos materials are encountered, do not disturb them and immediately notify the Contracting Officer. The Government will have the hazardous material removed under a separate contract.

PART 14 - SPILL PREVENTION AND RESPONSE PROCEDURE PLAN

14.1 General

14.1.1. Spill prevention and response requirements are designed to ensure the Installation meets and maintains compliance with:

a. AFI 32-4002; Hazardous Material Emergency Planning and Response Program.

b. RCRA Contingency Planning Requirements – 40 CFR Part 264, Subpart D, 40 CFR Part 265 Subpart D, and 40 CFR 279.52.

c. OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Regulation – 29 CFR Part 1910.120.

d. Spill Prevention Control and Countermeasure Plan – 40 CFR 112.7.

14.1.2. Spill response and reporting procedures and liability requirements are designed to ensure the Installation meets and maintains compliance with:

a. AFI 32-4002; Hazardous Material Emergency Planning and Response Program.

b. RCRA Contingency Planning Requirements – 40 CFR Part 264, Subpart D, 40 CFR Part 265 Subpart D, and 40 CFR 279.52.

c. OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Regulation – 29 CFR Part 1910.120.

d. Spill Prevention Control and Countermeasure Plan – 40 CFR 112.7.

e. Emergency Planning and Community Right-To-Know (SARA Title III) – Sections 301, 302, 303, and 304.

14.1.3. The Requirements for Petroleum, Oil, & Lubricants are designed to ensure the Installation meets and maintains compliance with:

a. OSHA's Hazard Communication Regulation – 29 CFR 1910.1200.

b. EPA SPCC Requirements – 40 CFR 112.

c. Local and State Oil and Petroleum Spill Prevention Requirements.

14.2 Responsibility

14.2.1. If the construction contractor manages, stores, or uses hazardous materials (including fuels) or produces hazardous waste, they must develop a Spill Prevention and Response Procedure (SPRP) Plan. The construction contractor's SPRP plan shall contain, as a minimum:

a. General identification information including:
   (1) Contractor name
   (2) Mailing address
   (3) Primary and alternate contacts
   (4) Contact's phone numbers (land line plus mobile if available)
   (5) Contact's pagers
   (6) Contact's fax number

b. A list of spill prevention and response equipment and materials with a corresponding map showing their location on-site.

c. A description of hazardous chemicals, HAZMAT, and their storage containers with a corresponding map showing their location on-site.

d. Actions the construction contractor shall take upon discovery of an incident including a statement of emergency response actions that the construction contractor will take based upon its training and capabilities.

e. Procedures for notification of the Installation after discovery of an incident.

f. Actions the contractors shall take to contain and clean up spills as well as dispose of spill residue.

g. A description of how the contractor shall coordinate and complete any required corrective actions.

h. A description of required employee hazardous material and spill response training. (Training to be provided to employees as required by all applicable Federal, state, and local regulations and copies of employee workplace hazard training program maintained on site at all times).

14.2.2. The construction contractor shall submit the completed SPRP plan to the Contracting Officer a minimum of ten working days prior to commencement of work for review and approval. The Installation will make a copy of its SPRP plan available to the construction contractor, upon request, to use as a guide in preparing their SPRP. The construction contractor may not adopt the Installation's SPRP as the construction contractors SPRP without the addition of construction contractor specific information as outlined above.

14.3 Spill Response and Reporting Procedures and Liability

14.3.1. The construction contractor shall manage, store, and use all hazardous materials (including fuels) in accordance with good engineering practices and implement best management practices in order to prevent spills and releases. The construction contractor shall report spills to the Installation and execute timely and appropriate actions to contain and cleanup all spills in accordance with the contractor SPRP plan and the Installation SPRP. The Installation does not authorize the construction contractor employees to provide emergency response nor clean up actions beyond the level of training of their employees. Once a spill or release of a hazardous material managed, used, or stored by the construction contractor has been contained, the Installation shall determine if additional cleanup is required and the extent of the contractor's responsibility. The construction contractor shall be liable for any direct and indirect costs incurred during spill response and clean-up, including but not limited to administrative costs, materials, labor, equipment, shipping, packaging, testing, replacement equipment and materials, and disposal.

14.3.2. Construction contractor-owned tanks used for vehicle or equipment refueling shall only be allowed to exist at the Installation if approved by the Contracting Officer. Construction contractors requesting permission to stage a fuel tank on the Installation shall do so in writing to the Contracting Officer. Construction contractors shall prepare a Spill Prevention Control and Countermeasure Plan (SPCC) and submit it with their request to stage a fuel tank. The construction contractor shall not use aboveground tanks with an individual capacity of greater than 660 gallons.

14.3.3. During fuel transfers, the contractor shall utilize spill containment devices and have spill containment materials available.

14.3.4. The construction contractor is prohibited from performing routine servicing of vehicles such as oil changes or brake fluid changes on Installation property.

14.3.5. The construction contractor is prohibited from using oil on roadways or other surface areas for dust suppression.

14.3.6. The construction contractor shall not release secondary containment water when oil sheen is present. The contractor shall collect contaminated containment water and make arrangements with the Installation Environmental Office for its proper disposition.

14.3.7. If the construction contractor uses aboveground petroleum, oil, and lubricants (POL) storage tanks, they shall be Underwriters Laboratory-approved, double-walled, convault-type tanks.

14.3.8. The construction contractor, if an owner or operator of an AST containing POLs, is subject to provisions of the OSHA Hazard Communication Standard cited at 29 CFR 1910.1200 and must comply with labels and other forms of warning, MSDSs, and training.

14.3.9. The construction contractor, if a generator of used oil, is subject to management standards for used oil (40 CFR 279.1) and must:

a. Store used oil only in tanks and containers.

b. Keep tanks and containers in good condition and free of leaks.

c. Label tanks and containers with the words “used oil”.

d. Stop, contain and cleanup spills or releases to the environment.

e. Use a transporter with an EPA identification number when shipping used oil off-site.

14.3.10. The construction contractor managing POLs at the Installation is subject to local and state oil and petroleum spill prevention requirements including but not limited to the following reporting requirements:

14.3.11. The construction contractor must report a release of oil that enters or may enter “waters of the state” including surface waters, groundwater, dry gullies, or storm sewers leading to surface waters to Local and State Department of Public Health and Environment (DPHE) immediately, the Installation Environmental Office shall also be notified.

14.3.12. The construction contractor must report releases of oil to land greater than 25 gallons to the state immediately and notify the Installation Environmental Office.

14.3.13. The construction contractor shall not mix used oil with characteristic hazardous waste (e.g. gasoline) since the mixing constitutes hazardous waste treatment and requires a permit.

PART 15 - REFRIGERANT HANDLING

15.1.1. See Section 01565.

CONSTRUCTION ISSUE

APPENDIX A

CERTIFICATION OF COMPLETED ABATEMENT

As authorized representative of the contractor, I hereby certify and attest that I have completed abatement work on project _____
Description
at _____, Contract Number _____
Location Number
in accordance with the contract provisions, federal, state and local regulations and have disposed of all waste and debris associated with this work at a landfill or disposal site authorized and licensed to accept such wastes. Copies of project logs and documents, landfill receipts and waste manifests are attached. At completion of all work, the work are visually inspected and found to be free and clear of all visual signs of asbestos materials and that clearance air quality monitoring and sample analysis under aggressive air disturbance conditions was found to be within permissible levels for space re-occupancy.

The contractor's representative further accepts and acknowledges that the contractor assumes all responsibilities for latent defects attributable to his failure to follow prescribed procedures or failure to properly abate the required conditions as described in the contract.

by: _____
Signature, Contractor or Authorized Representative Date

_____
Printed Name

_____
Printed Title and Firm

GOVERNMENT INSPECTOR'S CERTIFICATION

The Government's Inspector hereby certifies that he has accompanied the Contractor's Representative on his visual inspection and reviewed the results of his final clearance air quality monitoring and verifies that, to the best of his knowledge and belief, the above representations by the Contractor's Representative are true and correct.

by: _____
Signature Date

_____
Printed Name

_____
Printed Title and Firm

APPENDIX B

ENVIRONMENTAL CERTIFICATION
ACCOMPANYING COMPLETION OF NEW CONSTRUCTION

As authorized representative of the Contractor, I hereby certify and attest, to the best of my knowledge, that the construction completed under the contract (Government Contract No._____) is free and clear of building materials and products containing regulated quantities of asbestos and/or lead-based paints. I have determined the above based on product labels, manufacturer's information, submittal documents for specified materials, and other information available to me. The Contractor's representative further acknowledges and accepts that if it is later found that the Contractor has intentionally defrauded or misrepresented these facts, then the Contractor assumes total and complete liability for fines, penalties and/or abatement and removal of these materials at the direction of the Government.

by: _____

Signature, Contractor or Authorized Representative Date

_____

Printed Name

_____

Printed Title and Firm

GOVERNMENT INSPECTOR'S CERTIFICATION

The Government's Inspector hereby certifies and attests that, to the best of knowledge and belief, the above representations by the Contractor's representative are true and correct.

by: _____

Signature Date

_____

Printed Name

_____

Printed Title and Firm

Proposed Joint Commissary and Navy Exchange
NSA Annapolis , MD

ENVIRONMENTAL PERMITS STATUS MATRIX

PERMIT TYPE	PERMIT REQUIRED Y/N AND NUMBER	LOCAL JURISDICTION CONTACTED AND DATE	SUBMITTAL REQUIREMENTS	IF YES, TIME REQUIRED FOR PERMIT	PERMIT FEE	Website Link
AIR QUALITY	Y	All permit will be submitted to the ENV PWD Annapolis then sent to the appropriate agency for approval	Varies, depending on what is to be installed	3-11 months depending on permit	See link	http://www.mde.state.md.us/assets/document/permit/2008PermitGuide/arma/1.01.pdf
WATER QUALITY	Y	All permit will be submitted to the ENV PWD Annapolis then sent to the appropriate agency for approval	NPDES Permit, concurrent with approved MDE Erosion and Sediment Control Plan	3-6 months	Total disturbed area (in acres) 1 to less than 10 $100 10 to less than 15 $500 15 to less than 20 $1500 20 or more acres $2500	http://www.mde.state.md.us/assets/document/GPCA_Unified_Permit_Form_2009-l.pdf
SOLID WASTE/LANDFILL	N					
HAZARDOUS WASTE	N					
STORM WATER and EROSION/SEDIMENT CONTROL PLAN	Y	All permit will be submitted to the ENV PWD Annapolis then sent to the appropriate agency for approval	Submittal of MDE Stormwater and Erosion/Sediment Control Plan is ongoing by the Design A/E	3-6 months, use of expeditor is recommended save a few months	No Fee	http://www.mde.state.md.us/assets/document/permit/2008PermitGuide/WMA/3.21.pdf
COSTAL ZONE MANAGEMENT	N					
SANITARY SEWER SYSTEM	N					http://www.mde.state.md.us/assets/document/permit/2008PermitGuide/WMA/3.07.pdf
WATER SUPPLY SYSTEM	N					See above
FLOOD PLAIN/DREDGE AND FILL	N					
FORESTRY/TREE REMOVAL	Y	All permit will be submitted to the ENV PWD Annapolis then sent to the appropriate agency for approval	Tree save plan is part of E&S control Plan requirements		See link above under E&S Plans	See link above under E&S Plans
EXCAVATION/SOIL BORROW	Y	All permit will be submitted to the ENV PWD Annapolis then sent to the appropriate agency for approval	Submittal of MDE Erosion and Sediment Control Plan requirements	Concurrent with E&S plan timeframe	See link above under E&S Plans	See link above under E&S Plans
WETLANDS	N					

FOOTNOTES:

1.01 AIR QUALITY GENERAL PERMITS TO CONSTRUCT

- *Question: Am I planning on installing new equipment or modifying, replacing or moving existing equipment that is included in the list below and will be a source of air emissions?*

Why do I need this approval?

General permits with standardized permit conditions have been established for businesses with the following equipment:
• Perchloroethylene dry cleaning equipment
• Charbroilers
• Pit barbecues
• Small fuel burning equipment
• Small stationary gasoline storage tanks
• Groundwater air stripper/soil vapor extraction systems
• Sheetfed non-heatset lithographic printers
• Vehicle refinishing (autobody)
• Medium fuel burning equipment
• Ready-Mix Concrete Batch Plants
If you perform any of the above, a general permit makes the permitting process easier and quicker. Permits to construct establish the conditions and limitations for the operation so that appropriate emissions controls are included in the design of the facility.

What laws or regulations give MDE the legal authority to issue this approval?

STATE: Environment Article, Title 2, Subtitle 4; COMAR 26.11.02.

What is the process to get this approval?

1) Complete a "request for coverage" form. To request a general permit to construct package call (410) 537-3230 or go to http://www.mde.state.md.us/Permits/AirManagementPermits/Air_Permit/index.asp.
2) Mail the completed form and payment to:
MDE/ARMA
P.O. Box 2037
Baltimore MD 21203-2037
Coverage under the general permit becomes effective on the date the Department receives the completed request for coverage form and fee. The Department mails a letter acknowledging the receipt of the request and fee payment.

Are there any other requirements?

To obtain coverage under the general permit, all applicability requirements listed in the air quality general permit to construct package must be met. Each package is different based on the type of business activity covered.

How long should I expect it to take to get this approval once I submit a complete application?

30 days

Once I get this approval, how long will it last?

This is a one-time permit required prior to construction and/or installation or modification of the regulated emission source. If construction or installation does not take place within 18 months of permit issuance, then approval terminates.

How much will this approval cost?

Type of Equipment	Fee per Operation
Charbroiler or pit barbecue	$200
Small stationary gasoline storage tank farm	$200
Groundwater air stripper/soil vapor extraction system	$250
Perchloroethylene dry cleaning equipment	$500
Small fuel burning equipment	$500
Printing operation	$500
Vehicle refinishing operation	$500
Medium fuel burning equipment	$500
Ready-Mix concrete batch plant	$250

Who do I contact with additional questions?

John Scherer
Air Quality Permits Program
jscherer@mde.state.md.us
(410) 537-3230

3.21 EROSION/SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN APPROVALS

- *Question: Is the project undertaken by a State or Federal agency or local government agencies or private concerns? If so, will 5000 square feet or more or 100 cubic yards or more of earth be disturbed?* ***OR***

- *Question: Will the project impact an existing storm water management facility?*

Why do I need this approval?

The purpose of Maryland's erosion/sediment control and stormwater management programs is to reduce stream channel erosion, pollution, siltation, and local flooding caused by land use changes associated with urbanization.

Erosion/sediment control plan approval is required, before construction, to prevent siltation due to releases of sediment (soil) from active construction sites. For example, before a housing development begins, the land needs to be cleared and graded. Erosion/sediment control plan implementation is needed to control the exposed soil from washing away into the storm drains, streams, rivers, and the bay. Plan approval is required for any construction activity that disturbs 5,000 square feet or more of soil, or results in the excavation of 100 cubic yards or more of soil.

Stormwater management plan approval is required to prevent stream bank erosion by controlling the rate of stormwater runoff from newly developed areas by using infiltration practices, shallow marshes, retention, and detention ponds. For example, prior to construction, land is typically covered with grass and trees, which help slow down the rate of stormwater runoff and promotes infiltration. This reduces flooding and soil from being washed away. After construction, stormwater runoff typically increases due to the loss of ground cover and the increase of impervious surfaces such as roofs, sidewalks, roads, and parking lots. So, stormwater management is needed to control runoff to the same rate prior to construction. This approval is required for any new development project that disturbs 5,000 square feet or more of land. It can be obtained at the same time as the erosion and sediment control approval.

What laws or regulations give MDE the legal authority to issue this approval?

STATE: Environment Article, Title 4, Subtitle 1 for erosion and sediment control, and Subtitle 2 for stormwater management. These statutes are further defined in COMAR 26.17.01 and 26.17.02.

What is the process to get this approval?

<u>For erosion/sediment control and stormwater management plan approval for state and federal projects:</u>

1) The applicant submits one set of erosion/sediment control and stormwater management plans and calculations to the Department.
2) The Department either approves the plans or responds with comments to be addressed by the applicant before approval can be granted.
3) Upon approval, the Department informs the applicant in writing.
4) The Department conducts site inspections. Plans must be approved and implemented prior to the start of construction.

<u>For erosion/sediment control and stormwater management plan approval for private and local government projects:</u>

1) Contact your local government for information on applications and review process for stormwater management plan approval.
2) Contact your local soil conservation district for application and review process for erosion/sediment control approval.

Are there any other requirements?

STATE AND FEDERAL PROJECTS:

Erosion/sediment control plans and stormwater management plans are reviewed and approved by the Department. The erosion/sediment control plans must meet the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control (http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/index.asp) and adhere to the Erosion and Sediment Control Guidelines issued by the Department in January 1990 (http://www.mde.state.md.us/assets/document/State%20Erosion%20Control%20Guidelines.pdf)

Stormwater management plans must meet the 2000 Maryland stormwater design manual (http://www.mde.state.md.us/assets/document/Manual%202005.pdf) and Stormwater Management Guidelines For State and Federal Projects issued by the Department in July 2001 (http://www.mde.state.md.us/assets/document/sedimentstormwater/SWM_guidelines.pdf)

PRIVATE and local GOVERNMENT PROJECTS:

Erosion/sediment control plans and stormwater management plans are reviewed by the local authorities.

How long should I expect it to take to get this approval once I submit a complete application?

6 months for erosion/sediment control and stormwater management plans for state and federal facilities.

Contact your local government and soil conservation district for review time for private and local government projects.

Once I get this approval, how long will it last?

Type of Approval	Term
Erosion/sediment control approval	Two years
Stormwater management plan approval	No expiration

How much will this approval cost?

No fee.

Do I need to know any additional information?

Copies of publications are available by calling (410) 537-3543. Local agencies may also require grading permits. You may also need the general permit for construction activity (see section 3.21).

Who do I contact with additional questions?

Jim Tracy
Sediment, Stormwater, and Dam Safety Program
jtracy@mde.state.md.us
(410) 537-3563

Related link:
http://www.mde.state.md.us/Permits/WaterManagementPermits/water_permits/index.asp

3.07 WATER AND SEWERAGE CONSTRUCTION PERMIT

- *Question: Do I plan to install, extend or modify a community water supply and/or sewerage system?*

Why do I need this approval?

The purpose of water and sewerage construction permit is to ensure that infrastructure projects throughout the State are designed on sound engineering principles and comply with State design guidelines to protect water quality and public health. Water and sewerage construction permits are required before installing, extending or modifying community water supply and/or sewerage systems including treatment plants, pumping stations and major water mains and sanitary sewers. These permits ensure conformity with local water and wastewater comprehensive plans and ensure that there is adequate funding for long-term operation.
The following major water and sewerage facilities need construction permits:
Major water facilities (A major water supply system, including structures and equipment, treats raw water and distributes potable water to serve 25 or more of the same persons on a day-to-day basis at least six months out of a year, or to serve 15 or more residential connections.):

- Water mains (diameter >15")
- Pumping or booster station
- Elevated tank or storage tank
- Water treatment facilities
- Utilization of well water for public water supply

Major sewerage facilities (A major sewerage system, including structures and equipment, collects, conveys and treats wastewaters generated from domestic, industrial, and commercial establishments.):

- Gravity sewers (diameter >15")
- Pumping station
- Force mains
- Wastewater treatment facilities
- Community or multiuse septic tank system in which a pumping station and a force main are included.

The following minor water and sewerage facilities do not need water/sewerage construction permits:

- Gravity sewers or water mains with diameter 15" or smaller
- Pumping stations with average daily flow 5,000 gpd or less
- Installation of minor items such as a meter, valve or hydrant
- Replacing equipment with new equipment of equal capacity
- Well construction (drilling)
- Construction of conventional septic tank or mound system
- Construction of facilities unrelated to water/wastewater conveyance or treatment at a water/wastewater treatment plant

What laws or regulations give MDE the legal authority to issue this approval?

STATE: Environment Article, Title 9; COMAR 26.03.12.

What is the process to get this approval?

1) Submit plans and/or specifications with the permit application.
2) The Department acknowledges receipt of plans and/or specifications, determines the permit fee, and assigns a permit number.
3) The Department verifies that the project is within the service area of the current county water and sewerage comprehensive plans, and reviews/approves the financial management plan (if applicable) for the project.
4) The Department reviews the specifications for conformity with State design guidelines and COMAR 26.03.12. After engineering comments are addressed, the Department issues the permit.

Before I apply for this approval, do I need to get any approvals from the local or federal government?

A building permit and septic system construction permit may be needed for the project, contact the county government.

Is this approval directly related or contingent on other approvals?

A discharge permit must be issued first.

Are there any other requirements?

PRE-APPROVAL: Applicants must show that the proposed facility is included in the current County Water and Sewerage Plan, and certify that the proposed facility will be operated either publicly or privately under a sound financial management plan.
POST-APPROVAL: The project must be constructed in accordance with the approved plans and specifications.

How long should I expect it to take to get this approval once I submit a complete application?

3 months

Once I get this approval, how long will it last?

One time permit, assuming no changes to the equipment.

How much will this approval cost?

No fee. for projects that qualify for a local government waiver.
Privately financed water and sewerage capital projects are charged the following fees (COMAR 26.03.12.):

Type of Construction	Fee
Water mains and gravity sewers/force mains	$125 to $1800 depending on the length of the mains.
Water and wastewater pumping stations	$400 to $1400 depending on the design capacity.
Water treatment plants	$250 to $2000 depending on the design capacity and the number of treatment processes.
Wastewater treatment plants	$450 to $2000 depending on the design capacity and the number of treatment processes.

Who do I contact with additional questions?

Dr. Ta-Shon Yu
Water Quality Infrastructure Program
tyu@mde.state.md.us
(410) 537-3758

Related link:
http://www.mde.state.md.us/Permits/WaterManagementPermits/water_permits/index.asp

CONSTRUCTION ISSUE

SECTION 01565

REFRIGERANT HANDLING

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REFRIGERANT HANDLING

3.1.1. Related Section: Division 1 Section "Sustainable Design Requirements" for CFC based products.

3.1.2. General: Accomplish all work in accordance with current regulatory requirements established by the Environmental Protection Agency, including final regulations to implement the Clean Air Act Amendments.

3.1.3. Refrigerant to be Added to Equipment: All refrigerant added to equipment is contractor furnished, contractor installed and new non-recycled.

3.2 REFRIGERANT LOG BOOK: BE RESPONSIBLE FOR FURNISHING AND MAINTAINING A REFRIGERANT LOG BOOK FOR RECORDING REFRIGERANT TRANSFERS.

3.2.1. In the log book itemize services performed, actions taken, and amount of refrigerant added to or removed from each system installed, or affected, or removed by this project.

3.2.2. The Refrigerant Log Book is a three-ring loose leaf binder containing a table of contents and a separate Refrigerant logging form for each piece of refrigeration and HVAC equipment (see sample form).

3.3 EXECUTION OF RECORD KEEPING FOR REFRIGERANT TRANSFERS:

3.3.1. Duration: Establish the Refrigerant Log Book at the start of construction and continuously maintain and keep current until completion of the warranty portion of the contract.

3.3.2. Location of Refrigerant Log Book: During the construction period, keep the log book in the possession of the contractor at the construction site. After construction is completed, keep the log book in the Store Manager's Office.

3.4 Project Close-out: Upon completion of the construction portion of the project, furnish two updated copies of the log book to DeCA/Project Manager. Then, turn the original log book over to the Commissary Officer.

3.4.1. Sustainable Design Documentation Submittals:

3.4.2. Product Data for new HVAC equipment indicating absence of CFC refrigerants.

CONSTRUCTION ISSUE

END OF SECTION

CONSTRUCTION ISSUE

REFRIGERANT LOG BOOK

Location: _____ Refrigeration System:_____

Equipment Application: _____ Refrigerant Type:_____

Equipment designated as indicated on construction drawings:

Refrigeration Capacity: _____ BTU/HR

Total amount of refrigerant initially installed in system:

Equipment manufacturer name: _____

Model number: Serial number:_____

HVAC/Refrigeration installing contractor's name: _____

Name of installing contractor's lead technician on site: _____

Date installed: _____

CONSTRUCTION ISSUE

SERVICE DATE	TECHNICIAN NAME	COMPANY NAME	REASON FOR SERVICING	ACTIONS TAKEN	Lbs REF ADDED +	Lbs REF REMOVED -	DESTINATION RECOVERED REFRIGERANT	CORRECTIVE ACTIONS FOR LOSSES/ REMARKS

CONSTRUCTION ISSUE

SECTION 01720

CLOSEOUT PROCEDURES

PART 1 - **GENERAL**

1.1 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for contract close-out, including but not limited to:
   a. Operating and Maintenance Records
   b. Operation and Maintenance Training on Contractor-provided Equipment and Systems
   c. Warranties and Bonds
   d. Record documents
   e. Final cleaning
   f. Substantial Completion
   g. Real property records
   h. Parts
   i. Inspection for Certification of Final Acceptance

1.2 SUBMITTALS

A. Refer to Division 1 Section "Administrative Requirements" for procedures.

B. Submittal Schedule:

1. Provide the indicated quantity.

C. Submittal List:

Reference	Submittal Item	Quantity	Action
1.5A	Maintenance Manuals	X	R
1.6C	Instruction Certificate	X	R
1.7H	Warranties	X	R
1.8B	Record Drawings	X	R
1.8C	Record Specifications	X	R
1.10A	QC Punch List	X	R
1.11	Real Property Records	X	R
1.11B	Equipment List	X	R

X Submit quantity specified in Division 1 Section "Administrative Requirements".
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 OPERATING AND MAINTENANCE RECORDS

A. Provide Operation and Maintenance (O&M) records to the Government in both print and electronic (PDF) format. Organize information into sets of manageable size. The information in all copies must be identical.

B. Provide two complete printed copies of O&M records for all materials and equipment using 8-1/2 inch by 11 inch page size, bound in heavy-duty, hard vinyl, three-ring binders. Use pocket folders for folded sheet information and dividers with indexed tabs. Fully label all binders on both spine and cover, including any volume designation. In each binder, insert a master index that identifies all sections in the set.

C. Include and organize the following information:

1. Part 1:

a. Photocopy of Project Manual Table of Contents with notations of submittals included in each maintenance manual.
b. Supplementary Index.
c. A master list of General Contractor, subcontractors and installers. Include name of point(s) of contact, address, phone number, fax number and e-mail address.
d. A master list of Architect, Engineer(s) and any of their subcontractors. Include name of point(s) of contact, address, phone number, fax number and e-mail address.

2. Part 2:

a. Operating and Maintenance Instructions arranged by specification division; cross-referenced to the Project Manual. For each division, include:

1) Copies of warranties.
2) Appropriate design criteria.
3) Listing of equipment.
4) Parts list.
5) Spare parts list.
6) Operating instructions.
7) Manufacturer letters of certification.
8) Maintenance instructions - equipment.
9) Maintenance instructions - finishes.
10) Shop drawings and product data (Government's copy of all accepted submittals).
11) Wiring diagrams.

12) Test reports, including, but not limited to:

a) Water purity.
b) Test and Balance report.
c) Water treatment.
d) Sound system.
e) Fire alarm system.
f) Sprinkler system.
g) Product refrigeration test.

13) Emergency instructions.
14) Recommended "turn around" cycles.
15) Inspection procedures.
16) Fixture lamping schedule.
17) Valve tag system.
18) Commissionable items list with pre-functional and functional checklists (see Commissioning specification for complete required documentation requirements).

D. In addition to the two complete printed copies of O&M records, create electronic copies in .PDF format. Furnish six complete copies of the information on CD/DVD ROM. Fully label disc holders, including any volume designation. PDF documents must be bookmarked in sections corresponding to specification division; cross-referenced to the Project Manual.

1.4 OPERATIONAL AND MAINTENANCE TRAINING ON CONTRACTOR PROVIDED EQUIPMENT AND SYSTEMS

A. Instructional time by manufacturer's representatives for special systems must be provided in addition to the instructional time specified below. See Division 01 "Demonstration and Training" for additional operational and training requirements.

B. Notify the Government's Designated Inspector seven days prior to instruction sessions so he or she may be present.

C. After the systems are fully operational, tested and balanced to the Government's satisfaction, instruct the Government's representatives in the operation and maintenance of the systems. The number of trainees will typically be about 20. Provide trainers with at least five years of experience in training operators and technicians on the same system. Provide handouts for each of these classes.

D. Operating and Maintenance Instruction:

1. Arrange for the installer of equipment that requires regular maintenance to meet with the Government personnel to provide instruction in proper operation and maintenance. Include a detailed review of the following:

a. Maintenance manuals.
b. Spare parts and materials.
c. Tools.
d. Lubricants.
e. Control sequences.
f. Hazards.
g. Warranties and bonds.
h. Maintenance agreements and similar continuing commitments.

2. Demonstrate the following procedures:

a. Start-up and shut-down.
b. Emergency operations.
c. Noise and vibration adjustments.
d. Safety procedures.

E. Operating and Maintenance minimum requirement table follows:

Discipline	Minimum number of trips to project	Minimum hours of instruction
Plumbing	2	4
HVAC	2	4
Electrical	2	4
Fire Protection	2	4
Refrigeration & RMCS	Comply with Division 15 Sections Product Refrigeration Systems, Refrigeration Monitoring and Control Systems (RMCS), and others as applicable	Comply with Division 15 Sections Product Refrigeration Systems, Refrigeration Monitoring and Control Systems (RMCS), and others as applicable

F. Once instruction is completed, prepare, sign and submit Instruction Certification Letter to the Contracting Officer, and attach it to the request for Inspection for Substantial Completion.

1.5 WARRANTIES AND BONDS

A. Warranty Dates:

1. Add/Alter Projects: The warranty period begins the date the Government begins beneficial occupancy of a given phase. However, warranty for items such as refrigeration racks and piping, mechanical, electrical and other systems begins the day of the Government's final acceptance of the last part of the system as a whole (not the component installation date). The warranty period remains in effect for not less than one year. Refer to other sections of the specifications for particular items requiring warranty duration in excess of one year.

2. New Store Projects: The warranty period begins on the date of Government's final acceptance of the building and its systems as a whole (not at component installation date). The warranty period remains in effect for not less than one year. Refer to other sections of the specifications for particular items requiring warranty duration in excess of one year.

B. Warranty Inspection:

1. Approximately nine months after the date acceptance, return to the project with the Contracting Officer or Government's Designated Inspector, to conduct an inspection to determine whether the work completed by the Contractor is performing according to the requirements of the Contract Documents. Work not conforming to these requirements may be considered defective. The Contracting Officer or Government's Designated Inspector will prepare a comprehensive list of items for correction and, in cooperation with the Contractor, fix the time to correct or furnish all items on the list. Proceed promptly to correct items on the list.

C. Required Documentation:

1. See Divisions 2 through 16 Sections for specific requirements for warranties on products and installations.
2. Refer to the Contract Documents that specify certifications and other commitments and agreements for continuing services to Government.

D. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor, supplier, manufacturer, subcontractors and/or any other required co-signer of the warranty on the work that incorporates the product.

E. Warranty Definitions:

1. Standard product warranties are warranties published by individual manufacturers preprinted for particular products and specifically endorsed by the manufacturer to the Government.
2. Special written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Government.

F. Warranty Requirements:

1. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction damaged as a result of such failure.
2. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement.
3. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Government has benefited from use of the work through a portion of its anticipated useful service life.
4. Government's Recourse: Expressed warranties made to the Government are in addition to implied warranties and do not limit the duties, obligations, rights, and remedies otherwise available under the law. Do not interpret expressed warranty periods as limitations on the time in which the Government can enforce such other duties, obligations, rights, or remedies.
5. Rejection of Warranties: The Government reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
6. Special Warranty: Where the Contract Documents require a special warranty, or similar commitment on the work or part of the work, the Government reserves the right to refuse to accept the work until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

G. Warranty Process:

1. Instruct and train the commissary staff on the warranty and notification process.

   a. Should the Commissary require warranty service, the Commissary Store Director will provide a list in writing of the problems or symptoms to the General Contractor and the appropriate trade of supplier (if ascertainable by the Commissary).
   b. The General Contractor shall follow up with the Commissary within 24 hours of receiving notification or sooner if an emergency exists.
   c. The warranty item remains open until the subcontractor or supplier making the repair submits documentation and certification of warranty completion for signature to the Commissary Store Director.

2. Submittal Requirements: Submit written warranties to the Contracting Officer prior to the final inspection according to the following:

   a. When a designated portion of the work is complete and occupied or used by the Government, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Contracting Officer within 15 days of completion of that designated portion of the work.
   b. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Contracting Officer, for approval prior to final execution.
   c. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
   d. Upon completion of construction, ownership of the building will be transferred to the Installation upon which the facility is located, via DD Form 1354 "Transfer and Acceptance of Military Real Property". Special warranties shall be issued to the Installation as identified in this Section, under paragraph "Real Property Records".
   e. Form of Submittal: At substantial completion, compile each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the project manual. Include extended Warranties (for specific equipment with more than one year guarantee) such as:

      1) Heat exchangers.
      2) Refrigeration compressors.
      3) Battery units.
      4) Roof.

   f. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, sized to receive 8-1/2-by-11-inch paper.

      1) Provide heavy paper dividers with tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
      2) Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
      3) In each binder, provide a master list of the General Contractor and installing firms points of contract, including firm names, contact person, address, telephone, fax number and e-mail.
      4) When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

3. Provide Warrantee records to the Government in both print and electronic (PDF) format. Organize information into sets of manageable size. The information in all copies must be identical.

4. Provide two complete printed copies of warrantee records for all materials, equipment and systems using 8-1/2 inch by 11 inch page size, bound in heavy-duty, hard vinyl, three-ring binders. Use pocket folders for folded sheet information and dividers with indexed tabs. Fully label all binders

on both spine and cover, including any volume designation. In each binder, insert a master index that identifies all sections in the set.

5. In addition to the two complete printed copies of O&M records, create electronic copies in .PDF format. Furnish six complete copies of the information on CD/DVD ROM. Fully label disc holders, including any volume designation. PDF documents must be bookmarked in sections corresponding to specification division; cross-referenced to the Project Manual.

1.6 RECORD DOCUMENTS

A. General: Do not use record documents for construction purposes. Protect from loss in a secure location. Provide access to record documents for the Contracting Officer's reference as requested.

B. As-Built (Record) Drawings: Maintain one clean, undamaged set of prints of Contract Drawings and Shop Drawings at the job-site. Using red ink, mark up these drawings to show the actual installation. Mark the drawing is most capable of showing conditions accurately. Give particular attention to concealed elements that would be difficult to measure and record later.

1. Update the set each month with all changes taking place during the previous period.
2. The Government’s Designated Inspector will review the status of the records monthly, prior to processing the Contractor's invoice for progress payment. The Contracting Officer may hold retention against any invoice should the data not be current at the time of the invoice.
3. At final completion of the work, submit record documents reflecting all additions, and revisions which vary from the Contract Documents for written acceptance and approval from the Contracting Officer.
4. Show all deviations in actual construction from the Contract Drawings, and note the type of material used whenever a material option is specified. Show these deviations in the same general detail utilized in the Contract Drawings.
5. Maintain full size marked-up drawings, survey notes, sketches, nameplate data, description, and serial numbers of all installed equipment. Maintain this information in a current condition at all times until completion of the work. The resulting field marked prints shall be referred to and marked as "Record Field Data," and shall be used for no other purpose.
6. Make set available for inspection by the Government’s Designated Inspector whenever requested during construction, and submit them for approval at the completion of construction.
7. Delineate and locate dimensionally features not already shown on the Contract Drawings which are encountered by the Contractor during construction that might interfere with future construction, such as pipes, conduits, electrical cables, or the like buried in the ground, in concrete, or otherwise hidden. Specifically record the following information:

   a. Locations of all work buried under or outside each building, such as plumbing and electrical lines and conduits, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stub outs, invert elevations, etc
   b. Actual numbering of each electrical circuit.
   c. Locations of significant work concealed inside each building whose general locations change from those shown on the Contract.
   d. Locations of all items, not necessarily concealed, which vary from the Contract Documents.
   e. Installed location of all cathodic protection anodes.
   f. Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.

g. Sufficient information to locate work concealed in each building with reasonable ease and accuracy. In some instances, this may be by dimension, in others it may be in relation to the nearby building.

C. Store Record Documents apart from documents used for construction:

1. Provide files and racks for storage of Record Documents.
2. Maintain Record Documents in a clean, dry, legible condition and in good order. Do not store in work vehicles.
3. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets.
4. Place suitable titles, dates and other identification on the cover of each set.

D. Record Specifications:

1. Maintain one record copy of the Project Manual, including addenda.
2. Mark to show variations in actual work performed in comparison with the specifications and any contract modifications.
3. Give particular attention to substitutions, selection of options, and similar information on concealed or not readily discernible elements.

1.7 FINAL CLEANING

A. Employ experienced workers for final cleaning. Clean each surface to the condition expected in a commercial building cleaning and maintenance program. Use cleaning products recommended by the manufacturer of the surface to be cleaned that comply with Green Seal's GS-37 where applicable. For projects located in California, use products that comply with California Code of Regulations maximum allowable VOC levels. Complete the following before requesting final acceptance inspection.

1. Remove labels that are not permanent labels.
2. Clean transparent materials. Remove glazing compound. Replace chipped or broken glass.
3. Clean exposed hard-surfaces finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floor broom clean. Vacuum and shampoo carpeted surfaces. Clean and prepare floors according to the manufacturer's recommended procedures.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
5. Clean the site of rubbish, litter, and other foreign substances. Sweep paved areas and remove stains, spills, and other foreign deposits. Rake unpaved or unplanted grounds to a smooth even-textured surface.
6. Removal of Protection: Remove temporary protection and facilities.
7. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
8. Remove waste materials from the installation and dispose of lawfully.

1.8 SUBSTANTIAL COMPLETION

A. Definition: Substantial Completion is the date at which the work or building project, or a designated portion of the work or building project, is sufficiently complete in accordance with the construction contract documents, so that the owner may use or occupy the work or building project or designated portion for the intended use for which it is originally designed and intended without limitation.

Substantial Completion includes the completion of all life safety systems, weathertight envelope, and adequate protection of building occupants and/or equipment from hazards posed by additional or possible construction activities or other potential harmful conditions that may exist-- or become evident during the final work effort--to complete the project per the construction contract documents.

B. Pre-inspection: Prior to requesting inspection of work for substantial completion of the full contract scope, the following items must be completed in their entirety:

1. Restore permanent facilities consumed during the construction period including, but not limited to, the following:

   a. Replace filters and clean inside of ductwork and housings.
   b. Replace significantly worn parts and parts subject to unusual operating conditions.
   c. Replace lamps burned out or noticeably dimmed by hours of use.
   d. Repair all landscaped areas and return them to pre project conditions.

2. Generate a QC management team punch list, submit the list to the Government's Designated Inspector, and continue to work off the list in its entirety.
3. Submit specific warranties, maintenance agreements, final certifications and similar documents.
4. Complete start-up testing of systems, commissioning, and Government's personnel training.
5. Touch up, repair, and restore marred exposed finishes.

C. Inspection Request: Submit a written request for to the Government for substantial completion inspection not less than two weeks before the proposed inspection date. Note: the Government will not grant final acceptance, substantial completion, or beneficial occupancy unless all construction, finishes, equipment, systems, and commissioning is completed to ensure the facility is fully operational and there are no limits to the intended use of the full facility and its systems.

The request for substantial completion and turnover must provide the Contracting Officer with the following:

1. Signed statement from the Prime Contractor that the work for the project is substantially complete and ready for inspection.

2. The Contractor's QC management team's list of any incomplete work items that will require minor adjustment or correction. Again, the Government will not perform the actual formal inspection until all construction items are complete and only minor adjustments or corrections remain to finish the work.

3. Commissioning checklists
   a. Start Up and Pre-Functional checklists
   b. Functional Test reports
   c. Commissioning Deficiency report

4. Include all outstanding administration items required to complete the work as separate attachment to the request for inspection. Examples include:
   a. O&M manuals (see Paragraph 1.5 for additional information).
   b. Instruction certification letter documenting that training for installed equipment was provided as required.
   c. Warranty Dates.

d. DD Form 1354 progressed to include all items in current and previous phases (see attachments for further guidance on DD Form 1354).
e. Equipment list with cost, model, and serial number.

D. Inspection Procedures: A Government team will inspect the work, verify the Contractor's QC management team's punch list, and make any necessary corrections or additions. The QC management team's punch list--as modified by the Government team—results in the conformed punch list.

The Contracting Officer will certify the conformed punch list and will issue Substantial Completion of the whole facility only after the contractor resolves all items on the conformed punch list to the Contracting Officer's satisfaction. At their discretion, the Government may accept a project with minor incomplete punch list items. If this occurs, complete all punch list items within thirty calendar days of the date of inspection and arrange for Government verification to confirm resolution of those items.

E. Re-inspection: If the Government receives a request for inspection, and upon observation determines that the facility is not ready for inspection, the Government may suspend the inspection and notify the contractor in writing. The contractor must re-submit request for inspection including revised CQC punch list and include all items described in Paragraph C.

F. If the Government incurs cost associated with observation of incomplete and or unacceptable phased work that was initiated from the Contractor's premature request for inspection, the Contractor will bear all expenses the Government incurs for re-inspection.

1.9 REAL PROPERTY RECORDS

A. As an attachment to the request for Substantial Completion Inspection--and under the direction of the Real Property Accounting Officer from the military installation of the project site--prepare the DD Form 1354, "Transfer and Acceptance of Military Real Property" and submit to the Contracting Officer. An editable Adobe PDF file of the DD Form 1394 can be located at: http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1394.pdf. Complete instructions on how to fill out this form can be found at http://www.hnd.usace.army.mil/techinfo/UFC/UFC1-300-08/UFC1-300-08.pdf. Additional information can be found in the attachments to this document.

B. As an attachment to the request for Substantial Completion Inspection, provide a list of Government-furnished / Contractor-installed items and Contractor-furnished / Contractor-installed items.

1. List the following for each item:

a. The complete nomenclature of each item.
b. Manufacturer.
c. Model number.
d. Serial number.
e. Electrical rating, all nameplate data.
f. Capacity.
g. Other pertinent information.
h. Cost of each item.

2. List items including but not necessarily limited to, the following:

a. Electrical equipment (transformers, lighting fixtures, metering equipment, overhead door operators, exterior floodlights and poles, fire alarm and burglar alarm systems, etc., including the cost of each item).
b. Mechanical equipment (commercial refrigeration equipment, heating equipment, air conditioning system equipment, pumps, boilers, boilers, sprinkler, meters, and other items of mechanical equipment, including the cost of each item).
c. Other items considered Real Property Installed Equipment, including the cost of each item.

1.10 PARTS

A. Provide written receipt signed by Commissary Store Director for all "loose" items turned over such as:

1. Electric panel keys.
2. Extra air filters.
3. Special wrenches, tools, etc.
4. Extra fuses.
5. Extra chemicals.
6. Extra sprinkler heads.

1.11 FINAL ACCEPTANCE

A. Inspection Procedures: Upon completion/resolution of all conformed punch list items that result from the Substantial Completion Inspection, request an inspection for the Government to certify final acceptance and allow for final payment. Request inspection for final acceptance at least two weeks before the intended date of the inspection to allow for coordination of schedules with the Contracting Officer and/or its designated representative.

B. The following attachments shall accompany the written request to the Government for final acceptance:

1. Certification letter that the contractor has:
   a. completed a full inspection of its work
   b. completed all scheduled commissioning activities
   c. completed or otherwise resolved all conformed punch list items resulting from the Substantial Completion Inspection
   d. provided all administrative items required for close out
   e. made preparation to change over permanent locks and transmit keys to the Contracting Officer

2. Record documents including a conformed set of as-built drawings in AutoCad format and a conformed Project Manual in MS Word format; both prepared in electronic format and recorded on CD/DVD. Provide six complete sets of the CD/DVD.

3. Request for final payment.

C. The Contracting Officer will arrange for Government inspection personnel to perform the final inspection. After the inspection, the Contracting Officer will advise the contractor of any work necessary before the Government can accept the project as complete and certify the contractor has fulfilled its obligations under the contracted scope.

D. If necessary, the Government will repeat re-inspection. Contractor will bear all expenses the Government incurs, including repeat travel, for re-inspection if the Government determines that a facility was not made ready for final inspection.

E. Upon completion of the work to the satisfaction of the Contracting Officer, the Contracting Officer will issue a certificate of final acceptance for the project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

ATTACHMENTS:

ATTACHMENT A: DD FORM 1354 CHECKLIST

ATTACHMENT B: EXCERPTS FROM UFC1-300-08-EDITED FOR DeCA

ATTACHMENT C: SUMMARY INSTRUCTIONS FOR DD FORM 1354

ATTACHMENT D: BUILDING INFORMATION CHECKLIST

END OF SECTION

ATTACHMENT A:

DD FORM 1354 CHECKLIST

General Data Required:

1. Building:

1.1. Outside dimensions: SM _____

A. Main building: SM _____

B. Wings SM _____

C. Offsets SM _____

1.2. Number of floors:

1.3. Construction:

A. Foundations (such as concrete) TYPE _____

B. Floors (such as wood, concrete) TYPE _____

C. Walls (such as wood siding) TYPE _____

D. Roof (such as built-up, shingle) TYPE _____

1.4. Utilities entering building:

A. Water (size of pipe) _____

B. Gas (size of pipe) _____

C. Sewer (size of pipe) _____

D. Electric (phase, voltage, wire, connected load) _____

1.5. Landscape:

2. Systems in building:

2.1. Fire Protection:

Category Code	Nomenclature	Unit of Measure	Quantity	Cost
880-211	Clsd Hd Auto Spklers	SM		
	Number of Sprinkler Heads	EA		N/A
880-212	Open Hd Deluge Sys	SM		
	Number of Sprinkler Heads	EA		N/A
880-221	Auto Fire Detection Sys	SM		
	(Heat Detectors)	EA		
	(Horns)	EA		
	(Alarm Bells)	EA		
	(Smoke Detectors) (____)	EA		
	(Manual Pull Station)	EA		
880-222	Manual Fire Alarm Sys	EA		
880-231	CO_2 Fire Sys	EA		
880-232	Foam Fire Sys	EA		

880-233	Other Fire Sys (Smoke Detectors) (___)	EA		
	(Standpipe Connections) (___)			
	(Dry Chemical Sys) (___)			

Category Code	Nomenclature	Unit of Measure	Quantity	Cost
2.2. Security:				
872-841	Security Alarm Sys	EA		

3. Plants in Building:

Category Code	Nomenclature	Unit of Measure	Quantity	Cost
890-126	A/C Window Units	TN		
890-125	A/C Plt < 5 TN	TN		
		SM		
890-121	A/C Plt 5 to 25 TN	TN		
826-122	A/C Plt 25 to 100 TN	TN		
821-115	Heating Plt 750-3500 MB	MB		
821-116	Heating Plt > 3500 MB	MB		
811-147	Elect Emergency Power			
	Generator	KW		
	Strg Tank for Heat	GA		

4. Real Property Installed Equipment:

Category Code	Nomenclature	Unit of Measure	Quantity	Cost
890-126	A/C Window Units	TN		

Item	Size		Amount	Description
Evaporative Coolers		L/S/M^2		
Hot Water Heater				
Exhaust Fans				
Lavatory				
Water Closet				
Urinal				
Utility Sink				
Refrigerated Drinking Fountain				
Heating Plt < 750 MB		MB		
Forced Air Heating				
Other Heating				
Dehumidifiers				

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	_____	_____	_____
Elevator	_____	_____	_____
Other	_____	_____	_____

5. Related Facilities:

Category Code	Nomenclature	Unit of Measure	Amount	Cost	Description
812-223	Prim Distr Line OH	LM			
	Transformer	KVA			
	Power Poles	LM			
812-224	Sec Distr Line OH	LM			
812-225	Prim Distr Line UG	LM			
812-226	Sec Distr Line UG	LM			
812-926	Exterior Lighting (Street or Parking Area Lights)	EA			
824-464	Gas Mains	LM			
831-169	Sewage Septic Tank	KG			
832-266	Sanitary Sewer	LM			
842-245	Water Distr Mains	LM			
843-315	Fire Hydrants	EA			
851-143	Curbs and Gutters	LM			
851-145	Driveway	SY			
851-147	Road	SY			
		LM			
852-262	Vehicle Parking	SY			
871-183	Storm Drain	LM			
872-247	Fence, Security	LM			
872-247	Fence, Interior	LM			
852-289	Sidewalk	SY			
890-187	Utility Vault (4 or more transformers)	SF			
135-583	Tel Duct Facility	LM			
135-586	Tel Pole Facility	LM			

6. Other project equipment for which real property accountability will be transferred to the installation.

Nomenclature	Unit of Measure		Amount		Cost
Built-in Furniture (Seating, Cabinets, Counters, Shelving, etc.)	EA				
Garbage Disposers	EA				
Automatic Doors	EA				
Dock Levelers and Seals	EA				
Fire Extinguishing Sys	EA				
Alarm Systems	EA				

Dehumidification Sys	EA		

7. Equipment which DeCA retains possession and accountability for:

Nomenclature	Unit of Measure	Amount	Cost
All refrigerated and non-refrigerated display cases and shelving units, display units, and display carts and tables.	EA		
All operating equipment, furniture and machines including processing and storage racks and equipment tables, scales, ovens, grinders, slicers, saws, labelers, wrappers, testers, tenderizers, mixers, proofers, retarders, glazers, icing centers, office furniture, and equipment, systems furniture.	EA		
All checkout equipment including scanners, cash registers, scales, checkout counters, checkout stand lights, queuing directors, and assorted equipment.	EA		
All product refrigeration and storage systems including walk-in coolers and freezers, assorted refrigeration systems, controls and monitoring devices.	EA		
Communication systems.	EA		
Background music system.	EA		
Emergency generators and transfer switch.	KW		

8. Cost of planning and design and other costs associated with the provision of architectural and engineering services for design and construction of a commissary facility.

Nomenclature	Unit of Measure	Amount	Cost

9. Cost of construction management activities, other than in-house efforts, to provide construction surveillance and oversight management during construction.

Nomenclature	Unit of Measure	Amount	Cost

10. Alteration or Rehabilitation of a Building or Facility

Nomenclature	Unit of Measure	Amount	Cost
Demolition cost	SF		
Addition or Deletion of	SF		
Related Facilities	SF		

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ATTACHMENT B:

EXCERPTS FROM UFC1-300-08-EDITED FOR DeCA

CHAPTER 1
GENERAL INFORMATION PERTAINING TO THE DD FORM 1354
The most important aspect of the revised procedure is the requirement for the construction contractor to provide the PMAC provider and the PMAC provider to provide the client with an 'interim' DD Form 1354 with all relevant data 30 days prior to the Beneficial Occupancy. This form must contain details of the construction project sufficient to establish or update a real property record. When the project is complete, both DeCA and the installation will update their facility records and CIP accounts to reflect transfer and acceptance of the new capital asset.

The DD Form 1354 functions in Government as the deed and is often the most important source document for the records. It binds the transaction.

REFERENCE. For a complete itemization of the DD Form 1354, the UFC 1-300-08 in its entirety is available via the web. This document describes all aspects and requirements for the proper completion and submission of the DD Form 1354. Chapter 1 covers the target audience for this UFC, the various usages of the DD Form 1354, and who prepares it. Chapter 2 describes the data required to prepare a completed form. Chapter 3 describes the three different versions of the DD Form 1354 and when to use each version. Chapter 4 explains how the Realty Specialist uses the data from the completed form to enter data into the real property database and how the construction contractor uses the data to manage the CIP Account. Chapter 4 also explains how to document various real estate transactions. Chapter 5 provides guidance to the construction contractor to ensure that total project cost equals the sum of individual facilities costs. Chapter 6 lists the standard attachments to the 1354 and sets acceptance standards for completeness, timeliness and accuracy to help the accepting official know whether the DD Form 1354 should be accepted or rejected based on objective standards. There is a glossary of terms and appendices showing the DD Form 1354, instructions for each block or data field, a building information checklist, and several lists of codes. Although related to the transfer and acceptance of military real property, this UFC does not address USACE/NAVFAC/DPW/FacMgr/BCE/DIS procedures for:

- How to track planning and design costs for a construction project or
- How to enter project costs in the CIP or work-in-progress account.

OVERVIEW. This UFC handbook describes five different job positions that perform the required tasks. The five positions are: construction contractor who is responsible for the preparation of the DD Form 1354 (DeCA/ PMFM) RPAO who accepts and accounts for individual facilities, Realty Specialist who enters real property data into the real property database, DPW/ FacMgr/ BCE who is involved in master planning, construction, real property maintenance, and real property accountability; and the funding organization/activity who is the customer for the facility or project (HQ DeCA). The term construction contractor means the designated person to whom the construction organization assigns the responsibility to prepare the DD Form 1354. Under DeCA/PMFM contracts the person responsible to complete the 1354 is the construction contractor.

WHO PREPARES THE DD FORM 1354? For DeCA/PMFM construction projects the Construction contractor prepares the draft DD Form 1354. The Contractor submits the form to the Technical Inspector who in turns submits the form to the PMAC Core Team manager for processing through the DeCA/PMFM office.

CHAPTER 2
PREPARING THE DD FORM 1354
This chapter provides detailed block-by-block instructions for each data element, with examples and a description of "where the data come from."

FORMAT AND INSTRUCTIONS. The DD Form 1354, Transfer and Acceptance of Military Real Property, was revised to better meet the requirements of the CFOA, implement audit recommendations, and ensure consistent reporting of the cost of facilities. The DD Form 1354 is provided as Appendix B. Note that the backside of the form provides a brief description for each block on the form. Appendix C of this UFC replaces the instructions for filling out the DD Form 1354 that are currently contained in FMR 7000.14-R, Volume 3, Chapter 17, Appendix B. These FMR Appendix B instructions contain more detail than the form backside instructions, but less than the detailed instructions in this chapter, which are the most comprehensive and contain examples.

REQUIRED DATA. The essential information required for the transfer and acceptance of real property is documented on the DD Form 1354 and this information supports entries into the installation's real property accounting system. The format has 28 data blocks. Because this form is used for the variety of purposes, not all of the data blocks are required for each usage. When a block is not to be filled out for a particular usage, enter N/A for "not applicable." There should be no blank data fields except in the block 23, Item Remarks column, where blanks are allowed.
Installations should review and approve the draft DD Form 1354 as part of their review of other the construction contractor's submittal prior to submission to the PMAC Core Team.

The DD Form 1354, Transfer and Acceptance of Military Real Property, requires the preparer to provide specific information about the project. Information such as description of the real property facilities, category codes and sizes, costs, fund source(s), contract number(s), facility numbers, and as built drawing numbers, is typically required. For real estate transactions, the real estate instrument (document) contains much of the required information.

For Military Construction projects the DD Form 1391, Military Construction
Project Data and the project folder contain some of the information that is needed on the DD Form 1354. The Table below shows a crosswalk from equivalent data fields in the DD Form 1391 to the DD Form 1354. The latest DD Form 1391 should be validated by the DeCA/PM prior to use in preparing a DD Form 1354. The DD Form 1391 is available as an attachment on the DeCA FACTS Website.

Table 2-1. Crosswalk from 1391 to 1354

DD Form 1391		DD Form 1354	
Block Number	**Block Name**	**Block Number**	**Block Name**
3	INSTALLATION & LOCATION	6	SITE/INSNO/NAME
6	CATEGORY CODE	12	CATEGORY CODE
7	PROJECT NUMBER	3	PROJECT/JOB NUMBER
9	COST ESTIMATES		
	ITEM	10	ITEM NO.
	U/M	15/17	UNIT OF MEAS.-1 or 2
	QUANTITY	16/18	TOTAL QUANTITY 1 or 2
	COST	19	COST
10	DESCRIPTION OF PROPOSED CONSTRUCTION	28	PROJECT REMARKS. Helps overall project understanding

INSTRUCTIONS TO PREPARE DD FORM 1354 DATA FIELDS. The page number and the total number of pages comprising each 1354 project or transaction shall be shown in the space provided at the top right-hand corner of the form. When two or more pages are required to describe the information required for blocks 1 through 23, then blocks 24 through 26 (signatures and voucher number) shall be completed only on the first or signature page. Signing officials should initial subsequent or unsigned pages and line through the Property Voucher Number block on all except the signed page. The remainder of this chapter explains in detail what the data are and where data come from to complete the individual data element blocks on the DD Form 1354. A single example is used for all the example entries to the DD Form 1354 data fields in the remainder of this chapter. The example is a Military Construction, Army (MCA) project to construct a new battalion headquarters and classroom, and associated structures and utilities. A summary of these instructions is provided as Appendix C for quick reference and for publishing in the next update of the FMR.

Block 1. [FROM]. Enter in block 1 Defense Commissary Agency (DeCA). You should include the full address and zip code.

Example: Defense Commissary Agency (DeCA)
2250 Foulois Street
Lackland AFB, TX 78236

Block 2. [DATE PREPARED]. Enter the date the DD Form 1354 is prepared. Use the DoD standard YYYYMMDD format for all dates. This is the date used to track different editions when revisions are necessary. The form is considered prepared when it is ready for signatures in blocks 24 and 25.

Example: Use 20040115 for date: 15 JAN 2004

Block 3. [PROJECT/JOB NUMBER]. Enter the project number assigned to identify the project on a DD Form 1391 for new military construction (MILCON) or the job order number for other projects.

Examples: DD Form 1391 project number might be EA01MP01.

Block 4. [SERIAL NUMBER]. This is the document number assigned to the 1354 by DeCA/ PMFM. This shall be left blank by the construction contractor and PMAC.

Block 5. [TO]. Enter the name of the receiving organization or agency to which the transfer will be made. This receiving organization could be the DPW/FacMgr/BCE/DIS on a DoD installation that has been assigned the responsibility for accounting for the real property. Always include the address, zip code, and installation number – the unique identifier of the installation - which the RPAO represents. Installation numbers are available from individual service databases of installations or can be provided by the gaining installation Realty Specialist.

Example: Engineering Plans & Services Division
Directorate of Public Works
Fort Riley, KS 66442-6000
INSNO 20605

Block 6. [SITE/INSNO/NAME]. Site number or installation number of the actual facility physical location is one of the first points of entry into the database. Enter in block 6 the site number identifier or installation number (INSNO) and site name where the facility being transferred/accepted is physically located. Enter this number and name regardless of whether it is the same or different from the location of the RPAO (which is identified in block 5).

Example: 20605/Riley (In this example it happens to be the same as the identifier in block 5).

Block 7. [CONTRACT NUMBER(S)]. Enter the construction contract number (multiple contract numbers if applicable) in this block. Include the delivery order number in addition to the contract number if the contract could authorize work under different delivery orders that are not related to the project described in the final DD Form 1354.

Example: DACA31-98-D-0052.

Block 8. [DRAWING NUMBER(S)]. Enter the drawing number(s) or CAD identifier(s) of the project components. All drawing numbers that may be needed as a future reference to the project should be identified in this block.
NOTE. There is not a one-to-one correspondence between drawings and Item Numbers in column 10. For example, HVAC system drawings should be identified in block 8, but the HVAC system is not listed as a separate Item Number. Identify the facility or system associated with the drawing number or use a range of drawing numbers if consecutive and more than one drawing. Use Project Remarks, block 28, for additional space.

Example: B-9301 through B-9309; 47-018-1234; F 711-13-01

Block 9. [TRANSACTION DETAILS]. This block is divided into four subparts. Subpart A identifies the type of construction activity for this project. Subpart B identifies the reason that the DD Form 1354 is being issued in terms of an event. You must explain an "other" check for either section A or B in block 28, Project Remarks, on the back of the form. Subpart C identifies the version of this DD Form 1354. Subpart D identifies the Effective Date for the transaction described by the checkboxes in block 9.

Subpart A of Block 9 Type of Construction Activity. Insert an X in the appropriate box of subpart A to indicate whether the transaction involves acceptance of new construction, transfer of existing facilities, capital improvements to existing facilities, or some other type transaction. Check only one box. Definitions follow:

New construction. Acceptance of accountability for a facility that did not previously exist

Existing facility. Transfer of accountability for an existing facility

Capital improvement of an existing facility. Increases the facility size or capacity, useful life, or operating efficiency of an existing facility

Other. If the "Other" checkbox is checked, the preparer explains the transaction in Project Remarks (block 28), on the back of the DD Form 1354. Examples for marking "Other" are for occurrences such as real property inventory adjustment or capital decrease.

Subpart B of Block 9 When/Event. Insert an X in the appropriate box of subpart B to indicate when (in terms of an event) the DD Form 1354 is issued. The checkboxes are arranged in order of which box you should use with the first box being the most desirable, if it applies. Check only one box and the first box that applies.

PHYS COMPL/AVAIL – (Physical Completion/Available for Use).
Check this box when the entire facility(ies) described on the DD Form 1354 is substantially complete (except for deficiencies noted on the back) and the entire facility(ies) is being made available for use at the time of transfer. Beneficial occupancy usually occurs at this point. If beneficial occupancy occurs before the facility is complete, check BENF/O or Partial BOD as explained below.

BENF/O – (Beneficial Occupancy). Check this box when the transfer or acceptance of the whole facility occurs at the time of beneficial occupancy by the tenant, but the facility is not considered physically complete. Partial Beneficial Occupancy (BOD) is explained below.

Partial BOD – (**Partial Beneficial Occupancy)**. Check this box when the transfer or acceptance documented by this interim DD Form 1354 is for only a portion of a facility (such as one wing of a new hospital) or is for a phased turnover of one or more facilities in a multiple facilities project. Turnover of each phase at partial BOD would have its own interim 1354 and unique Army Property Voucher Number. Air Force and Navy Partial BOD DD Forms 1354 will all have the same Voucher Number. Partial BOD DD Forms 1354 will all have the same project number for all services.

Financial Completion. Check this box when the DD Form 1354 is used to change costs on an interim 1354 to reflect the final costs against the project. Project financial completion occurs after the entire project costs have been accumulated. This may occur many months or years after a project's physical completion. Checking financial completion means that the contractors have received final payment for the project, all project management costs are included, and no additional costs will be incurred against this project. If final costs are available at physical completion or BOD, you would only check the box "Physical Completion" or "BENF/O" in subpart 9B. Therefore indicate final costs by checking "Final" in subpart C.

Other. Check the "Other" box when the transfer or acceptance occurs at an event time other than the four cases described above; explain the "Other" checkbox for the event in Project Remarks (block 28) on the back of the DD Form 1354.

Subpart C of Block 9 Version. Use the DD Form 1354 subpart C to indicate whether the DD Form 1354 is a draft, interim, or final version. Normally costs are recorded on an interim 1354. Costs on an interim 1354 are assumed to be preliminary costs. Costs on the final DD Form 1354 are the final costs. If the 1354 were issued for financial completion only, use the checkbox for financial completion in subpart 9B and check "Final" in subpart 9C. If the 1354 is issued at Physical Completion with final costs, then check Physical Completion in 9B and check "Final" in 9C; there would be no reason to create an additional 1354 for financial completion since the final costs would already be documented.

Subpart D of Block 9 Effective Date of Transaction. Enter the effective date for the transfer or acceptance in standard format YYYYMMDD. NOTE. The effective date of the transaction is the earlier of BOD or Date Available For Use, and is the date from which the accounting system should depreciate the cost of the facility. If the project has multiple facilities, each facility may have a different effective date.

Example: Use 20040115

Block 10. [ITEM NUMBER]. A key step in the preparation of a DD Form 1354 is to identify the various components or items of the project. Enter a separate Item Number line for each new facility, and for each facility addition, capital

improvement, or deletion, including additions to or deletions from utility systems or other previously existing facility records. If there are more items than fit on a single page, use additional DD Forms 1354.

Do not create an excessive level of detail in the item listings. As a minimum, observe the following rules for determining individual items.

- Identify each facility with a unique item number.
- If the facility has more than one usage, identify each usage of the multi-purpose facility with the appropriate facility category code and units of measure. List these multiple uses such that the multi-purpose facility has one item number and several different lines, one for each category code.
- If land is purchased as part of the project, show land as a separate line item.

There are two ways to account for the demolition portion of the project and to document the reduction of real property. You may either attach an Authorization for Demolition (e.g., DA Form 337 or equivalent form for other Services) to document category codes and quantities of demolished real property separately from constructed/transferred Item Numbers or, in lieu of this attachment, indicate as additional DD Form 1354 Item Numbers, all demolished real property facility numbers and category codes using negative numbers (shown in parenthesis) for units of measure and N/A for costs in Item 19.

Do not show demolished facilities on the 1354 if the attached demolition document has all the required information to subtract demolished facilities from the real property inventory.

Attach separate lists of installed building equipment (IBE) (real property) and equipment in place (EIP) (personal property equipment such as bakery/deli equipment, cases etc that remain property of DeCA) to the DD Form 1354. This allows for the detailed equipment listings without cluttering up the 1354. The preparer, in conjunction with the Realty Specialist, should use judgment in determining the amount of detail provided for equipment.

Block 11. [FACILITY NUMBER]. Enter the Facility Number (FACNO)
assigned to each Item Number. The Facility Number is a unique, real property accountability alphanumeric, for each facility on an installation according to the Installation/Base Master Numbering Plan. Some installations have consolidated records for pavements and utilities and the additional pavements and utility distribution lines must be added to an existing facility number. The installation RPAO provides these numbers to the construction agent early in the construction phase.

Block 12. [CATEGORY CODE]. In block 12, record the five or six digit design use category code for each affected facility usage itemized in block 10. When a constructed facility has more than one design use, each usage over 1,000 SF must be identified as a separate line under the same Item Number. Facilities listed may be land, buildings, utilities, or structures and must be classified as the correct facility category in accordance with the service implementation of DODI 4165.3 (e.g., Army real property classification system prescribed in DA Pamphlet 415-28, Guide to Army Real Property Category Codes; NAVFAC P-72, Facility Category Codes; or Air Force Handbook 32-1084, Facility Requirements). These reference documents provide the facility category code, category description, and the various units of measures associated with each facility category. Prior to initiating any work on a DD Form 1354, the construction agent should coordinate with the receiving agency RPAO and develop a draft category code/real property classification plan that can be used for development of the various items on the DD Form 1354 for this project. A draft 1354 shall be provided as a submittal for review and approval by the installation DPW/FacMgr/BCE.

Block 13. [CATEGORY CODE DESCRIPTION]. Use the service implementation of DODI 4165.3 (e.g., DA PAM 415-28, NAVFAC P-72, or Air Force Handbook 32-1084) to determine the correct facility category code short title as the verbatim description that corresponds to the category code entered in block 12.

Block 14. [TYPE]. Indicate the type of construction: P = Permanent, S = Semi-permanent, and T = Temporary. For definitions of each type of construction see Draft DODI 4165.14, DOD Real Property Inventory Reporting and Forecasting, or Service real property regulations.

NOTE is for Blocks 15 through 18. Each Service category code reference stipulates an area or a capacity/other unit of measure, or both. If both units of measure are stipulated in the reference, then both are required on the DD Form 1354. If only one measure is required, place N/A in the other two columns.

Block 15. [UNIT OF MEASURE-1; AREA]. Enter in this column the appropriate Unit of Measure for area for each design use category code for each item of real property, i.e., only SF, SY, or AC. The service implementation of DODI 4165.3 (e.g., DA PAM 415-28, NAVFAC P-72, or Air Force Handbook 32-1084) identifies the appropriate area unit of measure for each real property category code.

Block 16. [TOTAL QUANTITY-UM 1]. Enter the total quantity of area for the Unit of Measure-1 for each item of real property. For buildings, enter the gross area. For demolition, enter negative numbers in parenthesis or attach an Authorization for Demolition.

Block 17. [UNIT OF MEASURE-2; CAPACITY/OTHER]. Enter in this column the appropriate Unit of Measure for capacity/other for each design use category code for each item of real property. The service implementation of DODI 4165.3 (e.g., DA PAM 415-28, NAVFAC P-72, or Air Force Handbook 32-1084) identifies the appropriate capacity/other unit of measure for each real property category code.

Block 18. [TOTAL QUANTITY-UM 2]. Enter the total quantity of capacity/other for the Unit of Measure-2 for each item of real property. For demolition, enter negative numbers in parenthesis or attach an Authorization for Demolition.

Block 19. [COST]. One of the primary purposes of the DD Form 1354 is to identify the cost of individual facilities contained in the construction project. These costs are required as part of the Service's Financial Statements. The preparer must identify the total project cost as well as costs assigned to each facility that is part of the project. Only one cost per item number (facility) is allowed in column 19. All costs of a multi-purpose facility should be shown against the primary category code for that facility, and the other categories of the multi-purpose facility should be annotated as N/A in column 19. The construction agent must provide distinct break out costs for each different building, utility, and structure constructed as part of this project. For example, if the project consists of two buildings, parking, sidewalks, water supply branch lines, sewer branch lines, and exterior lighting, you need different costs for the seven items in block 10. Each building and structure (parking and sidewalks) and each utility would have a cost in block 19.

The real property accounting system should record only capital costs in the
general ledger Plant, Property, and Equipment (PP&E) account for financial statements. Therefore, for capital improvements to existing facilities, preparers should only record the capital costs for the capital improvements to the existing facility. Do not enter any repair work costs on the 1354 since repair costs are not capitalized.

If demolition is within the footprint of a new construction project, then demolition costs are considered site preparation costs and included as part of the individual new facility costs. If demolition is not in the footprint of new construction, the demolition cost is expensed and does NOT get included as part of the capitalized cost of the project.

Costs provided in a DD Form 1354 can be either preliminary or final. Costs on the draft (if any) and interim version DD Forms 1354 are preliminary costs. Costs on a final version DD Form 1354 are the final costs. The office preparing an interim 1354 must maintain a suspense file to ensure that the accepting RPAO is furnished an updated DD Form 1354 with the final construction costs upon financial closeout. Final costs are generally available in several months or, if legal claims are involved, one or more years after physical completion and facility transfer. Use estimated costs only for real property assets found on post, or for other existing facilities with unknown original construction costs. In these cases, the estimates are the final costs.

To comply with the CFOA, the preparer should place the total project cost in Project Remarks (block 28) broken out in four components of total project cost as:

> (1) planning and design (P&D) including project management costs (pre-award), (2) construction contract supervision and administration (S&A) (also known as supervision, inspection, and overhead (SIOH) and including post-award project management costs);
> (3) the construction costs (including site preparation which also includes demolition of footprint facilities), and
> (4) project funded equipment costs. The sum of these four cost components is the total project cost and should equal the sum of the individual facility costs shown in column 19 on the front of the 1354 plus the equipment-in-place costs that are transferred as personal property and shown only in Project Remarks (block 28). The construction agent prorates P&D and S&A costs among the facilities comprising the project and includes the prorated P&D and S&A costs in the facility costs in column 19 for each facility. Estimated costs may be used to prorate P&D and S&A costs to the individual Item Number in column 10.

For real estate acquisitions, the preparer should list the cost in column 19 as the sum of real estate transaction costs and the actual purchase or fee costs. Show these two components of real estate costs in Project Remarks (block 28).

For real estate transfers, the preparer should list the cost in column 19 as the sum of real estate transaction costs and the actual costs that were on the losing agency's facility records. Show these two components of real estate costs in Project Remarks (block 28).

Block 20. [FUND SOURCE]. When recording costs, the preparer needs to identify the types of funds obligated or lines of accounting for the funds. It is important for compliance with CFOA to identify the DoD fund source in this column for each facility. Each Item Number could be funded from a different fund source and some facilities could even have a combination of fund sources. When there is more than one fund source for a single facility, show both fund sources with percentages of each. The construction authorization document usually identifies the fund source(s) or lines of accounting. Appendix E provides the complete list of standard abbreviations for DoD fund sources. Use space in Project Remarks (block 28) for continuation of data that does not fit in column 20.

Example: MILCON 75%/O&M 25%

Block 21. [FUNDING ORGANIZATION]. Identify the organization responsible for replacing this facility at the end of its useful life (e.g., Army, Air Force, Navy, Marine Corps (specify component for each service), DLA, DeCA, TMA, etc.). Appendix F provides the complete list of standard abbreviations for DoD Funding Organizations.

Example: ARMY

Block 22. [INTEREST CODE]. Document the Government's interest or ownership in the facility (e.g., DoD owned, leased, State owned, privately owned, etc.). Interest reflects ownership from a legal perspective, not who has control of, or accountability for, the facility. Appendix G provides the complete list of DoD Interest Code descriptions and abbreviations. Use the abbreviation rather than the code since the Services has similar interest codes that could indicate a different ownership.

Example: DoD-owned

Block 23. [ITEM REMARKS]. Use this column to note any information or remarks about the specific Item Number from column 10. There is no need to duplicate the project level remarks that appear in the Project Remarks (block 28) on the back. You should explain any prorating of costs among various items. Also explain any removals or demolitions, such as demolition to make room for footprint construction. Also use space in Project Remarks (block 28) for continuation of data that does not fit in column 23.

Block 24. [STATEMENT OF COMPLETION]. This block is for the signature and title of DeCA/ PMFM. The signing authority is certifying that the following Statement of Completion printed on the DD Form 1354 is true: "The facilities listed hereon are in accordance with maps, drawings, and specifications and change orders approved by the authorized representative of the using agency except for the deficiencies listed on the reverse side." Enter the title of the signing official. Enter the date at the time of signature. The date must be prior to, or the same as, the date of acceptance in block 25 on the DD Form 1354 in order to transfer simultaneously property responsibility and accountability. Use the standard date format YYYYMMDD.

Block 25. [ACCEPTED BY]. This block is for the signature and title of the individual, normally the RPAO, responsible for accepting accountability for the properties described on the DD Form 1354. Enter the title of the actual signing official. Enter the date at the time of signature. The date must be after, or the same as, the date of transference in block 24 on the DD Form 1354. Use the standard date format YYYYMMDD. Once the 1354 is signed, the RPAO will provide the 1354 to the Realty Specialist on the day of acceptance for entry into the real property database. The signing authority is accepting accountability for the real property facilities described on this DD Form 1354 in the quantities and for the costs listed in columns 10 through 22. The facilities accepted should have been inspected and determined to meet standards except for the deficiencies listed in block 27 on the reverse side. For real property adjustments signed by the RPAO in block 24, enter N/A in the three blocks for acceptance (Accepted by, Title, and Date Signed).

Block 26. [PROPERTY VOUCHER NUMBER]. The preparer of the document should leave this field blank. The receiving installation RPAO will fill in the property voucher number when the DD Form 1354 information is recorded in

the installation real property voucher register, such as a Register of Vouchers to a Stock Record Account, DA Form 272 for the Army. This voucher number is the next sequential number assigned in the register by the Real Property Office. For additional information concerning vouchers and voucher registers, see DA PAM 405-45, Real Property Inventory Management or other service publication.

Example: V-20040023 where V indicates a voucher number and the first four digits (2004) is the fiscal year and the last four digits (0023) is a four-digit sequence number.

Block 27. [CONSTRUCTION DEFICIENCIES]. Enter any significant construction deficiencies for the project. Do not list any perceived deficiencies in the scope or design of the project on this document, as this transfer document identifies only deficiencies in the awarded construction contract performance that the Government needs completed before declaration of completion of the contracted work. If there are more entries than fit on a single page, use additional DD Forms 1354.

Examples: Restore all grassed areas disturbed by construction
Replace/repair iron rod fence that was damaged during construction

Block 28. [PROJECT REMARKS]. This block is primarily for project level remarks. Enter any project explanations that would help others understand the real property transaction identified on the 1354. Fully describe any capital improvements. Remarks that pertain to only one Item should be listed in column 23, not in Project Remarks. In addition, if the "Other" checkbox is checked in block 9 (subpart A or B) an explanation is mandatory in this "Project Remarks" block. Also use Project Remarks (block 28) for continuation of data that does not fit in blocks 1 through 8, and columns 20 through 23. Also, enter in Project Remarks (block 28) the total project cost and four individual components of total project cost: P&D, S&A, construction, and equipment as described for Cost [block 19]. Use Project Remarks (block 28) to indicate which attachments are included with the 1354 (e.g., Building Information Checklist). If there are more remarks than fit in block 28 on a single page, use additional DD Forms 1354. The preparer should also list his/her name and phone number in the Project Remarks (block 28) space in case there are questions.

Examples: Military Construction, Army (MCA) project to construct a new battalion headquarters and classroom, and associated structures and utilities on Fort Riley, KS.
P&D Costs $ 1,250,000
S&A Costs $ 1,000,000
Construction Costs $25,000,000
Subtotal $27,250,000
Equipment Costs $ 2,500,000
Total Project Cost $29,750,000
Subtotal matches sum of individual item costs in column 19.
Equipment hand receipted to CWO Anthony Gerard, PBO for 24th INF DIV (M).
Block 8 Drawing Numbers continued: 47-018-1235, 47-018-1236, and 47-018-1237.
Attachments to this 1354: Building Information Checklist prepared by Jawhawk Constructors, Inc.
DD Form 1354 was prepared by Thomas Gerard, 703-683-7100.

CHAPTER 3
DRAFT, INTERIM AND FINAL VERSIONS OF THE DD FORM 1354

WHY DIFFERENT VERSIONS? For real property transfers, only the final version DD Form 1354 is normally required. The losing organization should prepare the form to be ready for signature at the time of transfer. An interim version 1354 with estimated costs may be prepared if the final costs associated with the transferred real property are not determined as of the date of the transfer.

Because final costs for new construction and revitalization projects are typically
not available when the facility is available for use (beneficial occupancy), this handbook has established three versions: a draft, interim, and final; for the DD Form 1354 for a single construction/revitalization project. The draft version, prepared during the design process, has no accounting impact and may be updated as often as necessary during construction. This version is not used by DeCA. Both the interim and final 1354 versions do impact accounting. All three versions must have the same project/job number (block 3) to cross reference all versions of the DD Forms 1354 associated with the single project. However, all three versions must have their own unique serial number (block 4) so that the preparing agency can track all versions of the DD Form 1354. This chapter explains the usage for each

version. To help the accepting official quickly identify the version of the DD Form 1354, there is a subpart C (checkbox for Draft/Interim/Final) of Block 9 (Transaction Details) to identify the version type.

There can be only one final version of a DD Form 1354 for a single construction/revitalization project. If there are updates to the draft version, you simply have an adjusted draft version with a later date prepared (block 2) and the same serial number (block 4). However, you can have multiple valid interim DD Forms 1354 for a phased turnover of facilities, each with its own serial number (block 4).

DRAFT VERSION. Not Used by DeCA.

INTERIM VERSION. The purpose of the interim DD Form 1354 is to provide in writing to the accepting RPAO, a transfer and acceptance document with auditable costs on the day of facility transfer. The interim DD Form 1354 is prepared prior to beneficial occupancy of construction, in preparation for the facility transfer on the Date Available For Use and before, or coincident with, beneficial occupancy.

The requirement is to have a complete interim DD Form 1354 signed by the transferring and accepting officials on the Date Available for Use or the Beneficial Occupancy Date (BOD), whichever comes first. The interim form includes actual P&D costs, actual project management costs, actual S&A costs, and actual construction contract costs to date. The actual construction costs are what has been obligated and expended (accrued) to date and therefore are not estimates. The interim 1354 should also have the Construction Deficiencies, on the back of the form in block 27, filled out based on the acceptance inspection with the construction contractor.

The construction contractor prepares the interim form and sends it to the technical inspector for review at least 30 calendar days prior to the anticipated transfer. The construction contractor should follow up with the accepting agency to ensure that the DD Form 1354 is complete and acceptable prior to the facility turnover day. The procuring contracting officer determines the Date Available For Use as the day the facility is physically complete except for correction of deficiencies documented in Construction Deficiencies (block 27) of the 1354.

A large construction project may contain multiple facilities, each with its own date of substantial physical completion and turnover, or beneficial occupancy for only a portion of a single large facility (i.e., Partial BOD). For these situations, the construction contractor prepares one and only one interim DD Form 1354 for each project phase, building, or portion of a building to be turned over and accepted separately. Use the same project/job number for each interim 1354 so that it is possible to correlate all the interim DD Forms 1354 for a single project. Each interim 1354 would have its own unique Serial Number (block 4) and Effective Date of Transaction (block 9D) and would show only costs for the facilities turned over, including their P&D and S&A costs. The construction agent project manager uses the signed interim 1354 to document credit to the CIP account appropriate for the accepted phase. The installation uses the interim DD Forms 1354 to record, in the real property system database, the real property assets as they are turned over and accepted in piecemeal fashion.

FINAL VERSION. When the final project costs are not known at the time of transfer, the construction contractor provides an interim DD Form 1354 based on the costs obligated and expended (accrued) to date. When the actual cost of construction is ascertained, the construction contractor furnishes the final DD Form 1354, which reflects the actual cost of construction, to replace the preliminary cost vouchered by the interim DD Form 1354 previously furnished.

There is only one final project 1354, even where there are multiple interim DD Forms 1354. The purpose of the final DD Form 1354 is to establish in writing the final total cost for each facility in a project. This final accounting can occur only after all costs are final and known. Prior to determining the final costs, the construction contractor, in conjunction with the project delivery team, corrects the deficiencies noted on the punch list, ensures warranties are in place, processes claims, resolves any labor or legal issues, and ensures final payments to the contractors. The importance of the final 1354 is that it documents the final facility cost, which may be different from that listed on the interim 1354, and such difference would cause the Realty Specialist to make a correction to the real property database facility cost.

After receipt of the final DD Form 1354 from the PMAC Core Team, the DeCA/ PMFM PM ensures that all financial accounts are balanced and closed and then completes the final DD Form 1354 for the project. The final project cost contains the final/actual P&D, S&A, and construction costs. The DeCA/ PMFM PM updates the costs from the interim DD Form 1354 with the final actual total costs and provides a signed (block 24) final 1354 to the RPAO of the accepting organization. The RPAO signs the final 1354 in block 25. The accepting official's signature on the final 1354 indicates that he/she accepts the final costs and provides feedback to the preparer that the final 1354 has been

received. The RPAO gives the final DD Form 1354 to the Realty Specialist to establish as a voucher and ensures that the Realty Specialist inputs the final facility cost into the real property database. Upon receipt of the final 1354, the installation Realty Specialist will adjust the costs in the real property database which were based on the interim and voucher the final DD Form 1354.

The interim and final DD Forms 1354 refer to the same Transaction Type (i.e., new construction or capital improvement as shown in block 9A), will have the same Effective Date (block 9D), and the same Project/Job Number (block 3). The Realty Specialist can identify all 1354 versions pertaining to the same capitalization event by the Project/Job Number. The interim and final versions will have different Dates Form Prepared (block 2) and different Serial Numbers (block 4), and possibly different item costs (column 19).

The Effective Date (block 9D) on the final DD Form 1354 for a project consisting of multiple individual facility turnovers on different dates must include the different effective date for each facility. These different dates may be shown in Project Remarks (block 28) with a "See Remarks" in block 9D. The Effective Date for a single facility with a phased turnover is the date the construction contractor declares the entire facility is available for use.

CHAPTER 4
REFER TO UFC1-300-08 FOR ADDITIONAL INFORMATION-

CHAPTER 5
PROJECT COST VERSUS FACILITIES COSTS

5-1 **PROJECT COSTS**. This chapter provides guidance to the construction agent project manager on how to determine the capitalization costs which are accrued against the facilities described on the DD Form 1354. Facility acquisition and capital improvement data in the real property accounting system must be substantiated by the costs on DD Forms 1354, and the costs on the 1354 must be reconcilable to the overall project costs. This chapter provides a methodology to ensure that DoD uses a consistent method of calculating these costs and to ensure correlation between costs recorded in the real property database for real property and 1354-documented project costs. The preparer of the DD Form 1354 must allocate or prorate P&D and S&A costs among the facilities in the project. Only facility costs appear as items in column 10 of the 1354. Indicate P&D, S&A, construction, equipment-in-place (EIP) costs, and total project costs in Project Remarks (block 28). The total project cost must equal the sum of the costs of individual facilities plus project-funded EIP costs. The preparer must explain any difference. Depending on the method of item pricing on the construction contract, some facility costs may translate directly from the contractor's facility cost. Other costs, such as total project P&D and S&A may have to be prorated or allocated among several facilities.

COST METHODOLOGY. The following step-by-step procedure is recommended:

- The construction contractor shall Identify all the facilities on the DD Form 1354 and their associated construction costs, i.e., within the 5-foot line of the facility.

- The construction contractor shall Identify any site preparation costs including footprint demolition, equipment (if project funded), or other costs that roll up with the costs directly attributable to those facilities.

- The construction contractor shall Identify costs associated with those facilities that should be rolled up to existing consolidated facility records, such as utility lines or pavements.

- The DeCA/ PMFM PM will allocate the total planning and design (P&D) and supervision and administration (S&A) costs (including project management costs) among the facilities listed on the 1354. If P&D and S&A costs are known for the entire project but are not known for individual facilities, prorate total P&D and S&A costs among the different facilities. Prorate based on either individual area of the facility or individual facility construction working estimates. Annotate in Project Remarks (block 28) which basis you used to prorate or allocate P&D and S&A costs to individual facilities.

Compute the individual facility and incremental consolidated facility costs by summing the actual and allocated costs computed in steps one through four.

CONSTRUCTION ISSUE

Check to ensure the sum of the individual facility costs (column 19) equals the total project cost. List in Project Remarks (Block 28) the total project cost and the individual total project cost contributions of construction, P&D, S&A, EIP, and any non-capitalizing costs, i.e., non-footprint demolition. If the sum of the individual facilities on the 1354 does not equal the project total, explain in the Project Remarks (Block 28).

CHAPTER 6
STANDARDS FOR INTERIM AND FINAL DD FORMS 1354
REFER TO UFC1-300-08 FOR ADDITIONAL INFORMATION-

ATTACHMENT C:

SUMMARY INSTRUCTIONS FOR DD FORM 1354

ITEM NUMBER	ITEM NAME	DESCRIPTION
ITEM 1	FROM	Name and address of the transferring agency: organization, installation, USACE District, NAVFAC Division/Activity, etc. Include zip code.
ITEM 2	DATE FORM PREPARED	Date the DD Form 1354 is actually prepared. Use the standard date format YYYYMMDD.
ITEM 3	PROJECT/JOB NUMBER	The project number assigned to identify the project on a DD Form 1391 for new construction and the DPW/FacMgr/BCE/DIS Individual Job Order (IJO) Number from work management system. Use both numbers when they exist.
ITEM 4	SERIAL NUMBER	Serial number assigned in sequence by the preparing organization. Identify the fiscal year, and sequence number; for example, 2004-0001, 2004-0002, etc.
ITEM 5	TO	Name and address of the receiving installation, activity, and service. Include zip code and installation number (INSNO) of receiving installation, which the RPAO represents.
ITEM 6	SITE/INSNO/ NAME	Site or installation number and site name where the facility being constructed/transferred/accepted is located.
ITEM 7	CONTRACT NUMBER(S)	Contract number(s) if any project work is performed under a contract.
ITEM 8	DRAWING NUMBER(S)	Enter the drawing number(s) or CAD identifier(s) for the project components.
ITEM 9	TRANSACTION DETAILS	Has four subparts
SUBPART 9A	TYPE of TRANSACTION	Checkbox to indicate whether the DD Form 1354 applies to acceptance of new construction, transfer of existing facilities, a capital improvement to existing facilities, or other. Enter remarks in block 28 "Project Remarks" if "other" is specified. Mark only one box.
SUBPART 9B	WHEN/EVENT	Checkbox to indicate when, in terms of event type, the transfer and acceptance documented by this 1354 occurs, e.g., at the time of physical for use date, beneficial occupancy date (BOD), partial completion/available BOD, financial completion or "other." Enter remarks in block 26 "Project Remarks" if "other" is specified. Mark only one box.

ITEM Number	ITEM NAME	DESCRIPTION
SUBPART 9C	VERSION	Checkbox to indicate whether this version is a draft, interim, or final DD Form 1354. Mark only one box.
SUBPART 9D	EFFECTIVE DATE	Effective date for the transaction being described in block 9. This is the start date for depreciation. Also known as the Capitalization Date. Use the standard date format YYYYMMDD.
ITEM 10	ITEM NUMBER	Use a separate Item Number for each facility. Do not use more than one Item Number for multiple category codes within the same facility. Assign item numbers in column 10 sequentially starting with the number one (1).
ITEM 11	FACILITY NUMBER	The unique 5-character facility alphanumeric to be assigned to a new facility, or existing facility number for existing or consolidated facilities. This alphanumeric is assigned by the installation and provided to the construction agent early in the design process.
ITEM 12	CATEGORY CODE	The category code that appropriately describes the facility (land, building, structure, utility or portion thereof) design-use. List only one category code per line and do not add another item number (column 10) for multi-use facilities. Category codes and descriptions should be consistent with service implementation of DODI 4165.3, Department of Defense Facility Classes and Construction Categories (e.g., DA PAM 415-28, "Guide to Army Real Property Category Codes" and Air Force Handbook 32-1084, Facilities "Requirements").
ITEM 13	CATCODE DESCRIPTION	The category code name that corresponds to the category code for the item number (Item 10).
ITEM 14	TYPE	The type of construction: use "P" for permanent, "S" for semi permanent, or "T" for temporary.
ITEM 15	AREA: UNIT OF MEAS-1	The area unit of measure 1. Use abbreviations "SF" for square feet, "SY" for square yards, and "AC" for acres per DODI 4165.3 with Service implementation thereof (e.g., DA PAM 415-28).
ITEM 16	TOTAL QUANTITY-UM1	The total area for the measure identified in Item 15. Use negative numbers for demolition.
ITEM 17	OTHER: UNIT OF MEAS-2	The Unit of Measure 2 for capacity or other measurement unit. Use abbreviations, such as "MB" for millions of BTU, found in DODI 4165.3.

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ITEM Number	ITEM NAME	DESCRIPTION
ITEM 18	TOTAL QUANTITY-UM2	The total capacity/other for the measure identified in Item 17. Use negative numbers for demolition
ITEM 19	COST	The cost for each facility (Item-block 10). For capital improvements to existing facilities, enter only the amount by which the general ledger balance is to be increased. Costs on interim DD Forms 1354 are actual costs to date, but considered preliminary; costs on final DD Forms 1354 are always final costs.
ITEM 20	FUND SOURCE	Fund source for this Item. Use the Item Remarks (column 23) to explain funding for this item if necessary. See Appendix E.
ITEM 21	FUNDING ORGANIZATION	The organization responsible for replacing this facility at the end of its useful life (e.g., Army, Air Force, Navy, Marine Corps (specify component for each service), DLA, DeCA, TMA, etc.). See Appendix F.
ITEM 22	INTEREST CODE	Indicator of the Government's interest or ownership in the facility (e.g., DoD owned, leased, State owned, privately owned, etc.). See Appendix G.
ITEM 23	ITEM REMARKS	Include any clarifying remarks pertaining only to the item number identified in column 10. Also summarize any cost sharing or prorating logic that would document how you derived the item cost.
ITEM 24	STATEMENT OF COMPLETION	Name, signature, title and date of signature by the individual responsible for the transfer of the properties.
ITEM 25	ACCEPTED BY	Name, signature, title and date of signature by the RPAO or delegated individual responsible for accepting the property.
ITEM 26	PROPERTY VOUCHER NUMBER	Next sequential number assigned by the RPAO in the Register of Vouchers to a Stock Record Account (e.g., DA Form 272 or Navy system assigned number).
ITEM 27	CONSTRUCTION DEFICIENCIES	All construction deficiencies in the project known or identified during the construction contractor turnover inspection.
ITEM 28	PROJECT REMARKS	Any information to explain "other" entries in blocks 9A or 9B and other information that would be helpful in understanding the transaction. Also used for project level remarks and continuation where more space is needed.

FUND SOURCE

APPENDIX E Code	Abbreviation	Fund Source Full Name
01	MILCON	Military Construction
02	BRAC	Base Realignment and Closure
03	O&M	Operations and Maintenance
04	RDTE	Research, Development, Test, and Evaluation
05	FH Const	Family Housing Construction
06	FH Opns	Family Housing Operations
07	MILPER	Military Personnel
08	PROCURE	Procurement
09	WCF	Working Capital Fund
10	FOREIGN	Foreign Funds
11	NAF	Nonappropriated Funds (NAF)
12	PRIVATE	Private/Donation
13	OTHER	Other Funds

FUNDING ORGANIZATION

APPENDIX F Code	Abbreviation	Funding Organization Full Name
00	ARMY	Army Active
01	USAR	Army Reserve
02	ARNG	Army National Guard
03	AIR F	Air Force Active
04	AIR R	Air Force Reserve
05	ANG	Air National Guard
06	NAVY	Navy Active
07	NAVRES	Navy Reserve
08	USMC	Marine Corps Active
09	MCR	Marine Corps Reserve
		Unified Commands
10	USCENTCOM	Central Command (USCENTCOM)
11	USEUCOM	European Command (USEUCOM)
12	JFCOM	Joint Forces Command
13	USPACOM	Pacific Command (USPACOM)
14	USSOUTHCOM	Southern Command (USSOUTHCOM)
15	USSOCOM	Special Operations Command (USSOCOM)
16	USSPACECOM	Space Command (USSPACECOM)
17	USSTRACOM	Strategic Command (USSTRACOM)
18	USTRANSCOM	Transportation Command (USTRANSCOM)
		Defense Agencies
21	BMDO	Ballistic Missile Defense Organization (BMDO)
22	DARPA	Defense Advanced Research Projects Agency (DARPA)
23	DECA	Defense Commissary Agency (DeCA)
24	DCAA	Defense Contract Audit Agency (DCAA)
25	DCMA	Defense Contract Management Agency (DCMA)
26	DFAS	Defense Finance and Accounting Service (DFAS)
27	DISA	Defense Information Systems Agency (DISA)
28	DIA	Defense Intelligence Agency (DIA)
29	DLSA	Defense Legal Services Agency (DLSA)
30	DLA HQ	Defense Logistics Agency (DLA) – Other (HQ, etc)
31	DDC	DLA Defense Distribution Center (DDC)
32	DRMS	DLA Defense Reutilization and Marketing Service (DRMS)
33	DESC	DLA Defense Energy Support Center (DESC)
34	DSCP	DLA Defense Supply Center Philadelphia (DSCP)
35	DSCC	DLA Defense Supply Center Columbus (DSCC)
36	DSCR	DLA Defense Supply Center Richmond (DSCR)

37	DAPS	DLA Defense Automation and Production Service (DAPS)
38	DNSC	DLA Defense National Stockpile Center (DNSC)
39	DSCA	Defense Security Cooperation Agency (DSCA)
40	DTRA	Defense Threat Reduction Agency (DTRA)
41	NIMA	National Imagery and Mapping Agency (NIMA)
42	NSA	National Security Agency (NSA)
		DoD Field Activities
50	AFIS	American Forces Information Service
51	DODEA	DoD Education Activity (DoDEA)
52	DODHRA	DoD Human Resources Activity
53	TMA	TRICARE Management Activity (TMA)
54	WHS	Washington Headquarters Services (WHS)
		Other Organizations
60	OTHER FED	Other Federal Agencies
61	STATE	State and Local Agencies
62	NATO	North Atlantic Treaty Organization (NATO)
63	OTHER NAT	Other Nations
64	PRIVATE	Private Organizations

INTEREST CODE

Code	Interest Abbreviation	Description
01	Owned by DoD	Real property facilities where ownership is held by a Military Department or WHS. Example: Base HQ at Bolling AFB.
02	Owned by Federal Government (Non-DoD)	Federal Government-owned real property facilities (other than DoD) that are licensed or permitted to the DoD. Example: Laboratory facility at the National Institutes of Health occupied by TRICARE Management Activity. Do not include facilities acquired from the General Services Administration (GSA) under this code. See Code 3 below.
03	Owned by Private Sector-Leased to DoD Component	A lease is a written agreement that conveys an interest, based on possession, in real property, usually exclusive, for a period of time for a specified consideration. Include under this code all General Services Administration (GSA) leases for use by DoD. Example: Office of the Secretary of Defense at 400 Army-Navy Drive
04	Owned by Other Than DoD - Land Easement	An easement is a real estate instrument that grants the right to use property (land only) for a specific purpose. It may be temporary or permanent. Example: permission for an Air Force installation to cross private property and/or public domain property with a utility line either underground or overhead.
05	Owned by Foreign Government	Foreign Government-owned real property facilities that are licensed or permitted to DoD. Example: US Army barracks in Heidelberg, Germany or Navy NATO facilities in Italy.
06	Owned by Other Foreign Source	Real property facilities leased from a foreign private sector for use by DoD. Example: US Marine Corps apartment complex located in Okinawa, Japan, and leased from a private realtor.
07	Privately Owned and Operated	Real property facilities on DoD sites that are owned and operated by the private sector. Examples: Burger King Restaurant or a privatized utility.

08	Owned by State or Local Government	Real property facilities owned by a state or local Government or other public entity. Examples: Army National Guard maintenance facility at Camp Blanding, FL, a state owned military site.

CONSTRUCTION ISSUE

ATTACHMENT D:

BUILDING INFORMATION CHECKLIST

Use Appendix D as a checklist of required information to be entered into the real property database. Provide this information for each Real Property Facility listed on the DD Form 1354 in a format that allows easy data entry into the real property system. Normally this information is provided by the A-E electronically, often in XML format or GIS compatible format.

BUILDING IDENTIFICATION for this 5-Part CHECKLIST				
Facility Number	**Building Name**	**Number of Floors**	**Gross SF**	**Net SF**

1. Building Dimensions and Construction Materials

Building Outside Dimensions	**Length (LF)**	**Width (LF)**
Main Building		
Wings		
Offsets		
Basement		
Attic		
Porches, covered		
Roof		
Foundation		

Other Building Data	**Feet**
Ceiling Height Main Bldg	
Ceiling Height Basement	
Door Height	
Door Width	
	Code
Fire Rating Code	

Construction Materials	**Type**
Principal Structural Material	
Secondary Structural Material	
Exterior Wall Material	
Interior Wall Material	

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Floor Surface Material	
Sub-Floor Material	

Additional Construction Materials	**Type**	
	Foundation Form	**Pile or Foundation Material**
Foundation		
	Roof Type	**Roofing Material**
Roof Support		
Roof Deck		
Roof Surface		

Construction Materials (Pavements)	**Type**
Surface Course Materials	
Base Course Materials	

Utility Connections	**Number of pipes**	**Diameter of each pipe**	**Capacity of all inlet pipes**	**Available or Connected? (Yes/No)**
Water				
Gas				
Sewer Pipe				
Storm Sewer Pipe				
Steam				
Condensate				
Communications				
System	**Energy Type**	**Source Location**	**Fuel Description**	**Air Circulation**
Heating				
Air Conditioning				
Hot Water				
Steam				
Electrical				

Electric	Phase	Voltage	Wire Size	Connected Load - AMPS	Connected Load - KVA

UFC 1-300-08 30 JUNE 2004					

UFC 1-300-08 30 JUNE 2004 Nomenclature	UM	Amount of UM	Description
Fire Protection System			
Closed Head Auto Sprinkler	HD		
Open Head Deluge System	HD		
Auto Fire Detection System	HD		
Manual Fire Alarm System	EA		
CO2 Fire System	EA		
Foam Fire System	EA		
Other Fire System	EA		
Halon 1301 Fire System	EA		
Security System			
Security Alarm System	EA		
Heating System			
Heating Plant	MB		
Storage Tank for Heating Fuel	GA		
Air Conditioning System			
Central A/C Plant	TN		
Electrical System			
Emergency Electric Power Generator	KW/KVA		
Storage Tank for Generator Fuel	GA		
Hot Water			

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Item	Size/Quantity	Units	Model	Description
Evaporative Coolers		CFM		
Hot Water Heater		GA		
Exhaust Fan		CFM		
Wash Basin		EACH		
Water Closet		EACH		
Urinal		EACH		
Utility Sink		EACH		
Refrigerated Drinking Fountain		EACH		
Heating Plant under 750 MB/Hr		MB		
Forced Air Heating		BTU		
Other Heating		BTU		
Dehumidifiers		GPM		
Elevators		LBS & PN		
Theater-type Seats, bolted to floor		PN		
Other (SPECIFY)				

UFC 1-300-08 30 JUNE 2004 Nomenclature	**UM**	**Amount of UM**	**Cost**	**Comments**
Primary Elec. Dist Line OH	LF			
Transformers	KVA			
Power Poles	EA			
Secondary Elec. Dist Line OH	LF			
Primary Elec. Dist Line UG	LF			
Secondary Elec. Dist Line UG	LF			
Exterior Street Lighting or Parking Area Lights	EA			
Gas Mains	LF			
Septic Systems	KG			

Sanitary Sewer	LF			
Water Dist Mains	LF			
Fire Hydrants	EA			
Curbs & Gutters	LF			
Driveway	SY			
Roadway	SY			
Vehicle Parking	SY			
Storm Drain	LF			
Fence, Security	LF			
Fence, Interior	LF			
Sidewalk	SY			
Transformer Vault (four or more transformers)	SF			
Telephone Duct	LF			
Telephone Pole	LF			

CONSTRUCTION ISSUE

SECTION 01731

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 GENERAL

1.1.1. This section includes administrative and procedural requirements for cutting and patching and as follows:

1.1.1.1. Products and installation for patching and extending work.

1.1.1.2. Transition and adjustments.

1.1.1.3. Repair of damaged surfaces, finishes, and cleaning.

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.3 SUBMITTALS (Not used)

1.4 CUTTING AND PATCHING.

1.4.1. Requirements for structural work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1.4.1.1. Where cutting and patching involves welding or adding reinforcement to existing structural elements, submit details and engineering calculations (by a structural engineer licensed in the state of the project location) showing integration of reinforcement with original structure. Obtain approval to proceed from the Contracting Officer.

1.4.2. Operational limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decrease operational life or safety. Maintain fire resistance ratings of members and systems.

1.4.3. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to eliminate interruption of services to occupied areas.

1.4.4. Cutting and patching roofs: Determine from the government which roofing manufacturer is responsible for the roof bond or guarantee. Subcontract all cutting and patching to the roofing manufacturer's approved local contractor. Provide the government with a letter confirming his authority to perform such work prior to commencing the work.

1.4.5. Exterior Building Enclosure: Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas. Maintain the security system and secure openings nightly.

1.4.6. Visual requirements. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Contracting Officer's opinion, reduce the buildings aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually satisfactory manner.

1.5 Warranty.

1.5.1. Existing warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void warranties required or existing.

1.6 Materials.

1.6.1. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. If identical materials are unavailable or Contractor cannot find, use materials whose installed performance will equal or surpass that of existing materials.

1.6.1.1. New materials: As specified on product Sections; match existing products for patching and extending work. Install work according to manufacturer and special standards.

1.6.1.2. Type and quality of existing products; determine by inspection and testing products where necessary, install work according standards.

1.7 Inspection

1.7.1. Examine surfaces Contractor will cut and patch and conditions under which Contractor will cut and patch before cutting. If unsafe or unsatisfactory conditions exist, take corrective action before proceeding.

1.7.2. Verify demolition is complete and areas are ready for installation of new work.

1.8 Preparation.

1.8.1. Arrange work for a minimum of cutting.

1.8.2. Temporary support: Provide temporary support of work to be cut.

1.8.3. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather for portions of the project exposed during cutting and patching operations.

1.8.4. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

1.8.5. Verify and identify the existence of underground or hidden conduits, plumbing, or voice/data circuits.

1.8.6. Do not cut active pipe, conduit, or ductwork scheduled for removal or relocation and serving an occupied building until Contractor either bypasses them or provides alternate services to the affected areas of the building.

1.8.7. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1.8.8. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

1.8.9. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

1.8.10. Cut, move or remove items as necessary for access to alterations and renovation work. Replace and restore at completion.

1.8.11. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.

1.8.12. Prepare surface and remove surface finishes to provide for proper installation of new work and finishes.

1.9 Performance.

1.9.1. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1.9.1.1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

1.10 Cutting

1.10.1. Verify underground or hidden electrical conduits, piping etc. have been identified before cutting.

1.10.2. Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.

1.10.3. When cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

1.10.4. To avoid marring existing finished surfaces, cut or drill from exposed or finished side into concealed surfaces.

1.10.5. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or a diamond-core drill.

1.10.5.1. Core drill all required small masonry openings.

1.10.6. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.

1.10.7. Except as otherwise indicated in Divisions 15 and 16, comply with the following:

1.10.7.1. Cut-off pipe or conduit in floors, walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

1.11 Patching

1.11.1. Patch with durable seams that are as invisible as possible. Comply with specific tolerances.

1.11.2. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

1.11.3. Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1.11.4. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

1.11.5. Where removing walls or where partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials as required by the contract documents to achieve uniform color and appearance.

1.11.5.1. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.

1.11.5.2. Where new work abuts or aligns with existing, perform a smooth and even transition. Patch work to match existing adjacent work in texture and appearance.

1.11.5.3. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division. Make corrective action recommendations to the Contracting Officer.

1.11.6. Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

1.11.6.1. Patch or replace damaged, lifted, discolored, or imperfect portions of existing surfaces.

1.11.6.2. Repair substrate prior to patching finish.

1.11.6.3. Comply with United States Gypsum Company's "Gypsum Construction Handbook," 6th Edition, recommendations or corrective remedies for damaged gypsum board.

1.12 Finishes.

1.12.1. Finish surfaces as specified in individual Product Sections.

1.12.2. Finish patches to uniform finish and texture over entire area. When Contractor cannot match finish, refinish entire surface to nearest intersections.

1.12.3. Cleaning.

1.12.3.1. Remove debris and abandoned items from the area and from concealed spaces.

1.12.3.2. Clean areas and spaces where cutting and patching are performed. Completely remove paint, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01750

FIRE PREVENTION, SAFETY, AND SECURITY

PART 1 - GENERAL

1.1 GENERAL

1.1.1. The Contractor shall be responsible for initiating, maintaining and supervising all fire prevention, safety, and security precautions and programs in connection with the performance of the Contract.

1.1.2. Section Includes

1.1.2.1. Fire Prevention

1.1.2.2. Safety

1.1.2.3. Security

1.2 RELATED SECTIONS

1.2.1. All contract documents and contract modifications made part of the contract by inclusion or reference apply to this section.

1.3 SUBMITTALS

1.3.1. Refer to specification Division 1 Section “Administrative Requirements” for procedures.

1.3.2. Submittal Schedule:

1.3.2.1. Provide the indicated quantity. Note that the Government will retain three copies and the pdf file.

1.3.3. Submittal action by reviewer:

1.3.3.1. R: Review each submittal, mark to indicate action taken, and return.

1.3.4. Submittal requirements for this section are as follows:

Action	**Reference Para.**	**Submittal**
R	1.5.2	Fire Prevention Plan
R	1.6.3	Safety Plan
R	1.7.1	Security Plan

1.4 MANAGEMENT

1.4.1. The Contractor shall be responsible for Safety on site.

1.5 FIRE PREVENTION

1.5.1. Standards: Comply with the requirements of the Installation's Fire Prevention Standards. Comply with NFPA 241 "Standards for Safeguarding Construction, Alterations, and Demolition Operations."

1.5.2. Submittals: Provide a Fire Prevention Plan which contains, but is not limited to, procedures for the following:

1.5.2.1. The supervisor's authority and responsibilities:

a. The proper availability, operation and location of fire protection equipment and general supervision of safeguards.

b. Coordination with installation fire chief on all matters of special permits such as burning or welding permits, fire prevention, fire reporting, and fire fighting.

1.5.2.2. Safeguards:

a. Fire-resistant construction for offices, shops, and sheds located within the construction area and within 30 feet of building lines. Comply with the requirements of NFPA 241.

b. Prohibition of smoking in the commissary and in the vicinity of hazardous operations and locations.

c. Access for fire fighting vehicles to the immediate job site throughout the construction period.

d. Vehicle parking control measures so as not to conflict with emergency vehicle site access.

e. Control measures for combustion powered construction equipment (compressors, hoists, derricks, pumps, etc., dealing with both fire prevention and exhaust fumes.

f. Temporary Fire protection: Until permanent fire protection is operational, install and maintain temporary fire protection facilities (including alarm and all suppression systems) of the types required to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

g. Changes to exits or exits related to temporary construction. Inform and gain the approval of the Installation Safety and Fire Officers for the maintenance of exit requirements (both travel distance and exit numbers).

1.6 SAFETY

1.6.1. Standards: Comply with ANSI A10 Series standards for "Safety Requirements for Construction and Demolition." Comply with OSHA 1910 and 1926. Comply with USACE EM 385-1-1 Health and Safety Manual. Comply with NAVFAC P-307 (Management of Weight Handling Equipment).

1.6.2. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

1.6.2.1. Employees on the Work and other persons who may be affected thereby;

1.6.2.2. The Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

1.6.2.3. Other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

1.6.3. Submittals: Provide a Safety Plan and accident prevention policy for all personnel during the performance of the work. Requirements: The plan must contain, but is not limited to, procedures for the following: Submit Safety Plan and obtain approval prior to start of construction.

1.6.3.1. Individuals responsible for safety.
1.6.3.2. Subcontractor supervision.
1.6.3.3. Indoctrination of new employees.
1.6.3.4. Safety related signage and postings.
1.6.3.5. Safety gear (hardhats, tie-offs for persons and ladders, hearing and eye protection, etc)
1.6.3.6. Barriers
1.6.3.7. "Tool Box" safety meetings.
1.6.3.8. Fire prevention and protection.
1.6.3.9. Housekeeping practices.
1.6.3.10. Electrical and mechanical equipment inspections.
1.6.3.11. Floor, platform, and/or roof loading (access and monitoring for overload)
1.6.3.12. Emergencies
1.6.3.13. First aid and medical facilities.
1.6.3.14. Sanitation.
1.6.3.15. Safety promotions.
1.6.3.16. Accident Reporting. (Provide a copy of each accident report to the Contracting Officer within seven calendar days of the incident.)
1.6.3.17. Reporting. A list of job safety actions taken and safety inspections conducted. Indicate that Contractor has met safety requirements including the results on the following:

a. Did Contractor hold job safety meeting? (If YES, attach a copy of the meeting minutes.)
b. Were there any lost time accidents? (If YES, attach a copy of the completed OSHA report.)
c. Were there any non-lost time accidents? (If YES, attach a copy of the completed OSHA report.)
d. Was trenching/scaffold/high voltage electrical work done? (If YES, attach a statement or checklist showing inspection performed.)
e. Equipment Inspections: Attach a list of safety inspections on any equipment delivered to the site for construction purposes stating the equipment meets all OSHA operating requirements (e.g., fire extinguishers, back up alarms, etc.). Perform weekly inspections for compliance.

1.6.4. Comply with all applicable requirements stipulated by the Occupational Safety and Health Act and General Provisions clause titled Accident Prevention for method of operation, work conditions, procedures, and equipment.

1.6.5. The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

1.7 SECURITY

1.7.1. Submittals: Provide a Security Plan for persons and property during the performance of the work. Requirements: The plan must contain, but is not limited to, procedures for the following:

1.7.1.1. Security Clearances: Information for security clearances and compliance with security regulations as imposed by both the military installation and the building's occupying agency for all Contractor employees.

1.7.1.2. The Government's reservation of right to exclude or remove from the site or building any employee of the Contractor or Subcontractor whom the Government deems incompetent, careless, insubordinate, otherwise objectionable, or whose continued employment on the work is deemed by the Government to be contrary to public interest.

1.7.1.3. Identification pass: While on the Installation, each employee of the Contractor and subcontractors must have in his possession, an approved identification pass. Indicate the individual's name, and bear a picture of the individual. Coordinate with the Commissary Store Director for individual requirements regarding security badges while within the confines of the commissary building.

1.7.1.4. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction unless otherwise directed by the Contracting Officer. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

1.7.1.5. Storage: For storage of materials and equipment that are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism. As alterations or construction on buildings progress, provide temporary security enclosures, doors and locks necessary to prevent unauthorized entrance.

1.7.1.6. Restricted Areas: Do not permit workers in restricted areas (as designated by the Contracting Officer).

1.7.1.7. Do not change over from use of temporary security to permanent security until the Contracting Officer accepts the work.

1.7.1.8. Restrictions on photographs at sensitive areas of the installation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01810

COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
Description of the commissioning process and responsibilities common to all parties.
Schedule of Systems to be Commissioned.

B. Related Sections
Section 02997 - Commissioning Site Construction
Section 08997 - Commissioning Openings
Section 11997 - Commissioning Equipment
Section 13997 - Commissioning Special Construction
Section 15997 - Commissioning Mechanical Systems
Section 16997 - Commissioning Electrical Systems

1.2 DESCRIPTION

A. Commissioning
This project will have selected building systems commissioned. The commissioning process will be directed by the Contractor and monitored by the Government Commissioning Representative (GCR) whose services will be provided by the Government.
Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the Government's operational needs. This is achieved by actual verification of performance. The commissioning process encompasses and coordinates the functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

a. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
b. Verify and document proper performance of equipment and systems.
c. Verify that O&M documentation is complete.
d. Verify that the Government's operating personnel are adequately trained.

B. The commissioning process does not reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product in accordance with the Contract Documents.

C. Abbreviations. The following are common abbreviations used in the Specifications and in the Commissioning Plan.

A/E-	Architect and Design Engineers	GC-	General Contractor (prime)
CA-	Commissioning Agent	MC-	Mechanical Contractor
CC-	Controls Contractor	PC-	Prefunctional Checklist
GCR-	Government Commissioning Representative (Same as CA)	PM-	Project Manager (of the Government)
PCO-	Contracting Officer	Subs-	Subcontractors to General
EC-	Electrical Contractor	TAB-	Test and Balance Contractor
ES-	Electronic Security Contractor	TI-	Technical Inspector
FT-	Functional Performance Test	QC-	Contractor's Quality Control Manager

1.3 COMMISSIONING TEAM

A. The Systems Commissioning Team shall include the following members:
Government Commissioning Representation – Contracting Officer's designated Government Representative for Commissioning.
General Contractor Superintendent
Contractor Quality Control Manager
Mechanical Subcontractor Representative
Electrical Subcontractor Representative
Testing, Balancing, and Adjusting Subcontractor Representative
Instrumentation and Controls Subcontractor Representative
DeCA Project Manager
DeCA Technical Inspector
Government Furnished Equipment Manufacturer's Representatives
DeCA Store Maintenance Contractor Representatives after BOD
Construction Store Maintenance Contractor Representative
User Group representative (Commissary representative and/or Installation maintenance personnel)

B. Provision of a fully commissioned system of all materials required under the construction contract is the responsibility of the General Contractor. Therefore, Contractor Group members of the Systems Commissioning Team, through participation in the planning, management and oversight of all construction activities related to equipment approvals, performance testing and commissioning of the systems identified herein must be able to assure the Government that all systems have been properly tested and commissioned. The Government and User members are intended to participate fully as adjuncts to the Contractor Group Team members. It is intended that through this participation, the Contractor Group Team members will be provided timely access to all design information necessary to resolve questions as to intended performance of the systems specified. In addition, the Government will be sufficiently involved in the development of commissioning and performance testing programs to assure timely review of plans and procedures submitted by the Contractor. The purpose of this process will be to provide fully functional systems which interact to meet all contract performance requirements. The participation of the Government Commissioning Team members shall not relieve the General Contractor of any responsibility for compliance with the requirements of the contract.

C. Management.
The Contractor shall coordinate the commissioning.

The GCR is hired by and represents the Government. The GCR monitors and verifies the commissioning activities.
The Contractor Quality Control Manager shall witness all required tests.
The TI will witness all required tests and certify the results.

D. Scheduling.
The GCR will work with GC according to established protocols to schedule the commissioning activities. The GCR will review the Construction Schedule and verify that prefunctional and functional testing is properly scheduled. The GC will integrate all commissioning activities into the master schedule.
Commissioning inspections and testing will be accomplished in the presence of a representative of the Contracting Officer.

1.4 OVERVIEW OF THE COMMISSIONING PROCESS

A. Commissioning Plan.
An initial Commissioning Plan has been developed for this project and is included elsewhere in the Bid Documents. The commissioning plan provides guidance and further details the requirements in the execution of the commissioning process. The Specifications take precedence over the Commissioning Plan in the event of a conflict. The Contractor shall ensure that the initial commissioning plan is complete. Any missing or incomplete Pre-functional checklists or functional checklists shall be provided or completed by the construction contractor.

B. Commissioning Process. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
Commissioning during construction begins with a scoping meeting conducted by the Contractor and monitored by the GCR where the commissioning process is reviewed with the commissioning team members during a scheduled weekly contractors' meeting. This meeting will occur prior to the completion of the first Prefunctional Checklist.

a. Most Prefunctional Checklists to be completed during the startup process are included in the Commissioning Plan. The construction contractor shall identify any missing checklists and provide as necessary.
b. The QC will witness and the TI will monitor to ensure the Prefunctional Checklists are completed.

Additional meetings will be required throughout construction, scheduled by the QC and TI with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems. These will be part of the weekly contractors' meetings.
Equipment documentation, including Shop Drawings and installation instructions, is submitted to the TI through the normal submittals process.
In general, performance verification proceeds from component level to systems and intersystem levels with prefunctional checklists being completed before functional testing.
The Subs, under their own direction, execute and document the prefunctional checklists with the QC verifying and the TI monitoring conformance.
Prior to commencement of functional testing, the Commissioning Team shall perform a systems activation inspection to ensure the systems are ready to be functionally tested.

c. Functional Checklists are included in the Commissioning Plan. The construction contractor shall identify any missing checklists and provide as necessary.
d. The QC will witness and ensure the Functional Checklists are completed. The TI will be present to monitor activities to ensure functional checklists are completed.

The Subs, under their own direction, execute and document the Functional checklists with the QC verifying and the TI monitoring conformance.
Items of non-compliance in material, installation or setup are noted for the Contractor to correct. Non-complying systems will then be retested and functional performance verified by the QC and monitored by the TI.
All functional performance tests are completed before Beneficial Occupancy Date.
The QC and TI review the O&M documentation for completeness.
The QC and TI review the training plan provided by the Subs. The QC and TI will witness training session(s) to verify that acceptable training was provided.

1.5 GOVERNMENT COMMISSIONING REPRESENTATIVE (GCR) DUTIES AND RESPONSIBILITIES

A. Duties and responsibilities of the GCR are set forth in the Commissioning Plan.

1.6 DEFINITIONS

Acceptance Phase - phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.

Government Commissioning Representative (GCR), same as Commissioning Agent (CA) - an independent party, not otherwise associated with the A/E team members or the Contractor, though he/she may be hired as a subcontractor to them. The GCR directs and coordinates the day-to-day commissioning activities. The GCR does not take an oversight role.

Commissioning Plan - an overall plan, developed before ~~or after~~ bidding, that provides the structure, schedule and coordination planning for the commissioning process.

Datalogging - monitoring flows, currents, status, pressures, etc. of equipment using stand-alone dataloggers separate from the control system.

Deferred Functional Tests - FTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.

Deficiency - a condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the design intent).

Functional Completion - All TAB and commissioning responsibilities of the Contractor, (except for seasonal or approved deferred testing and controls training), must be completed.

Functional Performance Test (FT) - test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The Government Commissioning Representative develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. FTs are performed after prefunctional checklists and startup are complete.

Indirect Indicators - indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").

Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of control systems.

Over-written Value - writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50F to 75F to verify economizer operation). See also "Simulated Signal."

Phased Commissioning - commissioning that is completed in phases due to the size of the structure or other scheduling issues, in order to minimize the total construction time.

Prefunctional Checklist (PC) - a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the GCR to the Sub. Prefunctional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.).

Sampling. - functionally testing only a fraction of the total number of identical or near identical pieces of equipment.

Seasonal Performance Tests - FT that are deferred until the system(s) will experience conditions closer to their design conditions.

Simulated Condition - condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).

Simulated Signal - disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.

Startup - the initial starting or activating of dynamic equipment, including executing prefunctional checklists.

Test Procedures - the step-by-step process which must be executed to fulfill the test requirements. The test procedures are developed by the GCR.

Test Requirements - requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures. The test requirements are specified in the Contract Documents.

Trending - monitoring using the building control system.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

A. All testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the construction contractor for the equipment being tested.

B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included in the base bid price to the Contractor and shall be left on site for use by the Government.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications.

2.2 UTILITIES AND ACCESSORIES

A. Provide utilities necessary to execute testing and commissioning, including water, fuels, chemicals, batteries and other similar expendable items.

B. Provide any equipment or device required for access, such as ladders, and platforms.

PART 3 EXECUTION

3.1 MEETINGS

A. During regular contractor meetings, the QC and TI will be available to answer questions about the Commissioning process and assist subcontractors in the completion of prefunctional and functional test sheets.

3.2 SUBMITTALS

A. Submittal Requirements For Commissioning
The Government Commissioning Representative will review submittals during regular site visits. The Government Commissioning Representative will review the final approved submittal located in the GC's trailer on site. The GC will maintain this filing system.

B. The Government Commissioning Representative will review normal Contractor submittals applicable to systems being commissioned and adjust prefunctional and functional test sheets as appropriate based on equipment being supplied.

C. Data for Commissioning
Typically submittals should include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any Government-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Government to keep the warranty in force clearly identified. In addition, copies of the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be maintained on site in the filing system set up and maintained by the GC. The Government Commissioning Representative will review this data on site and adjust prefunctional and functional test sheets as required.

3.3 START-UP AND PREFUNCTIONAL CHECKLISTS

A. General. Prefunctional checklists ensure that the equipment and systems are properly installed and operational. They ensure that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full prefunctional checkout. The prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.

B. Execution of Prefunctional Checklists.
The Subs and vendors shall execute startup and provide the TI, through the QC, with a signed and dated copy of the completed start-up and prefunctional tests and checklists.
Only individuals that have direct knowledge and witnessed that a line item task on the prefunctional checklist was actually performed shall initial or check that item off.

The QC and TI shall witness prefunctional tests and checklist completion by reviewing prefunctional checklist reports and by selected site observation.

C. Deficiencies.
List any outstanding items of the initial start-up and prefunctional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies shall be provided to the TI through the QC within two days of test completion. The QC will review and the TI will monitor outstanding deficiencies.

3.4 PHASED COMMISSIONING

A. When startup and initial checkout are required to be executed in phases, this phasing will be planned and scheduled in a coordination meeting of the GCR, mechanical, plumbing, TAB and controls contractor, and the GC. The GC shall modify the construction schedule to reflect phased commissioning.

3.5 FUNCTIONAL TESTING

A. Objectives and Scope.
The objective of functional testing is to demonstrate that each system is operating according to the Contract Documents. Functional testing facilitates bringing the systems to full dynamic operation. During the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.
Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the GCR and GC. Beginning system testing before full completion, does not relieve the Contractor from fully completing the system, including all prefunctional checklists as soon as possible.

B. Documentation and Non-Conformance
Documentation: The QC and TI will witness and the QC will document the results of all functional performance tests using the specific procedural forms developed for that purpose.
Non-Conformance.
a. The QC will record the results of the functional test on the procedure or test form. The TI will witness the test. All deficiencies or non-conformance issues shall be noted.
b. Corrections of minor deficiencies identified may be made during the tests. In such cases the deficiency and resolution will be documented on the procedure form.
c. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures.
d. Any required retesting shall not be considered a justified reason for a claim of delay or for a time extension.

3.6 OPERATION AND MAINTENANCE MANUALS

A. O&M Manuals.

The specific content requirements for O&M manuals are described elsewhere in Division 1. Special requirements for the controls contractor and TAB contractor are found in Section 15997.
The QC will verify and the TI will witness that O&M Manuals have been provided. The QC will review and the TI will verify O&M Manuals to ensure they meet the requirements of the Specifications.

B. Commissioning Record.
Compile, organize and index commissioning data into labeled, indexed and tabbed, three-ring binders and deliver two copies to the GCR for review.
Final Report Details.

a. The final commissioning report shall include an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, the report shall contain:
   1) Completed Prefunctional and Functional Checklists.
   2) Certified and approved factory start-up and testing reports.
   3) Certification letters from the RMCS and display case manufacturers certifying proper installation.
   4) Records of all required tests and inspections for code compliance and Contract Document compliance, and documentation of approved permits and licenses to operate components of the systems.
   5) Final HVAC Test and Balance Report.
   6) Checklist of all inventory items required by the Contract Documents, signed by the Commissary representative.
   7) Checklist of all keys turned over to the User for doors, cabinets, access doors, toilet accessories, plumbing fixtures, equipment, etc., signed by the Commissary representative.
   8) Training Plan, training procedure and documentation used to support training.

b. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.

3.7 TRAINING OF GOVERNMENT PERSONNEL

A. The GC shall coordinate the operator training. Training requirements are shown in each Section specifying commissioning and in Sections specifying items or systems to be commissioned.

B. The GCR will review the content of the training plan and adequacy of the training of Government personnel for commissioned equipment.
Each Sub and vendor responsible for training shall submit a written training plan to the GCR for review prior to training. The plan shall cover the following elements:

a. Equipment included in training
b. Intended audience
c. Location of training
d. Objectives
e. Subjects covered (description, duration of discussion, special methods, etc.)

f. Duration of training on each subject
g. Instructor for each subject
h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
i. Instructor and qualifications

For the primary HVAC equipment, the Controls Contractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.

Video taping of the training sessions will be provided by the subcontractor with tapes cataloged by the subcontractor and added to the O&M manuals. The QC and TI will witness the taped sessions and the GCR will review the cataloged tapes.

The mechanical design engineer shall, at the first training session, present the overall system design concept and the design concept of each equipment section.

3.8 DEFERRED TESTING

A. Unforeseen Deferred Tests. If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the Contracting Officer.

B. Seasonal Testing. During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The GC shall coordinate this activity. Tests shall be executed, documented and deficiencies corrected by the appropriate Subs, with facilities staff and the GCR witnessing. Make any final adjustments to the O&M manuals and as-builts due to the testing.

3.9 PREREQUISITES TO SUBSTANTIAL COMPLETION

A. The commissioning must be complete, except for training, prior to Beneficial Occupancy Date, unless approved in writing by the Contracting Officer.

3.10 SCHEDULE OF SYSTEMS TO BE COMMISSIONED

A. The following systems and assemblies will be commissioned:
a. Site Work
b. Openings
c. Equipment
d. Special Construction
e. Mechanical
f. Electrical

B. The above systems will be commissioned and associated Prefunctional Testing Checklists and Functional Testing Checklists are provided in the Commissioning Manual.

C. Depending upon the phasing of construction, checklists may be copied and completed for that section of the work. Portions of the systems may be commissioned in stages. Once an entire system is completed all test sheets for that system shall be submitted for review by the QC and TI. Only when the entire system is completed shall the functional test of the entire system be completed.

3.11 CHECKLISTS

CONSTRUCTION ISSUE

A. The following table lists checklists for each item and system to be commissioned, and corresponds to the table found in the Commissioning Plan. In case of conflict or discrepancy, the table in the Commissioning Plan takes precedence.

SYSTEM/COMPONENT	PRE-FUNCTIONAL TESTING	FUNCTIONAL TESTING
Division 2 - Sitework		
Storm Drainage	PC-02630	None
Water Distribution	PC-02510	None
Sanitary Sewerage	PC-02530	None
Storm Drainage	PC-02630	None
Division 8 - Openings		
Overhead Coiling Doors	None	FT-08331
Automatic Entrance Doors	None	FT-08460
Door Hardware	None	FT-08710
Division 11 - Equipment		
Equipment	PC-11000	None
Refrigerated Display Cases	PC-11000-1	None
Bakery Equipment	PC-11101	None
Deli Equipment	PC-11102	None
Produce Department Equipment	PC-11105	None
Loading Dock Equipment	PC-11106	None
Baler	PC-11170	None
Key Control Cabinet	None	FT-11025
Division 13 - Special Construction		
Cold Storage Rooms	PC-13030	None
Intrusion Detection	PC-13720	FT-13720
Video Surveillance	PC-13760	FT-13760
Fire Alarm	PC-13851	FT-13851
Mass Notification System	PC-13853	FT-13853
Division 15 - Mechanical		
Pumps	PC-15130	FT-15400
Domestic Water Piping	PC-15140	None
Sanitary Waste and Vent Piping	PC-15150	None
Storm Drainage Piping	PC-15160	None
Domestic Water Heaters	PC-15425-1	FT-15425
Hydronic Piping	PC-15510	None
Refrigeration Compressors	PC-15535-2	FT-15535
Pumps (HVAC)	PC-15540	FT-15540
Air Cooled Condenser	PC-15671	None
Fans	PC-15700-1	FT-15700-1
Unitary Air Conditioning Equipment	PC-15700-2	FT-15700-2
Air Curtains	PC-15700-3	FT-15700-3
Air Handling Units	PC-15700-4	FT-15700-4
Dehumidifiers	PC-15700-5	FT-15700-5

CONSTRUCTION ISSUE

SYSTEM/COMPONENT	PRE-FUNCTIONAL TESTING	FUNCTIONAL TESTING
Kitchen/Exhaust Makeup Air Unit	PC-15700-9	FT-15700-9
Ducts	PC-15890	None
Building HVAC Systems Automation Controls	PC-15935	FT-15935
Air Outlets and Inlets	PC-15940	None
Testing, Adjusting, and Balancing	PC-15950-1	FT-15950-1
Refrigerant Monitoring Systems	PC-15971	FT-15971
Plumbing Fixtures	None	FT-15410
Calibration and Leak-By Test Procedure	None	FT-15950-2
Sprinkler Systems	PC-15325	FT-15325
Fire Pumps	PC-15320	FT-15320
Division 16 – Electrical		
Grounding & Bonding	PC-16060	FT-16060
Electric Utility Services	PC-16210	None
Electric Metering	PC-16211	None
Generator Assemblies	PC-16231	FT-16231
Transformers (Dry)	PC-16271-1	None
Transformers (Liquid)	PC-16271-2	None
Safety Switches	PC-16410	None
Switchboards	PC-16441	FT-16441
Panel Boards	PC-16442	FT-16442
Interior Lighting	PC-16511	FT-16511
Emergency Lighting	PC-16511-1	FT-16511-1
Exterior Lighting	PC-16521	FT-16521
Doorbells and Buzzers	PC-16700-1	None
Telephone and Intercommunication Equipment	PC-16720	FT-16720
Public Address and Sound Systems	PC-16726	FT-16726
Voice and Data Communications Cabling	PC-16750-1	None
Data Communications Systems	PC-16750-2	FT-16750-2

CONSTRUCTION ISSUE

END OF SECTION

CONSTRUCTION ISSUE

SECTION 01820

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. This Section includes administrative and procedural requirements for instructing Government personnel, including the following:

1.1.1.1. Demonstration of operation of Contractor-Furnished, Contractor-Installed systems, subsystems, and equipment.

1.1.1.2. Training in operation and maintenance of Contractor-Furnished, Contractor-Installed systems, subsystems, and equipment.

1.1.1.3. Demonstration and training videotapes.

1.1.2. Related Sections include the following:

1.1.2.1. Division 1 Section "Contract Closeout" for additional operational and maintenance training.

1.1.2.2. Division 1 Section "Commissioning Requirements" for administrative and procedural requirements for demonstration and training as part of building systems commissioning.

1.1.2.3. Divisions 2 through 16 Sections for additional requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

1.2.1. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1.2.1.1. At completion of training, submit one complete training manual(s) for Government's use.

1.2.2. Qualification Data: For instructor.

1.2.3. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.2.3.1. Require attendees to sign in and out of all training meetings.

1.2.4. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.2.5. Demonstration and Training Videotapes: Submit two copies within seven days of end of each training module.

1.2.5.1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.

b. Name and address of photographer.
c. Name of DeCA Program Management Assistance Contract Inspector (PMAC).
d. Name of Contractor.
e. Date videotape was recorded.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

1.2.5.2. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding videotape. Include name of Project and date of videotape on each page.

1.3 QUALITY ASSURANCE

1.3.1. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training.

1.3.1.1. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.3.2. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.

1.3.3. Pre-instruction Conference: Conduct conference at Project site. Review methods and procedures related to demonstration and training including, but not limited to, the following:

1.3.3.1. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
1.3.3.2. Review required content of instruction.
1.3.3.3. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.4 COORDINATION

1.4.1. Coordinate instruction schedule with PMAC and Store Director. Adjust schedule as required to minimize disrupting Government's operations.

1.4.2. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

1.4.3. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by PMAC.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

2.1.1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

2.1.1.1. Motorized doors, including overhead coiling doors and automatic entrance doors.
2.1.1.2. Equipment, including loading dock equipment, grease hoods and food-service equipment.
2.1.1.3. Fire-protection systems, including fire alarm and fire-extinguishing systems.
2.1.1.4. Intrusion detection systems.
2.1.1.5. Conveying systems, including elevators.
2.1.1.6. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
2.1.1.7. HVAC instrumentation and controls.
2.1.1.8. Electrical service and distribution, including transformers, switchboards, panelboards, uninterruptible power supplies and motor controls.
2.1.1.9. Packaged engine generators, including transfer switches.
2.1.1.10. Lighting equipment and controls.
2.1.1.11. Communication systems, including intercommunication, surveillance, clocks and programming, voice and data, and television equipment.

2.1.2. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

2.1.2.1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.
c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2.1.2.2. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project Record Documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

2.1.2.3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.

b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

2.1.2.4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal, weekend and unoccupied modes of operation operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

2.1.2.5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

2.1.2.6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures for collecting specific performance data.

2.1.2.7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

2.1.2.8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

3.1.2. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

3.2.1. Engage qualified instructors to instruct Government's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

3.2.1.1. PMAC and Store Director will furnish Contractor with names and positions of participants.

3.2.2. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

3.2.2.1. Schedule training with PMAC and Store Director with at least seven days' advance notice.

3.2.3. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.

3.2.4. Cleanup: Collect used and leftover educational materials and give to PMAC and Store Director. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEOTAPES

3.3.1. General: Engage a qualified commercial photographer to record demonstration and training videotapes. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

3.3.1.1. At beginning of each training module, record each chart containing learning objective and lesson outline.

3.3.2. Videotape Format: Provide high-quality VHS color videotape in full-size cassettes.

3.3.3. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

3.3.4. Narration: Describe scenes on videotape by audio narration by microphone while videotape is recorded or dubbing audio narration off-site after videotape is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

3.3.5. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02230

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Removal of trees, shrubs and other vegetation.
b. Clearing and grubbing.
c. Removal and disposal of above-grade improvements, where indicated.
d. Removal and disposal of below-grade improvements, where indicated.
e. Disconnecting, capping or sealing, and removing and abandoning site utilities.
f. Temporary erosion and sedimentation control measures

1.1.2. Related Sections

a. Division 1 Sections "DeCA Sustainable Design Requirements" and "Environmental Protection" for additional land clearing waste disposal requirements.
b. Division 2 Section “Earthwork” for soil materials, excavating, backfilling and site grading.
c. Division 2 Section “Tree Protection and Trimming” for protecting and trimming trees to remain.
d. Division 2 Section “Landscaping” for finish grading, including preparation of topsoil and planting beds for lawns and planting.

1.2 MATERIALS OWNERSHIP

1.2.1. General

a. Except for materials indicated to be stockpiled or to remain on the Government's property, all cleared and removed materials shall become property of the Contractor and shall be removed from the site and disposed of legally.

1.3 SUBMITTALS

1.3.1. Photographs or Videotape

a. Sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

1.3.2. Record Drawings

a. Identify and accurately locate, including depths, all capped utilities and other subsurface structural, electrical, and mechanical conditions.

b. Identify any site changes or revisions constructed as part of this project that differ from what is required by the Solicitation Documents.
c. Identify any existing conditions found during construction that differ from those indicated in the Solicitation Documents.

1.3.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Photographs or Videotape	X	R
1.3.2	Record Drawings	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

1.4.1. Preinstallation Conference

a. Conduct conference at the project site to comply with requirements in Division 1 Section "Coordination".

1.5 PROJECT CONDITIONS

1.5.1. Traffic

a. Conduct site-demolition operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
b. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.
c. Maintain access to the Commissary service area and parking areas in the vicinity of the existing Commissary at all times, unless otherwise indicated in the contract plans.
d. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

1.5.2. Protection of Existing Improvements

a. Provide all protections necessary to prevent damage to existing improvements not indicated to be removed.

(1) Protect improvements on adjoining properties.
(2) Restore damaged improvements to their original condition, as acceptable to the Installation.

1.5.3. Existing Concrete Pads and Pavements

a. Existing concrete pads and concrete and bituminous pavements within the project limits are to be removed as part of this project, as indicated on the plans. All removals shall be saw cut, full depth, along the limit of the removal.
b. Any excavation or depressional areas resulting from the removals shall be filled.

1.5.4. Erosion Control

a. Do not commence site clearing operations until all erosion and sedimentation control measures are in place.
b. Complete all initial documentation required as part of the Storm Water Pollution Prevention Plan (SWPPP) prior to construction.

1.6 EXISTING UTILITY SERVICES

1.6.1. General

a. Existing underground utility facilities are present on the site. An effort has been made to indicate all such facilities on the plans; however it is possible that additional facilities may exist. Indicated locations for existing utilities are approximate; determine exact locations before commencing Work.
b. The Contractor shall notify the Base and Utility Locating Service prior to commencing clearing or excavation work. Minimum advance notice of 48 hours will be required so that underground utilities can be located and marked by the respective owners or their agents.
c. Arrange for disconnecting, removing, capping, and plugging utility services, as necessary. Notify affected utility companies in advance and obtain written approval before starting this Work.
d. Identify service lines and capping locations on Project Record Documents. Dimension locations from building corners and faces. Document the depths of the utilities at the point where they are capped or plugged.
e. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Installation. Provide temporary services during interruptions of existing service, as acceptable to governing authorities.
f. Where underground facilities are indicated to be removed, they must be removed, not abandoned in-place. If an underground facility is indicated to be abandoned, it may be removed or abandoned in-place at the Contractor's option.

(1) All trenches resulting from removals shall be completely backfilled and compacted.
(2) All existing utilities which remain after removals shall be permanently patched or plugged. Capping shall be with mechanical end caps or brick and mortar. Wood plugs are not acceptable.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1. General

a. Locate, protect and maintain benchmarks and survey control points from disturbance during construction.
b. Provide erosion control measures, in accordance with the contract documents and the Storm Water Pollution Prevention Plan (SWPPP), to prevent soil erosion and discharge of soil bearing water runoff or airborne dust to adjacent properties, drainage structures and walkways.
c. Locate and clearly flag trees and vegetation to remain or to be relocated.

d. Protect existing site improvements to remain from damage during construction.
e. Restore damaged improvements to their original condition, as acceptable to the Contracting Officer.

3.2 TREE PROTECTION - See Division 2 Section “Tree Protection and Trimming".

3.3 SITE CLEARING

3.3.1. General

a. Under no circumstances shall any tree be removed which is not indicated on the contract documents or in an area approved by the Installation.
b. Specific trees designated for removal and any areas designated for clearing shall be marked in the field and approved by the Installation prior to initiation of clearing operations.
c. Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions, as required, to permit installation of the new construction. All materials generated from the removals shall be disposed of off of the Installation. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes grubbing and off-site disposal of stumps and roots.

(1) Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.

d. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, except for those indicated to remain.

(1) Completely remove stumps, roots, and other debris protruding through ground surface.
(2) Use only hand methods for grubbing inside drip line of trees indicated to remain.
(3) Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

(a) Place fill material in horizontal layers not exceeding 8 inches loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.

3.4 SITE UTILITIES

3.4.1. General

a. Locate, identify, disconnect and seal or cap off utilities indicated to be removed or abandoned.
b. Arrange to shut off indicated utilities with the Installation or private utility companies where required.
c. Do not interrupt utilities serving other facilities unless permitted under the following conditions and then only after arranging to provide temporary utility service according to the requirements indicated below:

(1) Do not proceed with utility interruptions without obtaining written approval from the Installation. Written approval to be requested 21 days prior to requested interruption.
(2) Notify the Contracting Officer no less than 5 days prior to the interruption.

d. Abandonment or removal of certain underground pipe or conduits may also be indicated on mechanical or electrical drawings and included under work defined in Division 15 and 16 Sections. Removing abandoned underground piping or conduits and overhead power and communication lines interfering with construction is included under this Section.

3.5 TOPSOIL STRIPPING

3.5.1. General

a. Remove sod and grass before stripping topsoil.
b. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

(1) Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

c. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

(1) Limit height of topsoil stockpiles to 72 inches, unless otherwise approved by the Contracting Officer.
(2) Do not stockpile topsoil within tree protection zones.
(3) Dispose of excess topsoil as specified for waste material disposal.

3.6 SITE IMPROVEMENTS

3.6.1. General

a. Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

(1) All existing pavements which interfere with construction shall be completely removed. In removing driveway or roadway pavement, the Contractor shall make provision for a satisfactory transition between replacement pavement and that which is to be left in place.
(2) In areas where new pavement is to be placed over areas that are currently paved, the old pavement may be left in place, provided it is at least 18 inches below the finished grade of new pavement. The old pavement must be thoroughly broken into pieces no larger than 4 inches in any dimension to allow surface water to drain through the existing pavement.
(3) The Contractor shall saw to a full depth, a joint between the portion of the pavement removed and/or broken and that which is to be left in place.

3.7 DISPOSAL OF WASTE MATERIALS

3.7.1. General

a. Remove accumulated debris weekly from the site, as well as rubbish and other materials resulting from site demolition operations.
b. Burning on Government's Property: Burning is not permitted on the Installation.
c. All waste materials, unsuitable soil, excess suitable soil and topsoil shall be legally disposed of off-site at a location to be secured by the Contractor.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02231

TREE PROTECTION AND TRIMMING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. The protection and trimming of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent construction.

1.2 DEFINITIONS

1.2.1. Tree Protection Zone

a. Area surrounding individual trees or groups of trees to remain during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.3 SUBMITTALS

1.3.1. Product Data

a. Tree Pruning Schedule: Written schedule from arborist detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1.3.2. Qualification Data

a. For tree service firm and arborist.

1.3.3. Certification

a. From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

1.3.4. Maintenance Recommendations

a. From arborist, for care and protection of trees affected by construction during and after completing the Work.

1.3.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Qualification Data	X	R
1.3.3	Certification	X	I
1.3.4	Maintenance Recommendations	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Tree Service Firm Qualifications

a. An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of tree protection and trimming.

1.4.2. Arborist Qualifications

a. An arborist certified by ISA or licensed in the jurisdiction where Project is located.

1.4.3. Tree Pruning Standard

a. Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."

1.4.4. Preinstallation Conference

a. Conduct conference at Project site to comply with requirements in Division 1 Section "Coordination."

(1) Before tree protection and trimming operations begin, meet with representatives of the Installation, consultants, and other concerned entities to review tree protection and trimming procedures and responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1. Drainage Fill

a. Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch sieve and not more than 10 percent passing a 3/4-inch sieve.

2.1.2. Topsoil

a. Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and toxic and other non-soil materials.
b. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.

2.1.3. Filter Fabric

a. Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1. General

a. Temporary Fencing: Install temporary fencing around tree protection zones to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete.
b. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
c. Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems.
d. Maintain tree protection zones free of weeds and trash.
e. Do not allow fires within tree protection zones.

3.2 EXCAVATION

3.2.1. General

a. Install shoring or other protective support systems to minimize sloping or benching of excavations.
b. Do not excavate within tree protection zones, unless otherwise indicated.
c. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.

(1) Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction.
(2) Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition.
(3) Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

d. Where utility trenches are required within tree protection zones, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.

(1) Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

3.3 REGRADING

3.3.1. Grade Lowering

a. Where new finish grade is indicated below existing grade around trees, slope grade beyond tree protection zones. Maintain existing grades within tree protection zones.
b. As an alternative, where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist, unless otherwise indicated.

(1) Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

3.3.2. Minor Fill

a. Where existing grade is 6 inches or less below elevation of finish grade at the base of the tree, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.3.3. Moderate Fill

a. Where existing grade is more than 6 inches but less than 12 inches below elevation of finish grade at the base of a tree, place drainage fill, filter fabric, and topsoil on existing grade as follows:

(1) Carefully place drainage fill against tree trunk approximately 2 inches above elevation of finish grade and extend not less than 18 inches from tree trunk on all sides. For balance of area within drip-line perimeter, place drainage fill up to 6 inches below elevation of finish grade.
(2) Place filter fabric over top of the drainage fill with edges overlapping 6 inches minimum.
(3) Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

3.4 TREE PRUNING

3.4.1. General

a. Prune trees to remain that are affected by temporary and permanent construction.
b. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
c. Pruning Standards: Prune trees according to ANSI A300
d. Cut branches with sharp pruning instruments; do not break or chop.
e. Chip removed tree branches and dispose of off-site.

3.5 TREE REPAIR AND REPLACEMENT

3.5.1. General

a. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
b. Remove and replace trees indicated to remain that die or are damaged during construction operations that the Contracting Officer or Installation determines are incapable of restoring to normal growth pattern.

(1) For existing trees less than 6-inch caliper: Provide new trees of same size and species as those being replaced; plant and maintain as specified in Division 2 Section "Landscaping."
(2) For existing trees greater than 6-inch caliper: Provide new trees of 3 to 4-inch caliper size and of a species selected by Architect. The total replacement diameter shall be equal to the diameter of the damaged tree, measured 12 inches above grade. Plant and maintain new trees as specified in Division 2 Section "Landscaping."

c. Aerate surface soil, compacted during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch diameter holes a minimum of 12 inches deep at 24-inch centers around the new tree. Backfill holes with an equal mix of augured soil and sand.

3.6 DISPOSAL OF WASTE MATERIALS

3.6.1. General

a. Burning is not permitted on the Installation.
b. Remove excess excavated material and removed trees, branches and other landscape debris from the Installation and dispose of legally off-site.

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END OF SECTION

CONSTRUCTION ISSUE

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
b. Excavating and backfilling for buildings and structures.
c. Subbase course for concrete walks and pavements.
d. Base course for asphalt paving.
e. Subsurface drainage backfill for walls and trenches.
f. Excavating and backfilling utility trenches.
g. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

1.1.2. Related Sections

a. Division 1 Section Temporary Facilities and Controls" for temporary controls, utilities and support facilities.
b. Division 2 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above and below grade improvements and utilities.
c. Division 2 Section "Tree Protection and Trimming" for protecting and trimming trees to remain.
d. Division 2 Section "Landscaping" for grading, including preparation of topsoil and planting beds for lawns and planting.
e. Division 3 Section "Cast-In-Place Concrete" for aggregate base course for slabs-on-grade.

1.2 DEFINITIONS

1.2.1. Backfill

a. Soil materials used to fill an excavation.

(1) Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
(2) Final Backfill: Backfill placed over initial backfill to fill a trench.

1.2.2. Pavement Base Course

a. Aggregate course placed between the subbase course and hot-mix asphalt paving.

1.2.3. Engineered Fill

a. Specified material placed and compacted to specified density and/or moisture conditions under the observation of a Special Inspector.

1.2.4. Pipe Bedding

a. Course placed over the excavated subgrade in a trench before laying pipe.

1.2.5. Borrow

a. Satisfactory soil imported from off-site for use as fill or backfill.

1.2.6. Excavation

a. Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

(1) Authorized Additional Excavation: The contract documents have been prepared in accordance with the project geotechnical report recommendations, and are intended to include all earthwork necessary to construct the project.
(2) If based on actual field conditions, additional excavation is required beyond what is specified in the contract documents because of the presence of unsatisfactory subgrade soils, the Contractor shall remove this material when directed by the Contracting Officer.
(3) Authorized Additional Excavation will be paid for according to Contract provisions.

1.2.7. Fill

a. Soil materials used to raise existing grades.

1.2.8. Structures

a. Buildings, footings, foundations, retaining walls, slabs, tanks, equipment curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface, not including parking lots, driveways, sidewalk, curb and gutter and loading area pavements.

1.2.9. Subbase Course

a. Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or walk.

1.2.10. Subgrade

a. Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

1.2.11. Utilities

a. All on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of plastic warning tape.

1.3.2. Material Test Reports

a. From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

(1) Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
(2) Laboratory compaction curve according to ASTM D 1557 for each on-site or borrow soil material proposed for fill and backfill.

1.3.3. Special Inspection Reports.

1.3.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Material Test Reports	X	I
1.3.3	Special Inspection Reports	X	R

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Codes and Standards

a. A geotechnical engineering report has been prepared for this project by Schnabel Engineering. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed in this report are those of the geotechnical engineer and represent his interpretation of the subsurface conditions, tests, and the results of analyses which he has conducted.
b. Should the data contained in this report not be adequate for the contractor's purposes, the contractor should make his own exploration, tests and analyses prior to bidding. Contractor desiring to conduct additional subsurface explorations prior to bidding should contact the Contracting Officer for arrangements to enter the project site.
c. Perform all excavation work in compliance with the recommendations contained in the geotechnical engineering report. In the case where the geotechnical engineering report does not provide adequate direction, applicable requirements of the State of Maryland Standard Specifications should apply.
d. The contractor must receive approval from the Contracting Officer to deviate from the recommendations contained in the geotechnical engineering report, unless specific direction is given in the plans and specifications.

1.4.2. Testing and Inspection Service

a. Contractor shall employ and pay for a qualified independent geotechnical testing laboratory to perform soil testing and Special Inspector during earthwork operations.

1.4.3. Geotechnical Testing Agency Qualifications

a. An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

1.4.4. Pre-excavation Conference

a. Conduct conference at project site to comply with requirements in Division 1 Section "Coordination."

1.4.5. Special Inspector Qualifications.

a. Special inspections for earthwork shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located.

1.5 PROJECT CONDITIONS

1.5.1. General

a. Existing Utilities: Locate existing utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
b. Should uncharted or incorrectly charted utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.
c. Do not interrupt utilities without obtaining permission from the Contracting Officer a minimum of 5 working days in advance of the proposed interruption. Make outage request to the Installation and utility owner, in writing, 30 days in advance of the outage and state the date and duration of the proposed outage.
d. Demolish and completely remove from site existing underground utilities specifically indicated to be removed.
e. Other utilities which are to be taken out of service may be removed or abandoned in place, at the Contractors option.
f. Coordinate with utility companies and the Installation to shut off services if lines are active.
g. Protection of Persons and Property: Barricade open excavations and post warning lights as part of this work where excavations can be accessed by the public.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

2.1.1. General

a. Provide borrow (imported fill) soil materials when sufficient satisfactory soil materials are not available from on-site excavation. Onsite soils are expected to be suitable as fill, with the exception of the CL soils.

2.1.2. Suitable Fill

a. ASTM D 2487 soil classification groups ML, SC, SM, SP, SW, GC, GM, GP and GW or a combination of these group symbols; free of rock or gravel larger than 4 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

(1) Plasticity Index for the material should not exceed 25.

(2) Liquid Limit for the material should not exceed 50.
(3) Material should be within 3 percent of the optimum moisture content at the time of compaction.

2.1.3. Unsatisfactory Soils

a. ASTM D 2487 soil classification groups CL, ML, OL, CH, MH, OH, and PT, or a combination of these group symbols.

(1) Unsatisfactory soils also include satisfactory soil material not maintained within 3 percent of optimum moisture content at time of compaction.

2.1.4. Engineered Fill

a. Approved soil material conforming with the requirements above, as approved by the Special Inspector, shall be placed and compacted to the required density and moisture conditions.

2.1.5. Backfill

a. Satisfactory soil materials which can be compacted to the degree required for their intended use.

2.1.6. Subbase Material

a. Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve; or meeting the gradation requirements of the Maryland State Highway Administration Standard Specifications.

2.1.7. Pavement Base Course

a. Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve; or meeting the gradation requirements of the Maryland State Highway Administration Standard Specifications.

2.1.8. Pipe Bedding

a. Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve; or meeting the gradation requirements of the Maryland State Highway Administration Standard Specifications.

2.1.9. Sand

a. ASTM C 33; fine aggregate, natural or manufactured sand.

2.1.10. Impervious Fill

a. Clay, containing some gravel and/or sand, capable of being compacted to a dense state.

2.2 ACCESSORIES

2.2.1. Detectable Warning Tape

a. Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

(1) Red: Electric.
(2) Yellow: Gas, oil, steam, and dangerous materials.
(3) Orange: Telephone and other communications.
(4) Blue: Water systems.
(5) Green: Sewer systems.

2.2.2. Separation Fabric

a. Woven geotextile fabric, specifically manufactured for use as a separation geotextile; made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following measured per test methods referenced:

(1) Survivability: Class 2; AASHTO M 288
(2) Grab Tensile Strength: 247 lb-ft.; ASTM D 4632.
(3) Sewn Seam Strength: 222 lb-ft; ASTM D 4632.
(4) Tear Strength: 90 lb-ft.; ASTM D 4533.
(5) Puncture Resistance: 90 lb-ft.; ASTM D 4833.
(6) Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
(7) Permittivity: 0.02 per second, minimum; ASTM 4491

2.2.3. UV Stability

a. 50 percent after 500 hours exposure; ASTM 4355

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1. General

a. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
b. Maintain existing pavements in place as long as practical to provide a suitable working surface and to reduce the possibility of the underlying subbase becoming saturated from exposure to wet conditions.
c. Protect and maintain erosion and sedimentation controls, which are specified in Division 2 “Site Clearing”, during earthwork operations.
d. Floor, pavement and fill subgrades should be striped of topsoil and unsuitable, loose, or soft subsurface soils.
e. Where existing fill or soft soils are encountered in the in areas of proposed footings, they shall excavate to firm natural soils. Where existing fill or soft soils are encountered in the in areas of proposed slabs, they shall excavate to firm natural soils or to a minimum depth of 2 feet. The undercut subgrades shall be compacted with a minimum of two passes of a 10-ton static weight, vibratory roller and backfilled to the required elevation with fill compacted to 92% of the Modified Proctor (ASTM D 1557) density.

f. The subgrade remaining under areas where pavement is removed should be proof rolled with a heavy rubber-tired vehicle to determine its stability. The material may be left in place so long as the in-situ compaction is at least 92% of Modified Proctor density. If unsuitable subgrade is encountered it may be replaced with fill or may also be stabilized using lime/kiln dust, a large-sized aggregate (AASHTO No. 3 stone) or a combination of smaller-sized aggregate (AASHTO No. 57) and a high tensile modulus geogrid.

3.2 DEWATERING

3.2.1. General

a. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding the project site and surrounding area.
b. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

(1) Reroute surface water runoff away from excavated areas.
(2) Do not allow water to accumulate in excavations.
(3) Do not use excavated trenches as temporary drainage ditches.

c. If necessary, install a dewatering system to keep subgrades dry and convey ground water away from excavations.

(1) Maintain system until dewatering is no longer required.
(2) Dewatering system must meet the requirements of the Maryland Department of Environment.

3.3 EXPLOSIVES

3.3.1. General

a. Do not use explosives.

3.4 EXCAVATION

3.4.1. Unclassified Excavation

a. Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
b. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with approved suitable fill

3.4.2. Excavation for Structures

a. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch.
b. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

3.4.3. Excavations for Footings and Foundations

a. The footings and foundations shall bear on suitable native soils or on engineered fill. When existing fills are encountered the excavations shall be extended to the firm suitable natural soils. The over-excavated subgrades shall be backfilled with Engineered Fill. The over-excavation shall extend at least 6 inches horizontally from the edge of the foundation.
b. Do not disturb bottom of excavation.
c. Excavate by hand to final grade just before placing concrete reinforcement.
d. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.4.4. Excavations for Slabs-on-Grade

a. The slabs-on-grade shall bear on suitable native soils or on engineered fill. When existing fills are encountered the excavations shall be extended to the firm suitable native soils or to a minimum depth of 2 feet.
b. Do not disturb bottom of excavation.

3.4.5. Excavation for Underground Mechanical, Electrical Utility Structures

a. Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch.
b. Do not disturb bottom of excavations intended for bearing surface.

3.4.6. Excavation for Walks and Pavements

a. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.4.7. Excavation for Utility Trenches

a. Excavate trenches to indicated gradients, lines, depths, and elevations.
b. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
c. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

(1) For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
(2) For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
(3) Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.5 APPROVAL OF SUBGRADE

3.5.1. General

a. Notify Contracting Officer when excavations have reached required subgrade.
b. If Contracting Officer determines that unsatisfactory soil is present, continue excavation and replace with fill material as directed, or treat unstable condition as described elsewhere herein.
c. Proof roll subgrade with heavy rubber-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

d. Reconstruct subgrades damaged by rain, wind, accumulated water, or construction activities, as directed by Contracting Officer.

3.6 STORAGE OF SOIL MATERIALS

3.6.1. General

a. Stockpile borrow materials and satisfactory excavated soil materials.
b. Stockpile soil materials without intermixing.
c. Place, grade, and shape stockpiles to drain surface water.
d. Cover and utilize dust control watering, as necessary, to prevent windblown dust.
e. Stockpile soil materials away from edge of excavations.
f. Do not store within drip line of remaining trees

3.7 BACKFILL

3.7.1. General

a. Place and compact backfill in excavations promptly, but not before completing the following:

(1) Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
(2) Surveying locations of underground utilities for record documents.
(3) Inspecting and testing underground utilities.
(4) Removing concrete formwork.
(5) Removing trash and debris.
(6) Removing temporary shoring and bracing, and sheeting.
(7) Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.8 UTILITY TRENCH BACKFILL

3.8.1. General

a. Place and compact pipe bedding on trench bottoms and where indicated.
b. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
c. Place and compact gravel backfill for pipe zone bedding to a height of 6 inches over the utility pipe or conduit.

(1) Carefully compact material to 90% of Modified Proctor density under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

d. Coordinate backfilling with utilities testing.
e. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
f. Place and compact final backfill of satisfactory soil material to final subgrade.
g. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.9 FILL

3.9.1. General

a. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills. Prepare areas of footings and building floor slab as described in Article 3.1.
b. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
c. Excavations deeper than 4 feet shall be sloped, benched, or shored to OSHA standards.
d. Place and compact fill material in layers to required elevations as follows:

(1) Under grass and planted areas, use satisfactory soil material as determined by the Contracting Officer.
(2) Under walks and pavements, use compacted fill material.
(3) Under footings, steps and ramps use Engineered Fill.
(4) Under building slabs, use Engineered Fill.

3.10 MOISTURE CONTROL

3.10.1. General

a. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 3 percent of optimum moisture content.

(1) Do not place backfill or fill material on surfaces that are muddy, frozen or contain frost or ice.
(2) Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.

3.11 COMPACTION OF BACKFILLS AND FILLS

3.11.1. General

a. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
b. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
c. Compact fill materials to not less than the following percentages of the Modified Proctor Density (ASTM D 1557):

(1) Under structures, footings, building slabs, and steps: 92 percent of Modified Proctor.
(2) Under walkways, pavements and utility pads: 95 percent of Modified Proctor.
(3) Under lawn and unpaved areas: 85 percent of Modified Proctor.

3.12 GRADING

3.12.1. General

a. Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

(1) Provide a smooth transition between adjacent existing grades and new grades.
(2) Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.12.2. Site Grading

a. Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

(1) Lawn or Unpaved Areas: Plus or minus 1 inch.
(2) Walks: Plus or minus 1 inch.
(3) Pavements: Plus or minus 1/2 inch.

3.12.3. Grading inside Building Lines

a. Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.13 SUBBASE AND BASE COURSES

3.13.1. Under pavements and walks

a. Place subbase and base course on prepared subgrade and as follows:

(1) Install separation geotextile, when specified, on prepared subgrade in accordance with manufacturer's written instructions, overlapping sides and ends.
(2) Place base course material over subbase.
(3) Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
(4) Shape subbase and base to required crown elevations and cross-slope grades.
(5) When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
(6) When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.14 FIELD QUALITY CONTROL

3.14.1. General

a. Testing Agency: Contractor shall engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
b. The Contractor shall employ a special inspector to perform special inspections for existing site soil conditions, fill placement and load-bearing in compliance with the International Building Code referenced in Division 1 Section "Description of Work."
c. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

d. Frequency of testing will be in accordance with the approved Quality Control Plan.

e. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace material to depth required; recompact and retest until specified compaction is obtained.

3.15 PROTECTION

3.15.1. General

a. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris. Restore disturbed areas as soon as possible with seed or sod in accordance with the landscaping plan and Section 2900, Landscaping.

b. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

(1) Scarify or remove and replace soil material to depth as directed by Contracting Officer; reshape and recompact.

c. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

(1) Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

3.16.1. General

a. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of material off of the Installation.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02361

TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Soil treatment with termiticide.
b. Polymer barrier fittings with termiticide for installation around utility penetrations.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated. Include the EPA-Registered Label for termiticide products.

1.2.2. Product Certificates

a. For termite control products, from manufacturer.

1.2.3. Soil Treatment Application Report

1.2.3.1. After application of termiticide is completed, submit report for Government's records and include the following:

a. Date and time of application.
b. Moisture content of soil before application.
c. Termiticide brand name and manufacturer.
d. Quantity of undiluted termiticide used.
e. Dilutions, methods, volumes, and rates of application used.
f. Areas of application.
g. Water source for application.

1.2.4. Warranty

a. Special warranty specified in this Section.

1.2.5. Qualification Data

a. For qualified Installer.

1.2.6. Application Confirmation

1.2.7. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Product Certificates	X	I
1.2.3	Soil Treatment Application Report	X	I
1.2.4	Warranties	X	I
1.2.5	Qualification Data	X	I
1.2.6	Application Confirmation	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications

a. A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by manufacturer to install manufacturer's products, and who is accredited by manufacturer.

1.3.2. Regulatory Requirements

a. Formulate and apply termiticides according to the EPA-Registered Label.

1.3.3. Source Limitations

a. Obtain termite control products from single source from single manufacturer.

1.4 PROJECT CONDITIONS

1.4.1. Environmental Limitations

a. To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.
b. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.4.2. Prior to application, discuss and confirm with Base authorities the application method(s) proposed to be used. Obtain written confirmation from authorities having jurisdiction.

1.5 WARRANTY

1.5.1. Special Warranty

a. Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If

subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

(1) Warranty Period: Five years from date of final acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Basis-of-Design Products

a. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

b. Subject to compliance with requirements, provide termiticides by one of the following:

(1) Hilsen Termite and Pest Control, Inc.; Termidor.
(2) Bayer Environmental Science; Premise.
(3) BASF Corporation, Agricultural Products, Termidor.

2.2 SOIL TREATMENT

2.2.1. Termiticide

a. Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

b. Termiticides shall be currently registered by the EPA or approved for such use by the appropriate agency of the host county. A non-repellant termiticide shall be selected for maximum effectiveness and duration after application. The selected termiticide shall be suitable for the soil and climatic conditions at the project site.

c. Contractor is NOT authorized to use repellent type termiticides.

d. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

3.2.2. Soil Treatment Preparation

a. Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

(1) Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

3.4.1. Application

a. Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

(1) Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
(2) Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
(3) Masonry: Treat voids.
(4) Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

b. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
c. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
d. Post warning signs in areas of application.
e. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02510

WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Piping and specialties for potable-water and fire-protection water services and mains outside the building.

1.2 DEFINITIONS

1.2.1. Industry Abbreviations For Plastic Materials

a. PVC: Polyvinyl chloride.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

1.3.1. Minimum Working Pressures

a. The following are minimum pressure requirements for piping and specialties, unless otherwise indicated: Combined Potable-Water and Fire-Protection Water Service: 200 psig.

1.4 SUBMITTALS

1.4.1. Product Data

a. Provide product data for the following:

(1) Pipe and fittings.
(2) Valves.
(3) Fire Hydrants.

1.4.2. Shop Drawings

a. For precast concrete vault assemblies. Include frames and covers and drains.

1.4.3. Purging and Disinfecting Reports

a. As specified in "Cleaning" Article in Part 3.

1.4.4. Operation and Maintenance Data

a. For specialties to include in the maintenance manuals specified in Division 1. Include data for the following:

(1) Valves.
(2) Fire Hydrants.

1.4.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Shop Drawings	X	R
1.4.3	Purging and Disinfecting Reports	X	I
1.4.4	Operation and Maintenance Data	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

1.5.1. General

a. Comply with all requirements of the Installation's Public Works and/or Engineering Office in regard to all matters associated with installation of water systems. Specifically included are the tapping of existing mains, backflow prevention requirements and materials and testing and disinfection of potable water systems and plumbing.
b. Comply with standards of authorities having jurisdiction for fire protection system. Include materials, hose threads, installation, and testing.
c. Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision.
d. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated devices.
e. Provide listing/approval stamp, label, or other marking on piping and specialties made to specified standards.
f. Product Options: Water systems and accessories are based on specific performance characteristics. It shall be the obligation of the Contractor to confirm that the dimensions, operation, and other characteristics of the items provided meet the design concept or intended performance.
g. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
h. NSF Compliance:

(1) Comply with NSF 14 for plastic potable water service piping.
(2) Comply with NSF 61 for materials for water service piping and specialties for domestic water.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1. Preparation for Transport

a. Prepare valves, including fire hydrants, according to the following:

(1) Ensure that valves are dry and internally protected against rust and corrosion.
(2) Protect valves against damage to threaded ends and flange faces.
(3) Set valves in best position for handling. Set valves closed to prevent rattling.

1.6.2. During Storage

a. Use precautions for valves, including fire hydrants, according to the following:

(1) Do not remove end protectors, unless necessary for inspection; then reinstall for storage.
(2) Protect from weather. Store indoors, if possible, and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

1.6.3. Handling

a. Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.

1.6.4. General

a. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
b. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
c. Protect flanges, fittings, and specialties from moisture and dirt.
d. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

1.7.1. General

a. Perform site survey, research public utility records, and verify existing utility locations.
b. Verify that water-service piping may be installed to comply with original design and referenced standards.

1.8 SEQUENCING AND SCHEDULING

1.8.1. General

a. Coordinate connection to existing water main with the Installation.
b. Coordinate piping materials, sizes, entry locations, and pressure requirements with building water distribution piping.

c. Coordinate piping materials, sizes, entry locations, and pressure requirements with building fire-protection water piping.
d. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 PIPES AND TUBES

2.1.1. General

a. Applications of the following pipe and tube materials are indicated in Part 3 "Piping Applications" Article.
b. PVC Plastic Pipe: AWWA C900, SDR 14 (Class 200), bell ends with elastomeric gasket meeting ASTM F 477, and spigot end. Pipe Marking: “NSF-pw” according to NSF 14.
c. Push on Joint Ductile Iron Pipe: AWWA C151, with push on joint bell with plain spigot end, unless grooved or flanged ends are indicated.

(1) Push on Joint Ductile Iron Fittings: AWWA C153 ductile iron compact pattern
(2) Gaskets: AWWA C111, rubber.

d. Copper Tubing: Conforming to AWWA B42, hard drawn or annealed, Type K

2.2 PIPE AND TUBE FITTINGS

2.2.1. General

a. Applications of the following pipe and tube fitting materials are indicated in Part 3 "Piping Applications" Article.
b. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket meeting ASTM F 477 in each bell.
c. Cast Iron Fittings: AWWA C110, and have cement mortar lining, standard thickness in accordance with AWWA C104. Bell design shall be modified for push-on joint suitable for use with the specified PVC pipe. Include elastomeric gasket meeting ASTM F 477 in each bell.
d. Copper Tube Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.

2.3 JOINING MATERIALS

2.3.1. General

a. Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Article.
b. PVC Piping: The following materials apply:

(1) Push-on Joints: ASTM D 3139 with elastomeric gasket conforming to ASTM F477.

c. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

d. Copper Tubing: AWS A5.8, BCuP

2.4 VALVES

2.4.1. Nonrising-Stem, Metal-Seated Gate Valves

a. AWWA C500, ductile-iron body and bonnet; with cast-iron or bronze, double-disc gate, bronze gate rings, bronze stem and stem nut. 200-psig minimum working-pressure rating; mechanical joint end connections; and interior coating complying with AWWA C550.

2.4.2. Nonrising-Stem, Resilient Seated Gate Valves

a. AWWA C509, ductile iron body and bonnet; with bronze or ductile iron gate, resilient seats, bronze stem and stem nut. 200 psig minimum working pressure rating; mechanical joint end connections and interior coating complying with AWWA C550.

2.4.3. Pre-Cast Concrete Valve Vaults

a. 5 foot diameter, designed for heavy traffic loading and made according to ASTM C858 and installed in accordance with ASTM C 891. Comply with standards of local agency having jurisdiction for pre-cast concrete valve vault construction. Frame and Cover: All valve vaults shall have ASTM A 536 Grade 60-40-18 ductile iron castings designed for heavy-duty service. Include 24-inch I.D. by 7 to 9 inch riser with 4 inch minimum flange width and 26 inch diameter cover with “Water” cast into lid.

2.4.4. Valve Boxes

a. Comply with AWWA M44 for cast iron valve boxes. Cast-iron box with top section and cover with lettering "WATER," bottom section with base of size to fit over valve and barrel approximately 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.

(1) Provide steel tee-handle operating wrench with each valve box. Include tee handle with one pointed end, stem of length to operate valve, and socket-fitting valve-operating nut.

2.4.5. Indicator Posts

a. UL 789, FM-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of bury of valve.

2.4.6. Tapping Sleeve and Tapping Valve

a. Complete assembly, including tapping sleeve, tapping valve, and bolts and nuts. Use sleeve and valve compatible with tapping machine. Standard MSS SP-60.

(1) Tapping Sleeve: Cast- or ductile-iron, 2-piece bolted sleeve with flanged outlet for new branch connection. Sleeve may have mechanical-joint ends with rubber gaskets or sealing rings in sleeve body. Include sleeve matching size and type of pipe material being tapped and of outlet flange required for branch connection.

(2) Valve: AWWA, cast iron, non-rising stem, metal seated gate valve with one raised face flange mating tapping sleeve flange.

2.5 FIRE HYDRANTS

2.5.1. Description

a. Cast-iron body, compression-type valve, opening against pressure and closing with pressure, 6-inch mechanical-joint inlet, and 200-psig minimum working-pressure design.

2.5.2. Outlet Threads

a. NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.

2.5.3. Operating and Cap Nuts

a. Pentagon 1-1/2 inch point to flat.

2.5.4. Direction of Opening

a. Open hydrant valve by turning operating nut to left or counterclockwise.

2.5.5. Exterior Finish

a. Alkyd-gloss enamel paint. Color shall meet the requirements of NFPA 291 and the Installation, unless otherwise directed by the Contracting Officer.

2.5.6. Dry-Barrel Fire Hydrants

a. AWWA C502, freestanding, one 4-1/2-inch NPS and two 2-1/2-inch NPS outlets, 5-1/4-inch main valve, drain valve, and 6-inch NPS mechanical-joint inlet. Include 200-psig minimum working-pressure design and interior coating according to AWWA C550.

2.6 ANCHORAGES

2.6.1. Concrete Reaction Backing

a. Portland cement concrete mix, 3000 psig.

(1) Cement: ASTM C 150, Type I.
(2) Fine Aggregate: ASTM C 33, sand.
(3) Coarse Aggregate: ASTM C 33, crushed gravel.
(4) Water: Potable.

2.7 IDENTIFICATION

2.7.1. General

a. Refer to Division 2 Section "Earthwork" for underground warning tape materials.
b. Arrange for detectable warning tapes made of solid blue film with metallic core and continuously printed black-letter caption "CAUTION--WATER LINE BURIED BELOW."
c. Nonmetallic Piping Label: Engraved, plastic-laminate label at least 1 by 3 inches, with caption "CAUTION--THIS STRUCTURE HAS NONMETALLIC WATER-SERVICE PIPING," for installation on main electrical meter panel.

2.8 CORROSION PROTECTION PIPING ENCASEMENT

2.8.1. Encasement for Underground Metal Piping:

a. Standards: ASTM A674 or AWWA C105
b. Tube Form
c. High Density, cross laminated PE film of 0.004 inch minimum thickness.
d. Black in Color

PART 3 - EXECUTION

3.1 EARTHWORK

3.1.1. Refer To

a. Division 2 Section "Earthwork" for excavation, trenching, and backfilling.
b. Division 2 Section "Hot-Mix Asphalt Paving" for cutting and patching of existing paving.

3.2 PIPING APPLICATIONS

3.2.1. General

a. Use pipe, fittings, and joining methods for piping systems according to the following applications:
b. Water-Service Piping: Use the following:

(1) 4 to 12 Inch: PVC plastic, AWWA Class 200 with PVC fabricated fittings for PVC plastic pipe; and gasketed joints.

(2) 4 to 12 Inch: Ductile Iron push on joint piping with ductile iron fittings and rubber gaskets.

3.3 VALVE APPLICATIONS

3.3.1. Drawings Indicate Valve Types To Be Used

a. Where specific valve types are not indicated, the following requirements apply:

(1) Underground Valves, 3-Inch NPS and Larger: AWWA C500, gate valves, non-rising stem, with valve box.

3.4 JOINT CONSTRUCTION

3.4.1. PVC Piping, Gasketed Joints

a. Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

3.4.2. Ductile Iron Piping, Gasketed Joints

a. For water service piping in accordance with AWWA C 600 and AWWA M41.

3.4.3. Dissimilar Materials Piping Joints

a. Use adapters compatible with both piping materials, outside diameter, and system working pressure. Refer to "Piping Systems - Common Requirements" Article below for joining piping of dissimilar metals.

3.5 PIPING SYSTEMS - COMMON REQUIREMENTS

3.5.1. General Locations and Arrangements

a. Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
b. Install components with pressure rating equal to or greater than system operating pressure.
c. Install piping free of sags and bends.
d. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
e. Install fittings for changes in direction and branch connections.

3.6 PIPING INSTALLATION

3.6.1. General

a. Tap water main with size and in location as indicated on the plans, according to the requirements of the Installation:

(1) Install tapping sleeve and tapping valve according to manufacturer's written instructions.
(2) Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
(3) Install gate valve onto tapping sleeve. Comply with AWWA C600. Install valve with stem pointing up and with cast-iron valve box.
(4) Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.

b. Comply with NFPA 24 for fire-protection water-service piping materials and installation.
c. Install AWWA PVC plastic pipe according to AWWA M23 and ASTM F 645.

d. Install ductile iron water service piping according to AWWA C600 and AWWA M41.
e. Bury piping with depth of cover in accordance with local jurisdictional agency.

3.7 ANCHORAGE INSTALLATION

3.7.1. General

a. Install anchorages (concrete thrust blocks) for tees, plugs and caps, bends, crosses, valves, and hydrant branches.
b. Install underground piping with mechanically restrained joints at horizontal and vertical changes in direction.

3.8 VALVE INSTALLATION

3.8.1. AWWA-Type Gate Valves

a. Comply with AWWA C600 and AWWA M44.
b. Install underground valves with stem pointing up and with cast-iron valve box.

3.9 FIRE HYDRANT INSTALLATION

3.9.1. General

a. Install each fire hydrant with separate gate valve in supply pipe, anchor with thrust blocks, and support in upright position.
b. AWWA-Type Fire Hydrants: Comply with AWWA M17.
c. Install hydrants such that the face of the pumper nozzle is between 2 feet and 5 feet from face of any adjacent curb.

3.10 IDENTIFICATION INSTALLATION

3.10.1. General

a. Install continuous plastic underground warning tape, with metallic core, during back-filling of trench for underground water-service piping. Locate 6 to 8 inches below finished grade, directly over piping.
b. Attach nonmetallic piping label permanently to main electrical meter panel.

3.11 FIELD QUALITY CONTROL

3.11.1. General

a. Prepare reports for all testing activities.

3.11.2. Piping Tests

a. Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

3.11.3. Hydrostatic Tests

a. Test at not less than 1-1/2 times working pressure for 2 hours.

(1) Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to 0-psig. Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within above limits.

3.12 CLEANING

3.12.1. General

a. Clean and disinfect water distribution piping as follows:

(1) Purge new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
(2) Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities, use procedure described in AWWA C651 or as described below:

(a) Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine. Isolate system or part thereof and allow solution to stand for 24 hours.
(b) Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow solution to stand for 3 hours.
(c) Following allowed standing time, flush system with clean, potable water until chlorine does not remain in water coming from system.
(d) Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

(3) Dispose of all chlorinated test water in accordance with Division 1 Section “Environmental Requirements” of these specifications.

b. Prepare reports for purging and disinfecting activities.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02530

SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Construction of sanitary sewer and related items outside the limits of the building.

1.2 DEFINITIONS

1.2.1. PVC

a. Polyvinyl chloride plastic.

1.2.2. DIP

a. Ductile Iron Sewer Pipe

1.3 PERFORMANCE REQUIREMENTS

1.3.1. General

a. Gravity-Flow, Non-pressure Piping.

1.4 SUBMITTALS

1.4.1. Product Data

a. Piping, Fittings, Gaskets, Couplings, Clean outs and Identification Materials

1.4.2. Shop Drawings

a. Include plans, elevations, details, and attachments for the following:

(1) Precast and cast-in-place concrete manholes, including plan, elevation, sections, details and frames and covers

1.4.3. Design Mix Reports and Calculations.

1.4.4. Field Test Reports

a. Indicate and interpret test results for compliance with performance requirements.

1.4.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Shop Drawings	X	R
1.4.3	Design Mix Reports and Calculations	X	R
1.4.4	Field Test Reports	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

2.1.1. General

a. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

2.2 PIPES AND FITTINGS

2.2.1. Ductile-Iron Sewer Pipe

a. ASTM A746, for push-on joints.
b. Fittings in subparagraph below are available in NPS 3 to NPS 16 (DN80 to DN400).

(1) Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.

c. Gaskets: AWWA C111, rubber.

2.2.2. PVC Sewer Pipe and Fittings: According to the following:

a. PVC Sewer Pipe and Fittings, 15 inch and Smaller: ASTM D 3034, SDR 26, for gasketed joints.

(1) Gaskets: ASTM F 477, elastomeric seals.NON PRESSURE TYPE PIPE COUPLINGS

2.3.1. Sleeve-Type Pipe Couplings

a. ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for non-pressure joints.

(1) Sleeve Material for Plastic Pipe: ASTM F 477, elastomeric seal.
(2) Sleeve Material for Dissimilar Pipe: Compatible with pipe materials being joined.
(3) Bands: Stainless steel, at least one at each pipe insert.

2.4 MANHOLES

2.4.1. Normal-Traffic Precast Concrete Manholes

a. ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

(1) Diameter: 48 inches minimum, unless otherwise indicated.
(2) Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
(3) Riser Sections: 4-inch minimum thickness. Lengths to provide depth indicated.
(4) Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
(5) Gaskets: ASTM C 443, rubber.
(6) Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch diameter frame and cover.
(7) Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.
(8) Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

2.4.2. Cast-in-Place-Concrete Manholes

a. Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.

(1) Grade Rings: Include two reinforced-concrete rings, of 6- to 9-inch total thickness, to match 24” diameter of manhole frame and cover.
(2) 2. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.

2.4.3. Manhole Frames and Covers:

a. STM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch diameter cover. Include indented top design with lettering "SANITARY SEWER" cast into cover.

2.5 CONCRETE

2.5.1. General

a. Cast-In-Place concrete according to ACI 318, ACI 350R, and the following:

(1) Cement: ASTM C 150, Type II.
(2) Fine Aggregate: ASTM C 33, sand.
(3) Coarse Aggregate: ASTM C 33, crushed gravel.
(4) Water, Potable.

2.5.2. Portland Cement Design Mix

a. 4,000 psi minimum, with a 0.45 maximum water-cementitious minerals ratio.

(1) Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
(2) Reinforcement Bars: ASTM A 615, Grade 60, deformed steel.

2.5.3. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.

a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

(1) Invert Slope: As indicated on Plans.

b. Benches: Concrete, sloped to drain into channel.

(1) Slope: 4 percent.

2.5.4. Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.

a. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
b. Reinforcement Bars: ASTM A 615, Grade 60, deformed steel.

2.6 PROTECTIVE COATINGS

2.6.1. Description

a. One- or two-coat, coal-tar epoxy; 15-mil minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:

(1) Concrete Manholes: On exterior surface.

2.7 CLEANOUTS

2.7.1. Gray-Iron Cleanouts

a. ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:

(1) Medium Duty: In landscaped and paved foot-traffic areas.
(2) Heavy Duty: In vehicle-traffic service areas.
(3) Sewer Pipe Fitting and Riser to Cleanout: Ductile Iron Pipe and fittings.

PART 3 - EXECUTION

3.1 EARTHWORK

3.1.1. General

a. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 IDENTIFICATION

3.2.1. General

a. Materials and their installation are specified in Division 2 Section "Earthwork."
b. Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.
c. Use detectable warning tape over all piping and over edges of underground structures.

3.3 PIPING APPLICATIONS

3.3.1. General

a. Include watertight joints.
b. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.
c. Gravity-Flow Piping: Use the following:

(1) 4-Inch thru 6-Inch: Under pavement when less than 2 feet of cover is provided from top of pipe to finished grade, or as specified elsewhere on the plans: Ductile-iron sewer pipe; compact-pattern, ductile-iron fittings; gaskets and gasketed joints.
(2) 4-Inch thru 10-Inch: PVC sewer pipe and fittings; gaskets and gasketed joints.

3.4 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

3.4.1. Special Pipe Couplings

a. Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

(1) Use the following pipe couplings for non-pressure applications:

(a) Sleeve type to join piping, of same size, or with small difference in OD.
(b) Increaser/reducer-pattern, sleeve type to join piping of different sizes.
(c) Ring-type to join piping of different sizes where annular space between smaller pipe’s OD and larger pipe's ID permits installation.

3.5 INSTALLATION

3.5.1. General

a. Locations and Arrangements: Contract plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
b. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
c. Use manholes for changes in direction of mainline sewer, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
d. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
e. Install gravity-flow sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
f. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping when work stops.
g. It shall be the responsibility of the Contractor to properly dewater excavations and dispose of any pumped water in accordance with all applicable environmental regulations.

3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

3.6.1. General

a. Join and install pipe and fittings according to installations indicated.

3.6.2. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings

a. According to AWWA C600.

3.6.3. PVC Sewer Pipe and Fittings

a. Join profile sewer pipe fittings with gaskets according to ASTM D 2321, ASTM F 1668, ASTM D 3034, ASTM D 3212 and manufacturer's written instructions.

3.7 MANHOLE INSTALLATION

3.7.1. General

a. Install manholes, complete with appurtenances and accessories indicated.
b. Form continuous concrete channels and benches between inlet and outlet pipes.
c. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated on contract plans.
d. Install precast concrete manhole sections with gaskets according to ASTM C 891.
e. Construct cast-in-place concrete manholes as indicated in the plans.

3.8 CONCRETE PLACEMENT

3.8.1. General

a. Place cast-in-place concrete in accordance with ACI 318 and ACI 350R.

3.9 CLEANOUT INSTALLATION

3.9.1. General

a. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use ductile iron pipe fittings in sewer pipes at branches for cleanouts and ductile iron pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
b. Set cleanout frames and covers in earth in cast-in-place concrete block, 18”x 18” by 12 inches deep. Set with tops 1 inch above surrounding grade.
c. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.10 FIELD QUALITY CONTROL

3.10.1. General

a. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction or the Contracting Officer.
b. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

(1) Submit separate reports for each system inspection.
(2) Defects requiring correction include the following:

(a) Alignment: Less than full diameter of inside of pipe is visible between structures.
(b) Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
(c) Crushed, broken, cracked, or otherwise damaged piping.
(d) Infiltration: Water leakage into piping.
(e) Exfiltration: Water leakage from or around piping.

(3) Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
(4) Reinspect and repeat procedure until results are satisfactory.

c. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects in accordance with procedures of authorities having jurisdiction.

(1) Do not enclose, cover, or put into service before inspection and approval.
(2) Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
(3) Submit separate reports for each test.
(4) If authorities having jurisdiction do not have published procedures, perform tests as follows:

(a) Sanitary Sewerage: Perform hydrostatic test.

(b) Allowable leakage is a maximum of 50 gallons per inch of nominal pipe size per mile, during 24-hour period.
(c) Close openings in system and fill with water.
(d) Purge air and refill with water.
(e) Disconnect water supply.
(f) Test and inspect joints for leaks.

(5) Manholes: Perform hydraulic test according to ASTM C 969.
(6) Leaks and loss in test pressure constitute defects that must be repaired.
(7) Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02553

NATURAL GAS DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Piping.
b. Valves.

1.2 DEFINITIONS

1.2.1. Gas Main

a. Utility's natural gas piping.

1.2.2. Gas Distribution

a. Piping from gas main to individual service-meter assemblies.

1.2.3. Service-Meter Assembly

a. Piping, valves, service regulator, service meter and specialties.

1.2.4. Point of Delivery

a. Piping outlet from service-meter assembly.

1.2.5. Natural Gas Piping

a. Piping that conveys natural gas from point of delivery to natural gas utilization devices inside the building.

1.2.6. HDPE

a. High Density Polyethylene plastic.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. Minimum Working-Pressure Ratings

a. Piping and Valves: 100 psig minimum, unless otherwise indicated.
b. Service Meters: 10 psig minimum, unless otherwise indicated.
c. Service Regulators: 65 psig minimum, unless otherwise indicated.

1.4 SUBMITTALS

1.4.1. Product Data

a. Pipe and fittings.
b. Valves.

1.4.2. Shop Drawings

a. For natural gas service piping and service meter assembly. Include plans, elevations, sections, details, and attachments to other work.

1.4.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Shop Drawings	X	R
1.4.3	Operation and Maintenance Data	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

1.5.1. General

a. Comply with requirements of utility supplying natural gas and with authorities having jurisdiction for natural gas systems. Comply with NFPA 54 for materials, installation, testing, inspection, and purging.
b. Where this section conflicts with either Section 15430 Plumbing Specialties of these specifications or the standard practices of Baltimore Gas & Electric, those other requirements shall take precedence.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1. Handling Flammable Liquids

a. Remove and legally dispose of liquids from drips in existing gas piping. Handle liquids to avoid spillage and ignition. Notify gas supplier before handling liquids. Do not leave flammable liquids on premises overnight.

1.6.2. Store HDPE pipes and valves protected from direct sunlight.

1.7 PROJECT CONDITIONS

1.7.1. General

a. **Gas service will be brought to the building(s) by the Baltimore Gas & Electric Company (BG&E). The contractor must included all costs associated with the work being completed by BG&E in their proposal. The contractor will be responsible for providing and installing the gas meters and other appurtenances , as required by Section 15430 of these specifications.**

b. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

c. Interruption of Existing Natural Gas Service: Schedule installation of natural gas service to facilities so as not to interrupt service to other buildings occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of gas supply according to requirements indicated:

d. Notify Contracting Officer no fewer than five days in advance of proposed interruption of natural gas service.

e. Do not proceed with interruption of natural gas service without Contracting Officer's written permission.

1.8 COORDINATION

1.8.1. Coordinate connection to gas main with utility. Coordinate natural gas distribution with other utility Work.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

2.1.1. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.1.2. HDPE Pipe

a. ASTM D 2513, SDR 11.

b. Pipe to be specifically designated as being manufactured for the distribution of natural gas. Pipe manufactured for any other uses, including leaching systems for landfills, must not be used.

(1) HDPE Fittings: ASTM D 2683, socket type or ASTM D 3261, butt type with dimensions matching ASTM D 2513, SDR 11, HDPE pipe.

2.1.3. Transition Fittings

a. Manufactured pipe fitting with one HDPE pipe end for heat-fusion connection to HDPE pipe and with one ASTM A 53/A 53M, Schedule 40, steel pipe end for threaded connection to steel pipe.

2.1.4. Service-Line Risers

a. Manufactured HDPE pipe fitting with HDPE pipe inlet for heat-fusion connection to underground HDPE pipe; HDPE pipe riser section with protective-coated, anodeless, steel casing and threaded outlet for threaded connection to aboveground steel piping.

2.2 JOINING MATERIALS

2.2.1. Components, Tapes, Gaskets, and Bolts and Nuts

a. Suitable for natural gas as recommended by the pipe manufacturer.

2.3 SHUTOFF VALVES

2.3.1. Shutoff Valves, General

a. Manual operation, suitable for natural gas service, and with 100-psig minimum working-pressure rating.

2.3.2. Ball Valves

a. Bronze body, with chrome-plated brass ball; lever handle; and complying with ASME B16.33, MSS SP-110, UL 842. Include locking device.

2.3.3. HDPE Valves

a. Made for gas distribution, with nut or flat head for key operation; and complying with ASME B16.40, UL 842.

2.3.4. Valve Boxes

a. Cast-iron, two-section box. Include top section with cover with "GAS" lettering, bottom section with base to fit over valve and barrel 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head and with stem of length required to operate valve.

2.4 SERVICE REGULATORS - Specified in Section 15430

2.5 SERVICE METERS - Specified in Section 15430

PART 3 - EXECUTION

3.1 EARTHWORK

Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.2 PREPARATION

3.2.1. General

a. Close equipment shutoff valves before turning off gas to premises or piping section.
b. Inspect natural gas piping according to fuel gas code to determine that natural gas utilization devices are turned off in piping section affected.
c. Comply with fuel gas code requirements for prevention of accidental ignition.

3.3 PIPING APPLICATIONS

3.3.1. General

a. Flanges, unions, and transition and special fittings with pressure ratings same as or higher than system pressure rating may be used, unless otherwise indicated.
b. Aboveground Piping: NPS 2 and Smaller: Steel pipe, malleable-iron fittings, and threaded joints.
c. Underground Piping: HDPE pipe, HDPE fittings, and heat-fusion joints.
d. Underground-to-Aboveground Piping Connections: Service-line riser.
e. HDPE-to-Steel Piping Connections: Transition fitting.

3.4 VALVE APPLICATIONS

3.4.1. General

a. Drawings indicate types of shutoff valves to be used. If specific types are not indicated, the following requirements apply:

(1) Connections to Existing Gas Piping: Use valve and fitting assemblies made for tapping gas mains.
(2) Underground: Use HDPE valves.
(3) Aboveground, NPS 2 and Smaller: Ball valves.

3.5 PIPING INSTALLATION

3.5.1. General

a. Install underground, natural gas distribution piping buried at least 36 inches below finished grade.
b. Install underground, PE, natural gas distribution piping according to ASTM D 2774.
c. Install underground, PE, natural gas distribution piping at entrance to and under part of building in steel piping protective conduit that is vented to outside.
d. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where readily accessible to permit cleaning and emptying. Do not install where condensate would be subject to freezing.

(1) Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

e. Terminate service-regulator horizontal vents or horizontal vent piping with reducing-elbow fittings with large end as outlet. Install fitting outlet turned down with corrosion-resistant insect screen in outlet.

3.6 VALVE INSTALLATION

3.6.1. General

a. Install PE shutoff valves on branch connections to existing underground, natural gas distribution piping. Install valves with valve boxes.
b. Install metal shutoff valves on aboveground, natural gas distribution piping.

3.7 CONNECTIONS

3.7.1. General

a. Drawings indicate general arrangement of piping, fittings, and specialties.
b. Connect gas distribution piping to natural gas source and extend to service-meter assemblies and points indicated. Connect to building's natural gas piping if it is installed; otherwise, terminate piping with caps, plugs, or flanges, as required for piping material.
c. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment having threaded pipe connection.
d. Connect to utility gas main according to utility's procedures and requirements.
e. Install aboveground, natural gas distribution piping upstream from equipment shutoff valves, electrically continuous, and bonded to grounding electrode according to NFPA 70.
f. Do not use natural gas distribution piping as grounding electrode.

3.8 LABELING AND IDENTIFYING

3.8.1. Equipment Nameplates and Signs

a. Install engraved plastic-laminate equipment nameplates and signs on or near each service regulator and service meter.

3.8.1.2. Text

a. In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

3.8.2. Warning Tapes

a. Arrange for installation of continuous, underground, detectable warning tape over natural gas distribution piping during backfilling of trenches for piping.
b. Refer to Division 2 Section "Earthwork" for warning tapes.

3.9 PAINTING

3.9.1. General

a. Paint exposed metal piping, valves, service regulators, service meters and meter bars, and piping specialties except units with factory-applied paint or protective coating. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.10 FIELD QUALITY CONTROL

3.10.1. General

a. Test, inspect, and purge natural gas distribution according to requirements of fuel gas code and utility. Repair leaks and defective valves and specialties and retest system until no leaks exist. Report results in writing. Verify correct pressure settings for service regulators.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02630

STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. This Section includes storm drainage outside the building.

1.2 DEFINITIONS

1.2.1. DIP

a. Ductile Iron Pipe

1.2.2. RCP

a. Reinforced Concrete Pipe

1.2.3. PVC

a. Polyvinyl Chloride plastic

1.3 PERFORMANCE REQUIREMENTS

1.3.1. General

a. Gravity-Flow, Non-pressure Piping Pressure

1.4 SUBMITTALS

1.4.1. Product Data

a. Piping Materials.
b. Cleanouts.
c. Sleeve-type pipe couplings.
d. Identification materials.

1.4.2. Shop Drawings

a. Include plans, elevations, details, and attachments for the following:

(1) Precast concrete manholes and other structures, including frames, covers, and grates.

(2) Cast-in-place concrete manholes and other structures, including frames, covers and grates.

1.4.3. Design Mix Reports and Calculations

a. For each class of cast-in-place concrete.

1.4.4. Field Test Reports

a. Indicate and interpret test results for compliance with performance requirements.

1.4.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Shop Drawings	X	R
1.4.3	Design Mix Reports and Calculations	X	R
1.4.4	Field Test Reports	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. General

a. Do not store plastic pipe or fittings in direct sunlight.
b. Protect pipe, pipe fittings, and seals from dirt and damage.
c. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

1.6.1. General

a. Site Information: Perform site survey, research public utility records, and verify existing utility locations.
b. Locate existing structures and piping to be capped, abandoned and removed.
c. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

(1) Notify Contracting Officer not less than five days in advance of proposed utility interruptions.
(2) Do not proceed with utility interruptions without written permission from the Installation.

d. It shall be the responsibility of the Contractor to properly dewater excavations and dispose of any pumped water in accordance with all applicable environmental regulations.

1.6.2. Permits and Approvals

a. The Contractor shall be required to submit a *National Pollutant Discharge Elimination System, Notice of Intent (NPDES-NOI)* for this project. This submittal is to include a Stormwater Pollution Prevention Plan (SWPPP), a draft of which has been prepared as part of the design process.

(1) The contractor must retain a registered professional engineer, acceptable to the State of Maryland, to make all necessary submittals.
(2) Any review comments received from either the Installation or the State will be provided to the contractor for their use.

b. The Contractor shall be required to submit an *Application for Sediment Control/Stormwater Management Final Approval* to the Maryland Department of the Environment for this project. The initial submittal of this application has been made as part of the design process.

(1) The contractor must retain a registered professional engineer, acceptable to the State of Maryland, to make all necessary submittals.
(2) Any review comments received from either the Installation or the State will be provided to the contractor for their use.

c. All approved permits must be received by contractor and provided to the Contracting Officer prior to beginning land disturbing construction on the site.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

2.1.1. General

a. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

2.2 PIPES AND FITTINGS

2.2.1. Ductile-Iron Sewer Pipe

a. AWWA C151, for push-on joints

(1) Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
(2) Gaskets: AWWA C111, rubber.

2.2.2. PVC Sewer Pipe and Fittings

a. 15 inch and Smaller: ASTM D 3034, SDR 26, with bell and spigot ends for gasketed joints with ASTM F 477 elastomeric seals.

2.2.3. Reinforced-Concrete Sewer Pipe and Fittings

a. ASTM C 76, with bell and spigot ends and gasketed joints with ASTM C 443 rubber gaskets. Class III, Wall B.

2.3 SPECIAL PIPE COUPLINGS AND FITTINGS

2.3.1. Sleeve-Type Pipe Couplings

a. ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for non-pressure joints.

(1) Sleeve Material for Concrete Pipe: ASTM C 443, rubber.
(2) Sleeve Material for Plastic Pipe: ASTM D 3212, elastomeric seal.
(3) Sleeve Material for Dissimilar Pipe: Compatible with pipe materials being joined.
(4) Bands: Stainless steel, at least one at each pipe insert.

2.4 MANHOLES

2.4.1. Normal-Traffic Precast Concrete Manholes

a. ASTM C 478, precast, reinforced concrete, of depth and diameter indicated, with provision for sealant joints.

(1) Diameter: 48 inches minimum, unless otherwise indicated.
(2) Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
(3) Riser Sections: 5-inch minimum thickness. Lengths to provide depth indicated.
(4) Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
(5) Gaskets: Mastic between sections of structure.
(6) Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch diameter frame and cover.
(7) Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.
(8) Pipe Connectors: None for storm drainage manholes. Mortar pipe end into manhole.

2.4.2. Cast-in-Place-Concrete Manholes

a. Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.

(1) Grade Rings: Include two reinforced-concrete rings, of 6- to 9-inch total thickness, to match 24” diameter of manhole frame and cover.
(2) Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.

2.4.3. Manhole Frames and Covers:

a. ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service (HS25 Loading). Include 24-inch diameter opening, 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch diameter cover. Include indented top design with lettering "STORM SEWER" cast into cover.

2.4.4. Structure Channels and Benches

a. Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious ratio.
b. Include channels and benches in manholes.

(1) Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope. Invert Slope: As indicated on the plans.
(2) Benches: Concrete, sloped to drain into channel. Slope: 4 percent.

2.5 CATCH BASINS

2.5.1. Standard Precast Concrete Catch Basins

a. ASTM C 478, precast, reinforced concrete, of depth and diameter indicated, with provision for sealant joints.

(1) Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
(2) Riser Sections: 5-inch minimum thickness, 48-inch diameter minimum unless otherwise indicated, and lengths to provide depth indicated.
(3) Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
(4) Gaskets: Mastic between sections of structure.
(5) Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch diameter frame and grate.
(6) Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.
(7) Pipe Connectors: None for catch basins. Mortar pipe end into structure.

2.5.2. Cast-in-place Concrete Catch Basins

a. Construct of reinforced concrete; designed according to ASTM C 890 for A-16 (AASHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions and appurtenances indicated.

(1) Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch diameter frame and grate.
(2) Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.

2.5.3. Frames and Grates

a. ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch diameter flat grate with small square or short-slotted drainage openings.

(1) Grate Free Area: Approximately 50 percent, unless otherwise indicated.

2.6 INLETS

2.6.1. General

a. In accordance with plan details.

2.7 CONCRETE

2.7.1. General

a. Cast-In-Place concrete according to ACI 318, ACI 350R, and the following:

(1) Cement: ASTM C 150, Type II.
(2) Fine Aggregate: ASTM C 33, sand.
(3) Coarse Aggregate: ASTM C 33, crushed gravel.
(4) Water: Potable.

2.7.2. Portland Cement Design Mix

a. 4,000 psi minimum, with a 0.45 maximum water-cementitious minerals ratio.

(1) Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
(2) Reinforcement Bars: ASTM A 615, Grade 60, deformed steel.

2.8 CLEANOUTS

2.8.1. Gray-Iron Cleanouts

a. ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:

(1) Medium Duty: In landscaped and paved foot-traffic areas.
(2) Heavy Duty: In vehicle-traffic service areas.
(3) Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.9 PIPE OUTLETS

2.9.1. General

a. Precast Concrete Flared End Sections: Matching the material specifications for the pipe.
b. Riprap: Broken, irregular size and shape, graded stone.

(1) Average Size: NSA No. R-4, screen opening 3 inches.

c. Filter Stone: NSA No. FS-2, No. 4 screen opening, average-size, graded stone.

PART 3 - EXECUTION

3.1 EARTHWORK

3.1.1. General

a. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 IDENTIFICATION

3.2.1. General

a. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

(1) Use warning tape or detectable warning tape over ferrous piping.
(2) Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 PIPING AND FITTING APPLICATIONS

3.3.1. General

a. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.

b. Gravity-Flow Piping: Use the following:

(1) Pipe Sizes 15 inch and less: PVC pipe and fittings
(2) Pipe Sizes 12 inch and greater: Reinforced concrete sewer pipe and fittings.
(3) Ductile Iron Pipe and fittings as specified on the contract plans.

3.4 SPECIAL PIPE COUPLING APPLICATIONS

3.4.1. Special Pipe Couplings

a. Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

(1) Use the following pipe couplings for non-pressure applications:

(a) Sleeve type to join piping, of same size, or with small difference in OD.
(b) Increaser/reducer-pattern, sleeve type to join piping of different sizes.

3.5 INSTALLATION

3.5.1. General

a. Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
b. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream.
c. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
d. Maintain swab or drag in line, and pull past each joint as it is completed.
e. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
f. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

3.6.1. General

a. Join and install pipe and fittings according to installations indicated.
b. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings: According to AWWA C600.
c. PVC Sewer Pipe and Fittings: As follows:

(1) Join profile sewer pipe fittings with gaskets according to ASTM D 2321, ASTM F 1668, ASTM D 3034, ASTM D 3212 and manufacturer's written instructions.

d. Concrete Pipe and Fittings: Install according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
e. Join piping made of different materials or dimensions with couplings made for this application.
f. Use couplings that are compatible with and that fit both systems' materials and dimensions.

3.7 MANHOLE INSTALLATION

3.7.1. General

a. Install manholes, complete with appurtenances and accessories indicated.
b. Form continuous concrete channels and benches between inlets and outlet.
c. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3-inches above finished surface elsewhere, unless otherwise indicated.
d. Install precast concrete manhole sections according to ASTM C 891.

(1) Apply bituminous mastic coating at joints of riser sections for Storm Sewer manholes.

e. Construct cast-in-place manholes as indicated on tre plans.

3.8 INLET AND CATCH BASIN INSTALLATION

3.8.1. General

a. Construct inlets to sizes and shapes indicated. Set frames and grates to elevations indicated.

3.9 CONCRETE PLACEMENT

3.9.1. General

a. Place cast-in-place concrete according to ACI 318 and ACI 350R.

3.10 CLEANOUT INSTALLATION

3.10.1. General

a. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
b. Set cleanout frames and covers in earth in cast-in-place concrete block, 18” by 18” by 12”. Set with tops 1 inch above surrounding earth grade.
c. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.11 TAP CONNECTIONS

3.11.1. General

a. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.
b. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
c. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections.
d. Remove debris or other extraneous material that may accumulate.

3.12 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

3.12.1. General

a. When a structure or pipe is indicated to be removed, it may not be abandoned in place.
b. When a structure or pipe is indicated to be abandoned, it may be abandoned or removed at the contractor's option.
c. Abandoned Piping: Securely close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed.

(1) Close open ends of piping with at least 8-inch thick, brick masonry bulkheads, or precast concrete plugs.

(2) Do not use wood plugs.

d. Abandoned Structures: Excavate around structure as required and use one procedure below:

(1) Remove structure and close open ends of remaining piping.
(2) Remove top of structure down to at least 36 inches below final grade.
(3) Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
(4) Backfill to grade according to Division 2 Section "Earthwork."

3.13 FIELD QUALITY CONTROL

3.13.1. General

a. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.

(1) In large, accessible piping, brushes and brooms may be used for cleaning.
(2) Place plug in end of incomplete piping at end of day and when work stops.
(3) Flush piping between manholes and other structures to remove collected debris, if required by the Installation or Contracting Officer.

b. Inspect interior of piping to determine whether line displacement or other damage has occurred.
c. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
d. Submit separate reports for each system inspection.
e. Defects requiring correction include the following:

(1) Alignment: Less than full diameter of inside of pipe is visible between structures.
(2) Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
(3) Crushed, broken, cracked, or otherwise damaged piping.
(4) Exfiltration: Water leakage from or around piping.

f. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
g. Reinspect and repeat procedure until results are satisfactory.
h. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

(1) Do not enclose, cover, or put into service before inspection and approval.
(2) Test completed piping systems in accordance with the requirements of the Contracting Officer.
(3) Schedule tests and inspections by the Contracting Officer with at least 24 hours' advance notice.
(4) Submit separate reports for each test.
(5) Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02741

HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Hot-mix asphalt paving.
b. Hot-mix asphalt patching.
c. Hot –mix asphalt patching overlay.
d. Pavement-marking paint.
e. Cold milling of existing hot-mix asphalt pavement.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.
b. Division 2 Section “Earthwork” for subgrade preparation, grading and base courses.
c. Division 2 Section “Pavement Joint Sealants” for joint sealants.

1.2 SYSTEM DESCRIPTION

1.2.1. General

a. Provide aggregate base and hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the latest edition of the Maryland Department of Transportation-State Highway Administration Standard Specifications for Construction and Materials.

(1) Standard Specification: Maryland Department of Transportation-State Highway Administration Standard Specifications for Construction and Materials.
(2) Measurement and payment provisions in the Standard Specifications do not apply.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each product specified. Include technical data and tested physical and performance properties.

1.3.2. Job-Mix Designs

a. For each job mix proposed for the work.

1.3.3. Material Test Reports

a. Indicate and interpret test results for compliance of materials with requirements indicated.

1.3.4. Qualification Data

a. For manufacturer and installer of asphalt paving.

1.3.5. Material Certificates

a. Certificates signed by manufacturers certifying that each material complies with requirements.

1.3.6. Sustainable Design Submittals:

a. Materials shall comply with requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.

1.3.7. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Job-Mix Designs	X	R
1.3.3	Material Test Reports	X	R
1.3.4	Qualification Data	X	R
1.3.5	Material Certificates	X	R
1.3.6	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.4.2. Manufacturer Qualifications

a. Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.

(1) Firm shall be a registered and approved paving mix manufacturer with authorities having jurisdiction or with the State of Maryland Department of Transportation.

1.4.3. Testing Agency Qualifications

a. Demonstrate to Contracting Officer's satisfaction, based on the Contracting Officer's evaluation of criteria conforming to ASTM D 3666, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the work.

1.4.4. Regulatory Requirements

a. Conform to applicable standards of authorities having jurisdiction for asphalt paving work on public property.

1.4.5. Asphalt-Paving Publication

a. Comply with AI's "The Asphalt Handbook," except where more stringent requirements are indicated.

1.4.6. Preinstallation Conference

a. Conduct conference at Project site to comply with requirements of Division 1 Section "Coordination".
b. Review methods and procedures related to asphalt paving including, but not limited to, the following:

(1) Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
(2) Review condition of substrate and preparatory work performed by other trades.
(3) Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
(4) Review and finalize construction schedule for paving and related work.
(5) Verify availability of materials, paving Installer's personnel, and equipment required to execute the work without delays.
(6) Review inspection and testing requirements, governing regulations, and proposed installation procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. General

a. Deliver pavement-marking materials to project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
b. Store pavement marking materials in a clean, dry, protected location and within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.6 PROJECT CONDITIONS

1.6.1. Environmental Limitations

a. Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:

(1) Prime and Tack Coats: Minimum surface temperature of 60 deg F.
(2) Slurry Coat: Comply with weather limitations of ASTM D 3910.
(3) Asphalt Binder Course: Minimum surface temperature of 40 deg F and rising at time of placement.
(4) Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

1.6.2. Pavement Marking Paint

a. Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Hot Mix Asphalt Paving

a. Contain recycled content.
b. 90% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.2 AGGREGATES

2.2.1. General

a. Use materials and gradations that have performed satisfactorily in previous installations.

2.2.2. Coarse Aggregate

a. Sound; angular crushed stone; crushed gravel; or properly cured, crushed blast-furnace slag; complying with ASTM D 692.

2.2.3. Fine Aggregate

a. Sharp-edged natural sand or sand prepared from stone; gravel, properly cured blast-furnace slag, or combinations thereof; complying with ASTM D 1073.
b. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass

2.2.4. Mineral Filler

a. Rock or slag dust, hydraulic cement, or other inert material complying with ASTM D 242.

2.2.5. Recycled Asphalt Products (RAP)

a. Use of RAP will be limited to 15% in surface and binder courses.

2.3 ASPHALT MATERIALS

2.3.1. Asphalt Cement

a. ASTM D 3381 for viscosity-graded material and conforming to State or Local DOT Standard Specifications.

2.3.2. Prime Coat

a. Asphalt emulsion prime conforming to State or Local DOT Standard Specifications.

2.3.3. Tack Coat

a. ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.

2.3.4. Water

a. Potable.

2.3.5. Pavement-Marking Paint

a. Latex, waterborne acrylic emulsion, lead and chromate free, ready mixed, complying with FS TT-P-19528, with drying time of less than 45 minutes.

2.4 MIXES

2.4.1. Hot-Mix Asphalt: Provide dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI's "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; in accordance with the State of Maryland Department of Transportation Standard Specifications and complying with the following requirements:

(1) Provide mixes with a history of satisfactory performance in geographical area where project is located.
(2) Surface Course: Hot Mix Asphalt (HMA) Thin Lift Mix N9.5
(3) Binder Course : Hot Mix Asphalt (HMA) Thin Lift Mix N19.0

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
b. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
c. Notify Contracting Officer writing of any unsatisfactory conditions.
d. Do not begin paving installation until unsatisfactory conditions have been corrected.

3.2 COLD MILLING

3.2.1. General

a. Clean existing paving surface of loose and deleterious material immediately before cold milling.
b. Remove existing asphalt pavement, including hot-mix asphalt and, as necessary, unbound-aggregate base course, by cold milling to grades and cross sections indicated.
c. Repair or replace curbs, manholes, and other construction damaged during cold milling.

3.3 PATCHING

3.3.1. General

a. Saw cut perimeter of patch and excavate existing pavement section to stable base.
b. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated.
c. Cut excavation faces vertically. Remove excavated material.
d. Re-compact existing unbound aggregate base course to form new sub-grade.
e. Furnish and place and compact new aggregate and new asphalt material as indicated.

3.4 SURFACE PREPARATION

3.4.1. General

a. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.
b. Ensure that prepared subgrade is ready to receive paving.
c. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

3.4.2. Prime Coat

a. Apply uniformly over surface of compacted-aggregate base at a rate of 0.15 to 0.50 gallons/sq. yd.
b. Apply enough material to penetrate and seal, but not flood, surface.
c. Allow prime coat to cure for 72 hours minimum.

(1) If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt.
(2) Use just enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
(3) Protect primed substrate from damage until ready to receive paving.

3.5 HOT-MIX ASPHALT PLACING

3.5.1. General

a. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off.
b. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix.
c. Place each course to required grade, cross section, and thickness, when compacted as detailed below:

(1) Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
(2) Revise below to higher temperature if thin lifts in cool weather are likely. See National Asphalt Pavement Association (NAPA) recommendations.
(3) Spread mix at minimum temperature of 250 deg F.
(4) Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
(5) Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

d. Place paving in consecutive strips not less than 10 feet wide, except where infill edge strips of a lesser width are required.

(1) After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt base course for a section before placing asphalt surface course.

e. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

3.6.1. General

a. Construct joints to ensure continuous bond between adjoining paving sections.
b. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

(1) Clean contact surfaces and apply tack coat.
(2) Offset longitudinal joints in successive courses a minimum of 6 inches.
(3) Offset traverse joints in successive courses a minimum of 24 inches.
(4) Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

3.7.1. General

a. Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement.
b. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
c. Complete compaction before mix temperature cools to 185 deg F.

3.7.2. Breakdown Rolling

a. Accomplish breakdown or initial rolling immediately after rolling joints and outside edge.
b. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness.
c. Repair surfaces by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.

3.7.3. Intermediate Rolling

a. Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve specified density.
b. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

(1) Average Density: 94% in accordance with AASHT0 M323.

3.7.4. Finish Rolling

a. Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

3.7.5. Edge Shaping

a. While surface is being compacted and finished, trim edges of pavement to proper alignment.
b. Bevel edges while still hot, with back of rake or smooth iron.
c. Compact thoroughly using tamper or other satisfactory method.

3.7.6. Repairs

a. Remove paved areas that are defective or contaminated with foreign materials.
b. Remove paving course over area affected and replace with fresh, hot-mix asphalt.
c. Compact by rolling to specified density and surface smoothness.

3.7.7. Protection

a. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
b. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

3.8.1. Thickness

a. Compact each course to produce the thickness indicated within the following tolerances:
(1) Surface Course: Plus 1/4-inch no minus.
(2) Binder Course: Plus or Minus 1/4-inch.
(3) Aggregate Base Course: Plus or Minus 1/2-inch.

3.8.2. Surface Smoothness

a. Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

(1) Binder Course: 1/4 inch.
(2) Surface Course: 1/8 inch.

3.9 PAVEMENT MARKING

3.9.1. General

a. Remove all existing pavement markings which conflict with proposed markings by grinding, sand blasting or other permanent method of removal. Painting over existing markings with paint matching the pavement color will not be considered acceptable.
b. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Contracting Officer.
c. Allow paving to cure for 30 days before starting pavement marking.
d. Sweep and clean surface to eliminate loose material and dust.
e. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.10 FIELD QUALITY CONTROL

3.10.1. Testing Agency

a. Contractor will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.
b. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

3.10.2. Thickness

a. In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

3.10.3. Surface Smoothness

a. Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

3.10.4. In-Place Density

a. Test in place density by use of a nuclear gauge at intervals recommended in the QA/QC plan.

3.10.5. Non-Compliance

a. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02751

CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Driveways and roadways.
b. Parking lots.
c. Curbs and gutters.
d. Sidewalks and Walkways.
e. Exterior Equipment Pads
f. Miscellaneous exterior concrete

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements” for recycled content of steel products.
b. Division 2 Section “Earthwork” for subgrade preparation, grading and subbase course.
c. Division 2 Section “Pavement Joint Sealants” for joint sealants.

1.2 DEFINITIONS

1.2.1. Cementitious Materials

a. Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.2.2. Standard Specification

a. Maryland Department of Transportation-State Highway Administration Standard Specifications for Construction and Materials.
b. Measurement and payment provisions in the Standard Specifications do not apply.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of manufactured material and product indicated.

1.3.2. Design Mixes

a. For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1.3.3. Material Test Reports

a. From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

(1) Cementitious materials and aggregates.
(2) Admixtures.

1.3.4. Sustainable Design Submittals:

a. Materials shall comply with requirements of Division 1 Section "Sustainable Design Requirements."

b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.

1.3.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Design Mixes	X	R
1.3.3	Material Test Reports	X	I
1.3.4	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.4.2. Manufacturer Qualifications

a. Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1.4.3. Testing Agency Qualifications

a. An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

1.4.4. Source Limitations

a. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

1.4.5. ACI Publications

a. Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

1.4.6. Concrete Testing Service

a. Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

1.4.7. Preinstallation Conference

a. Conduct conference at Project site to comply with requirements of Division 1 Section "Coordination."

(1) Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement to attend conference:

(a) Contractor's superintendent
(b) Independent testing agency responsible for concrete design mixtures
(c) Ready-mix concrete producer
(d) Concrete pavement sub-contractor

1.5 PROJECT CONDITIONS

1.5.1. Traffic Control

a. Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Steel Reinforcement

a. Contain no less than 80% of Post-consumer recycled content and 10% pre-consumer recycled content.
b. 50% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.3. Concrete Materials

a. Contain Pre-consumer recycled content.
b. 90% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.2 FORMS

2.2.1. Form Materials

a. Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
b. Use flexible or curved forms for curves of a radius 50 feet or less.

2.2.2. Form-Release Agent

a. Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

2.3.1. Plain-Steel Welded Wire Fabric

a. ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

2.3.2. Joint Dowel Bars

a. Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

2.3.3. Tie Bars

a. ASTM A 615, Grade 60, deformed.

2.4 CONCRETE MATERIALS

2.4.1. General

a. Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

2.4.2. Portland Cement

a. ASTM C 150, Type I or II, meeting the requirements of the State of Maryland Department of Transportation.
b. Fly Ash: In accordance with State of Maryland Standard Specifications.

2.4.3. Aggregate

a. ASTM C 33, uniformly graded, from a single source as follows:

(1) Fine Aggregate - Portland Cement Concrete in accordance with State of Maryland Standard Specifications Article 909.01
(2) Course Aggregate - Portland Cement Concrete, Grade 57 in accordance with State of Maryland Standard Specifications Article 909.01.
(3) Maximum Aggregate Size: 2 inch
(4) Do not use fine or coarse aggregates containing substances that cause spalling.

2.4.4. Water

a. ASTM C 94.

2.5 ADMIXTURES

2.5.1. General

a. Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

2.5.2. Air-Entraining Admixture

a. ASTM C 260.

2.6 CURING MATERIALS

2.6.1. Absorptive Cover:

a. ASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. dry.

2.6.2. Moisture-Retaining Cover

a. ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

2.6.3. Water

a. Potable.

2.6.4. Evaporation Retarder

a. Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

2.6.5. Clear Waterborne Membrane-Forming Curing Compound

a. ASTM C 309, Type 1, Class B.

2.7 RELATED MATERIALS

2.7.1. Expansion- and Isolation-Joint-Filler Strips

a. ASTM D 1751, asphalt-saturated cellulosic fiber.

2.7.2. Pavement-Marking Paint

a. Latex, waterborne acrylic emulsion; lead and chromate free, ready mixed; complying with FS TT-P-19528, with drying time of less than 45 minutes.
b. Color: As indicated on plans.

2.8 CONCRETE MIXES

2.8.1. General

a. Prepare design mixes, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
b. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.
c. Proportion mixes to provide concrete with the following properties:

(1) Compressive Strength (28 Days): 3,500 psi.
(2) Flexural Strength (14 Days): 675 psi (pavements only)
(3) Maximum Water-Cementitious Materials Ratio: 0.50.
(4) Slump Limit: 2-5 inches.

d. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

(1) Fly Ash: 25 percent.

e. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent:

(1) Air Content: 6.5 percent.

2.9 CONCRETE MIXING

2.9.1. Ready-Mixed Concrete

a. Comply with requirements and with ASTM C 94.
b. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 90 minutes to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2.9.2. Project-Site Mixing

a. Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94.
b. Mix concrete materials in appropriate drum-type batch machine mixer.

(1) For mixers of 1 cu. yd. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
(2) For mixers of capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.

(3) Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1. General

a. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
b. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
c. Notify Contracting Officer writing of any unsatisfactory conditions. Do not begin paving installation until unsatisfactory conditions have been corrected.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

3.2.1. General

a. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations.
b. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
c. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

3.3.1. General

a. Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.
b. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
c. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
d. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.4 JOINTS

3.4.1. General

a. Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to building, unless otherwise indicated.
b. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

3.4.2. Construction Joints

a. Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
b. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
c. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.4.3. Expansion Joints

a. Form expansion joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
b. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
c. Extend joint fillers full width and depth of joint.
d. Terminate joint filler less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
e. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
f. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
g. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

3.4.4. Dowel Bars And Supports

a. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.4.5. Contraction Joints

a. Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

(1) Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

(a) Radius: 1/4 inch.

(2) Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

3.4.6. Edging

a. Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius.
b. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

(1) Radius: 1/4 inch.

3.5 CONCRETE PLACEMENT

3.5.1. General

a. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
b. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
c. Moisten subbase to provide a uniform dampened condition at the time concrete is placed.
d. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
e. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
f. Do not add water to concrete during delivery, at Project site, or during placement.
g. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
h. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

(1) Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms.
(2) Use only square-faced shovels for hand-spreading and consolidation.
(3) Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

i. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.
j. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
k. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

(1) Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

l. When adjoining pavement areas are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
m. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

(1) When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
(2) Do not use frozen materials or materials containing ice or snow.
(3) Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

n. Hot-Weather Placement: Place concrete according to recommendations in ACI 301 and as follows when hot-weather conditions exist:

(1) Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
(2) Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
(3) Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

3.6.1. General

a. Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

3.6.2. Float Finish

a. Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations.
b. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units.
c. Finish surfaces to true planes. Cut down high spots, and fill low spots.
d. Refloat surface immediately to uniform granular texture.

3.6.3. Medium-to-Fine-Textured Broom Finish (Sidewalks, Curb, Curb and Gutter, Concrete Pads)

a. Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.6.4. Medium-to-Coarse-Textured Broom Finish (Ramps and Truck Dock Pavement)

a. Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of travel.

3.7 CONCRETE PROTECTION AND CURING

3.7.1. General

a. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
b. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.
c. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

3.7.2. Evaporation Retarder

a. Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. per hour before and during finishing operations.

b. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

3.7.3. Curing Methods

a. Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

(1) Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

(a) Water.
(b) Continuous water-fog spray.
(c) Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

(2) Moisture-Retaining-Cover Curing

(a) Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
(b) Immediately repair any holes or tears during curing period using cover material and waterproof tape.

(3) Curing Compound

(a) Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions.
(b) Recoat areas subjected to heavy rainfall within three hours after initial application.
(c) Maintain continuity of coating and repair damage during curing period.

3.8 PAVEMENT TOLERANCES

3.8.1. Comply With Tolerances Of ACI 117 And As Follows:

a. Elevation: 1/4 inch.
b. Thickness: Plus 3/8 inch, minus 1/4 inch.
c. Surface: Gap below 10-foot long, unleveled straightedge not to exceed 1/4 inch.
d. Joint Spacing: 6 inches.
e. Contraction Joint Depth: Plus 1/4 inch, no minus.
f. Joint Width: Plus 1/8 inch, no minus.

3.9 PAVEMENT MARKING

3.9.1. General

a. Do not apply pavement-marking paint until layout, colors, and placement have been verified with the Contracting Officer.
b. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.
c. Sweep and clean surface to eliminate loose material and dust.

d. Apply two coats of paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.10 FIELD QUALITY CONTROL

3.10.1. Testing Agency

a. Contractor to engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.

3.10.2. Testing Services

a. Testing shall be performed according to the requirements contained in Division 1 and the following:

(1) Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
(2) Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each days pour of each type of concrete. Additional tests will be required when concrete consistency changes.
(3) Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each days pour of each type of air-entrained concrete.
(4) Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
(5) Flexural Test Specimens: AASHTO T 177; one set of four standard test beams for each flexural strength test. Beams shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
(6) Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
(7) Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing, if required.
(8) Flexural Test Tests: One set for each day’s pour of paving areas only. Two specimens shall be tested at 14 days; two specimens will be reserved for later testing, if required.
(9) When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
(10) When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
(11) The compressive strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.
(12) The flexural strength level of concrete pavements will be considered satisfactory if the average strength of the two beams tested equals or exceeds the specified flexural strength and neither of the beams falls below specified flexural strength by more than 50 psi. If the first two beams do not meet these

requirements, the remaining two beams will be tested and the average of strength of all four beams will be considered.

3.10.3. Test Result Reports

a. Test results shall be reported in writing to Contracting Officer, concrete manufacturer, and Contractor within 24 hours of testing.
b. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive or flexural strength at the time specified, concrete mix proportions and materials, compressive or flexural breaking strength, and type of break for all tests.

3.10.4. Nondestructive Testing

a. Impact hammer, sonoscope, or other nondestructive device may be permitted by Contracting Officer but will not be used as the sole basis for approval or rejection.

3.10.5. Additional Tests

a. Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Contracting Officer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.11 REPAIRS AND PROTECTION

3.11.1. General

a. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.
b. Drill test cores where directed by Contracting Officer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
c. Protect concrete from damage. Keep traffic off of pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
d. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material.
e. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02764

PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Expansion and contraction joints within cement concrete pavement, curbs and sidewalk.
b. Joints between cement concrete and asphalt pavement.
c. Joints between newly placed concrete and existing concrete, buildings and other structures.

1.1.2. Related Sections

a. Division 2 Section “Hot-mix Asphalt Paving” for constructing joints between concrete and asphalt pavement.
b. Division 2 Section “Cement Concrete Pavement” for constructing joints in concrete pavement.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each joint-sealant product indicated.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications

a. An employer of workers trained and approved by manufacturer.

1.3.2. Source Limitations

a. Obtain each type of joint sealant through one source from a single manufacturer.

1.3.3. Testing

a. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.4 DELIVERY, STORAGE AND HANDLING

1.4.1. General

a. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.
b. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.5 PROJECT CONDITIONS

1.5.1. General

a. Do not proceed with installation of joint sealants under the following conditions:

(1) When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
(2) When joint substrates are wet or covered with frost.
(3) Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
(4) Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1. Compatibility

a. Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

2.2.1. Type SL Silicone Sealant for Concrete and Asphalt

a. Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.

2.3 HOT-APPLIED JOINT SEALANTS

2.3.1. Sealant for Concrete and Asphalt

a. Single-component formulation complying with ASTM D 3405.

2.4 JOINT-SEALANT BACKER MATERIALS

2.4.1. General

a. Provide joint-sealant backer materials that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
b. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
c. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. Surface Cleaning of Joints

a. Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

3.3 INSTALLATION OF JOINT SEALANTS

3.3.1. General

a. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
b. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

c. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

(1) Do not leave gaps between ends of backer materials.
(2) Do not stretch, twist, puncture, or tear backer materials.
(3) Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

d. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

(1) Place sealants so they directly contact and fully wet joint substrates.
(2) Completely fill recesses provided for each joint configuration.
(3) Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

e. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

(1) Remove excess sealants from surfaces adjacent to joint.
(2) Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

f. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
g. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

3.4.1. General

a. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

3.5.1. General

a. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02821

CHAIN-LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Galvanized steel chain-link fabric.
b. Galvanized steel framework.
c. Gate framing and hardware.
d. Wood gate slats.

1.2 DEFINITIONS

1.2.1. CLFMI

a. Chain Link Fence Manufacturers Institute.

1.3 SUBMITTALS

1.3.1. Product Data

a. Material descriptions, construction details, dimensions of individual components and profiles, and finishes for the following:

(1) Fence and gate posts, rails, and fittings.
(2) Chain-link fabric, reinforcements, and attachments.
(3) Gates and hardware.

1.3.2. Shop Drawings

a. Show locations of fence, each gate, posts, rails, and tension wires and details of extended posts, extension arms, gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, elevations, sections, gate swing and other required installation and operational clearances, and details of post anchorage and attachment and bracing.

1.3.3. Product Certificates

a. Signed by manufacturers of chain-link fences and gates certifying that products furnished comply with requirements.

1.3.4. Qualification Data

a. For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.3.5. Field Test Reports

a. Indicate and interpret test results for compliance of chain-link fence and gate grounding and bonding with performance requirements.

1.3.6. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Product Certificates	X	I
1.3.4	Qualification Data	X	I
1.3.5	Field Test Reports	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.4.2. Source Limitations for Chain-Link Fences and Gates

a. Obtain each color, grade, finish, type, and variety of component for chain-link fences and gates from one source with resources to provide chain-link fences and gates of consistent quality in appearance and physical properties.

1.5 PROJECT CONDITIONS

1.5.1. Existing Utilities

a. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

(1) Notify Contracting Officer not less than five (5) days in advance of proposed utility interruptions.
(2) Do not proceed with utility interruptions without Contracting Officer’s written permission.

1.5.2. Field Measurements

a. Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

2.1.1. Steel Chain-Link Fence Fabric

a. Height indicated on Drawings. Provide fabric fabricated in one-piece widths for fencing in height of 12 feet and less. Comply with CLFMI's "Product Manual" and with requirements indicated below:

(1) Mesh and Wire Size: 2-inch mesh by 0.148 inch diameter.
(2) Zinc-Coated Fabric: ASTM A 392, with zinc coating applied to steel wire before weaving according to ASTM A 817, Type II, zinc coated (galvanized) with the following minimum coating weight:

(a) Class 2: Not less than 2 oz./sq. ft. of uncoated wire surface.

(3) Coat selvage ends of fabric that is metallic coated during the weaving process with manufacturer's standard clear protective coating.

b. Selvage: Twisted at top selvage and knuckled at bottom.

2.2 INDUSTRIAL FENCE FRAMING

2.2.1. Round Steel Pipe

a. Standard weight, Schedule 40, galvanized steel pipe complying with ASTM F 1083. Comply with ASTM F 1043, Material Design Group IA, external and internal coating Type A, consisting of not less than 1.8-oz./sq. ft. zinc; and the following strength and stiffness requirements:

(1) Line, End, Corner, and Pull Posts and Top Rail: Per requirements for Heavy Industrial Fence.

2.2.2. Post Brace Rails

a. Match top rail for coating and strength and stiffness requirements. Provide brace rail with truss rod assembly for each gate, end, and pull post. Provide two brace rails extending in opposing directions, each with truss rod assembly, for each corner post and for pull posts. Provide rail ends and clamps for attaching rails to posts.

2.2.3. Top Rails

a. Fabricate top rail from lengths 21 feet or longer, with swedged-end or fabricated for expansion-type coupling, forming a continuous rail along top of chain-link fabric.

2.2.4. Bottom Rails

a. Match top rail for coating and strength and stiffness requirements.

2.3 SWING GATES

2.3.1. General

a. Comply with ASTM F 900 for gate posts and swing gate types indicated.

(1) Gate Leaf Width: As indicated.
(2) Gate Fabric Height: As indicated.

2.3.2. Pipe and Tubing

a. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; external and internal coating Type A, consisting of not less than 1.8-oz./sq. ft. zinc.
b. Gate Posts: Round tubular steel.
c. Gate Frames and Bracing: Rectangular tubular steel.

2.3.3. Frame Corner Construction

a. Welded.

2.3.4. Hardware:

a. Hinges: Degree swing as indicated.
b. Latches permitting operation from both sides of gate with provision for Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
c. Padlock and Chain: As specified in Division 8 Section "Door Hardware."

2.4 WOOD GATE SLATS

2.4.1. Species and Grade

a. Western red cedar, Clear Heart VG (Vertical Grain) Grade B; NLGA, WCLIB, or WWPA.
b. Maximum Moisture Content: 19 percent.
c. Face Surface: Saw textured.

2.5 CHAIN-LINK CEILING

2.5.1. Fabric, Framing, and Stiffeners

a. Fabricated from same fabric and framing as gates.

2.5.2. Wall Supports

a. 4-by-4-by-1/4-inch steel angle punched for attachment to wall and fabric ceiling panels.

2.5.3. Intermediate Supports

a. Steel tubing, as recommended by manufacturer.

2.5.4. Finishes

a. Match adjacent gates.

2.6 FITTINGS

2.6.1. General

a. Provide fittings for a complete fence installation, including special fittings for corners. Comply with ASTM F 626.Post and Line Caps: Hot-dip galvanized pressed steel or hot-dip galvanized cast iron. Provide weathertight closure cap for each post.

(1) Provide line post caps with loop to receive top rail.

2.6.2. Rail and Brace Ends

a. Hot-dip galvanized pressed steel. Provide rail ends or other means for attaching rails securely to each gate, corner, pull, and end post.

2.6.3. Rail Fittings

a. Top Rail Sleeves: Hot-dip galvanized pressed steel or round steel tubing. Not less than 6 inches long.
b. Rail Clamps: Hot-dip galvanized pressed steel. Provide line and corner boulevard clamps for connecting bottom rails in the fence line to line posts.

2.6.4. Tension and Brace Bands

a. Hot-dip galvanized pressed steel.

2.6.5. Tension Bars

a. Hot-dip galvanized steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

2.6.6. Truss Rod Assemblies

a. Hot-dip galvanized steel rod and turnbuckle or other means of adjustment.

2.7 CAST-IN-PLACE CONCRETE

2.7.1. General

a. Comply with ACI 301 for cast-in-place concrete.

2.7.2. Materials

a. Portland cement complying with ASTM C 150, aggregates complying with ASTM C 33, and potable water.

(1) Concrete Mixes: Normal-weight concrete with not less than 3000-psi compressive strength (28 days), 3-inch slump, and 1-inch maximum size aggregate.

2.8 FENCE GROUNDING

2.8.1. Conductors

a. Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.

(1) Material above Finished Grade: Copper.
(2) Material on or below Finished Grade: Copper.
(3) Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.

2.8.2. Connectors and Grounding Rods

a. Comply with UL 467.
b. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance.
b. Do not begin installation before final grading is completed, unless otherwise permitted by Contracting Officer.
c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

Stake locations of fence lines, gates, and terminal posts. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

3.3.1. General

a. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
b. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.

c. Post Setting: Hand-excavate holes for post foundations in firm, undisturbed or compacted soil. Set posts in concrete footing. Protect portion of posts aboveground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Using mechanical devices to set line posts per ASTM F 567 is permitted. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during placement and finishing operations until concrete is sufficiently cured.

(1) Dimensions and Profile: As indicated on Drawings.
(2) Exposed Concrete Footings: Extend concrete 2 inches above grade, smooth, and shape to shed water.

3.4 CHAIN-LINK FENCE INSTALLATION

3.4.1. Terminal Posts

a. Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 30 degrees or more.

3.4.2. Line Posts

a. Space line posts uniformly at 10 feet o.c.

3.4.3. Post Bracing Assemblies

a. Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts. Locate horizontal braces at midheight of fabric on fences with top rail and at two-thirds fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

3.4.4. Top Rail

a. Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended by fencing manufacturer.

3.4.5. Bottom Rails

a. Install, spanning between posts, using fittings and accessories.

3.4.6. Chain-Link Fabric

a. Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

3.4.7. Tension or Stretcher Bars

a. Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.

3.4.8. Tie Wires

a. Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

(1) Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to braces 24 inches o.c.

3.4.9. Fasteners

a. Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

3.5 GATE INSTALLATION

General: Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 CHAIN-LINK CEILINGS ERECTION

3.6.1. Wall Supports

a. Anchor wall support angle to walls at 12 inches o.c. and as follows:

(1) For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

3.6.2. Ceiling Panel Attachment

a. Attach chain link ceiling panels to wall support angles with bolts at 12 inches o.c.
b. Attach chain link ceiling panels to intermediate supports as recommended by manufacturer.

3.7 GROUNDING AND BONDING

3.7.1. Fence Grounding

a. Install at maximum intervals of 1500 feet except as follows:

(1) Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
(2) Gates and Other Fence Openings: Ground fence on each side of opening.

(a) Bond metal gates to gate posts.
(b) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

3.7.2. Grounding Method

a. At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location, including the following:

3.7.3. Bonding Method for Gates

a. Connect bonding jumper between gate post and gate frame.

3.7.4. Connections

a. Make connections to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

(1) Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
(2) Make connections with clean, bare metal at points of contact.

3.7.5. Bonding to Lightning Protection System

a. If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

3.8 ADJUSTING

3.8.1. Gate

a. Adjust gate to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

3.8.2. Lubrication

a. Lubricate hardware, gate operator, and other moving parts.

3.9 DEMONSTRATION

3.9.1. General

a. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain gates.
b. Test and adjust operators, controls, hardware, and other operable components. Replace damaged or malfunctioning operable components.
c. Train Owner's personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
d. Schedule training with Owner with at least seven days' advance notice.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02826

ORNAMENTAL METAL FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Decorative metallic-coated steel tubular picket fences.
b. Swing gates.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Lightning-Protection System

a. Maximum grounding-resistance value of 25 ohms under normal dry conditions.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of product indicated.

1.3.2. Shop Drawings

a. For gates. Include plans, elevations, sections, details, and attachments to other work.

1.3.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Fabricator of products.

1.4.2. Welding Qualifications

a. Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel".

PART 2 - PRODUCTS

2.1 MANUFACTURERS

To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design", including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 STEEL AND IRON

2.2.1. Galvanized-Steel Sheet

a. ASTM A 653/A 653M, structural quality, Grade 50 with G90 coating.

2.3 MISCELLANEOUS MATERIALS

2.3.1. Concrete

a. Normal-weight, air-entrained, ready-mix concrete complying with requirements in Division 3 Section "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch maximum aggregate size.

2.3.2. Non-shrink Grout

a. Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107 and specifically recommended by manufacturer for exterior applications.

2.4 GROUNDING MATERIALS

2.4.1. Grounding Conductors

a. Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.

(1) Material above Finished Grade: Copper.
(2) Material on or below Finished Grade: Copper.
(3) Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.

2.4.2. Grounding Connectors and Grounding Rods

a. Comply with UL 467.

(1) Grounding Rods: Copper-clad steel.

(a) Size: 5/8 by 96 inches.

2.5 DECORATIVE METALLIC-COATED STEEL TUBULAR PICKET FENCES

2.5.1. Decorative Metallic-Coated Steel Tubular Picket Fences.

a. Basis-of-Design Product: Subject to compliance with requirements, provide Iron World, Howard County, MD, Maverick Commercial Ornamental Picket Fence, Canterbury (flat top picket, 3 horizontal rails) Rail Fence and Swing Gates.

(1) Finish:

(a) Powder Coating: 2-coat finish consisting of epoxy primer and TGIC polyester topcoat, with a minimum total dry film thickness of not less than 3 mils. Comply with coating manufacturer's written instructions

(2) Color: Black.

2.5.2. Metallic-Coated Steel Sheet

a. Galvanized-steel sheet.

2.5.3. Swing Gate Posts

a. Square tubes 3 by 3 inches formed from 0.108-inch (12 gage) nominal-thickness, metallic-coated steel sheet.

2.5.4. Post Caps

a. Manufacturer’s standard.

2.5.5. Rails

a. “U” channels.

(1) Size: 1-1/2 by 1 by1-1/2 inches.
(2) Metal and Thickness: 0.072-inch (15 gage) nominal-thickness, metallic-coated steel sheet.

2.5.6. Pickets

a. Square tubes.

(1) Size: ¾-inch or 1-inch square.
(2) Metal and Thickness: 16 or 18 gage nominal-thickness, metallic-coated steel sheet.
(3) Flat top pickets with plugs.
(4) Picket Spacing: 3-15/16 inches face to face.

2.5.7. Fasteners

a. ¼-inch industrial drive rivets.

2.5.8. Galvanizing

a. For components which galvanized coating is not specified, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.

2.6 SWING GATES

2.6.1. Gate Configuration

a. Double leaf.

2.6.2. Gate Frame Height

a. As indicated.

2.6.3. Gate Opening Width:

a. As indicated.

2.6.4. Rails

a. Fabricate members from “U” channels 1 inch wide by 1-1/2 inches high formed from 0.120-inch (11 gage) nominal -thickness, metallic-coated steel sheet.

2.6.5. Picket Size, Configuration, and Spacing

a. Comply with requirements for adjacent fence pickets.

2.6.6. Hardware

a. Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than 5 feet wide. Provide center gate stops and cane bolts for pairs of gates. Rest of hardware specified in Division 8 Section “Door Hardware.”

2.6.7. Hinges

a. Manufacturer’s standard bolt-on hardware with ball bearing hinges..

2.6.8. Cane Bolts

a. Provide for each leaf of pairs of gates. Fabricated from minimum 1/2-inch- diameter, round steel bars, hot-dip galvanized after fabrication. Finish to match gates. Provide galvanized-steel pipe strikes to receive cane bolts in both open and closed positions.

2.6.9. Fasteners

a. Manufacturer's standard corrosion-resistant, color-coated fasteners matching fence components.

2.6.10. Galvanizing

a. For components which galvanized coating is not specified, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.
b. Do not begin installation before final grading is completed unless otherwise permitted by Contracting Officer.
c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 DECORATIVE FENCE INSTALLATION

3.2.1. General

a. Install fences according to manufacturer's written instructions.
b. Install fences by setting posts as indicated and fastening rails to posts and piers.
c. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches plus 3 inches for each foot or fraction of a foot that fence height exceeds 4 feet.
d. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

(1) Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete.
(2) Concrete Fill: Place concrete around sleeves and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

(a) Exposed Concrete: Extend 2 inches above grade. Finish and slope top surface to drain water away from post.

(3) Posts Set into Concrete in Sleeves: Use galvanized-steel pipe sleeves with inside diameter at least 3/4 inch larger than outside diagonal dimension of post, preset and anchored into concrete for installing posts.

(a) Extend posts at least 5 inches into sleeve.
(b) After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink grout, mixed and placed to comply with grout manufacturer's written instructions; shape and smooth to shed water. Finish and slope top surface of grout to drain water away from post.

3.3 GATE INSTALLATION

Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.4 GROUNDING AND BONDING

3.4.1. Fence Grounding

a. Install at maximum intervals of 1500 feet except as follows:

(1) Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
(2) Gates and Other Fence Openings: Ground fence on each side of opening.

(a) Bond metal gates to gate posts.
(b) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

3.4.2. Grounding Method

a. At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.

3.4.3. Bonding Method for Gates

a. Connect bonding jumper between gate post and gate frame.

3.4.4. Connections

a. Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

(1) Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
(2) Make connections with clean, bare metal at points of contact.
(3) Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.4.5. Bonding to Lightning-Protection System

a. If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning-protection down conductor or lightning-protection grounding conductor, complying with NFPA 780.

3.5 ADJUSTING

3.5.1. General

a. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range.
b. Lubricate hardware and other moving parts.

END OF SECTION

SECTION 02870

SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Benches.
b. Bicycle racks.
c. Trash receptacles.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

2.2.1. Steel

a. Free from surface blemishes and complying with the following:

(1) Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.2.2. Anchors, Fasteners, Fittings, and Hardware

a. Manufacturer's standard, corrosion-resistant-coated or noncorrodible materials; commercial quality; tamperproof, vandal and theft resistant; concealed, recessed, and capped or plugged. Provide as required for site furnishings' assembly, mounting, and secure attachment.

(1) Anchors: For inconspicuously bolting legs of site furnishings to on-grade substrate; one per leg.

2.3 BENCHES

2.3.1. Basis-of-Design Product: Victor Stanley, Co., Model Steelsites RB Series RB-28. Contact Information: P.O. Drawer 330, Dunkirk, MD 20754. Phone: 800-368-2573.

a. Frame and Armrests: Smooth rectangular mild steel bars with edges uniformly eased.
b. Seat and Backrest: Fabricated from evenly spaced, parallel flat mild steel straps whose edges are uniformly eased.
c. Arms: Two, at each end.
d. Arm Height: Standard with product.
e. Seat Height: Standard with product.
f. Overall Height: 31-1/4 inches.
g. Overall Width: 26 inches.
h. Overall Length: 72 inches.
i. Installation Method: Anchored at finished grade to substrate indicated on Drawings.
j. Steel Finish: Powder-coated. Color: Black.

2.4 BICYCLE RACKS

2.4.1. Basis-of-Design Product: Columbia Cascade Company, Timberform "CycLoops" Model 2170-7-P (Pedestal Mount).

a. Frame: One-piece 2-inch inside diameter Schedule 40 pipe (outside diameter 2-3/8 inches) with four hex socket screws at each end to secure frame to pedestal mounting base.
b. Pedestal Mounting Base: ¼-inch thick mild steel plate permanently welded to 1-1/2-inch inside diameter Schedule 40 pipe sleeve with decorative metal base cover to conceal pedestal mounting base and expansion anchors.
c. Style: Serpentine or ribbon.
d. Overall Length: 63 inches.
e. Capacity: Designed to accommodate seven bicycles.
f. Installation Method: Anchoring to floor is facilitated through four 5/8-inch diameter holes in pedestal mounting base.
g. Steel Finish: UV resistant exterior grade polyester powder coating applied to a minimum thickness of 6 mils. Liquid, epoxy, and lead-containing powder coatings are not acceptable. Color: Black.

2.5 TRASH RECEPTACLES

2.5.1. Basis-of-Design Product: Victor Stanley, Co., Model Trash Receptacle Ironsites Series SD-42. Contact Information: P.O. Drawer 330, Dunkirk, MD 20754. Phone: 800-368-2573.

a. Steel Facing Surrounds: Evenly patterned, parallel flat steel slats 3/8 inch thick.

b. Receptacle Shape, Form, and Function: Round cylinder; with opening for depositing trash in top.
c. Style: As indicated by manufacturer's designation.
d. Overall Height: 38-3/4 inches.
e. Overall Diameter: 28 inches.
f. Inner Container: Plastic liner designed to be removable and reusable.
g. Capacity: 36 gal.
h. Installation Method: Anchored to substrate indicated on Drawings.
i. Steel Finish: Powder-coated. Color: Black.

2.6 FABRICATION

2.6.1. Metal Components

a. Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

2.6.2. Welded Connections

a. Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

2.6.3. Factory Assembly

a. Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
b. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
c. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.
d. Anchor site furnishings to floor surfaces with corrosion resistant zinc alloy expansion anchors (minimum bolt size ½-inch – 16, 2-3/16-inch anchor length) and washer.

3.3 CLEANING

After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02875

CART CORRALS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Shopping cart return station corrals

1.2 SUBMITTALS

1.2.1. Product Data

a. For each item of equipment required, including the manufacturer's standard details and maintenance installation instructions.

(1) Manufacturer's standard commercial warranty and point of contact for warranty service.
(2) Installation and operating instructions.
(3) Parts list.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

1.3.1. Maintenance Requirements

a. Provide continued parts support for equipment for the projected life cycle of the equipment plus 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable

products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

2.2.1. Aluminum

a. Extrusion: 6063-T5 aluminum, ASTM B 221.
b. Profile: Custom for each component.
c. Finish: Clear anodized.

2.2.2. Anchors, Fasteners, Fittings, and Hardware

a. Manufacturer's standard, corrosion-resistant-coated or noncorrodible materials; commercial quality. Assembled with common tools and unskilled labor.

2.3 CART CORRALS

2.3.1. 2E11-C Covered Cart Corral

2.3.1.1. Salient Features

a. Aluminum tube frame with peaked roof and tri-glass roof panels.
b. High impact polyethylene plastic barriers that are ballasted with pea gravel or sand (no holes drilled into parking lot surface).
c. Tri-Glass (triangular front and back panels).

(1) Material: Expanded PVC.
(2) Width: 69 inches.
(3) Height: 20 inches.
(4) Color: White.

d. Roof Cover.

(1) Material: Twin-Wall polycarbonate sheet.
(2) Finish: Opal.
(3) Thickness: 6 mm.
(4) Width: 48 inches.
(5) Length 79-3/4 inches.
(6) UV sable on both sides.

e. Cart storage capacity: 36.
f. Dimensions:

(1) Overall width: 104 inches (out-to-out of bumpers).
(2) Over length: 180 inches.
(3) Overall height: 99 inches.
(4) Minimum interior height 78 inches.

g. Bumper Color: Blue.

2.3.1.2. Basis-of-Design Product

a. McCue Corporation, CartPark 4, Covered-Peaked Cart Corral. (800) 800-8503 or www.mccue.com.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1. General

a. Check that surfaces to which cart corrals will be secured are sound and free of irregularities interfering with installation.
b. Do not begin installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Unless otherwise required anchor cart corrals securely, positioned at locations indicated.
b. Touch up scarred finishes with manufacturer's matching color material.
c. Replace damaged and defective items.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 02900

LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Trees.
b. Shrubs.
c. Ground covers.
d. Plants.
e. Lawns.
f. Topsoil and soil amendments.
g. Fertilizers and mulches.
h. Stakes and guys.
i. Landscape edgings.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.
b. Division 2 Section "Site Clearing" for topsoil stripping and stockpiling, and site clearing.
c. Division 2 Section “Tree Protection and Trimming” for protecting and trimming trees to remain.
d. Division 2 Section "Earthwork" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.

1.2 SUBMITTALS

1.2.1. Product Certificates

a. Signed by manufacturers certifying that their products comply with specified requirements.
b. Manufacturer's certified analysis for standard products.
c. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
d. Label data substantiating that plants, trees, shrubs, and planting materials comply with specified requirements.

1.2.2. Grass Seed Certification

a. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1.2.3. Maintenance Instructions

a. Recommending procedures to be established by Government for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

1.2.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Certificates	X	I
1.2.2	Grass Seed Certification	X	I
1.2.3	Maintenance Instructions	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications

a. Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this project and with a record of successful landscape establishment.

1.3.2. General

a. Provide quality, size, genus, species, and variety of trees and shrubs indicated, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock."

1.3.3. Topsoil Analysis

a. Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.

(1) Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.

1.3.4. Measurements

a. Measure trees and shrubs according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1. Packaged Materials

a. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer.
b. Protect materials from deterioration during delivery and while stored at site.

1.4.2. Seed

a. Deliver seed in original sealed, labeled, and undamaged containers.

1.4.3. Sod

a. Harvest, deliver, store, and handle sod according to the requirements of the American Sod Producers Association's (ASPA) "Specifications for Turfgrass Sod Materials and Transplanting/Installing."

1.4.4. Trees and Shrubs

a. Deliver freshly dug trees and shrubs.
b. Do not prune before delivery, except as approved by Contracting Officer.
c. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage.
d. Do not bend or bind-tie trees or shrubs in such a manner as to destroy natural shape.
e. Provide protective covering during delivery.
f. Do not drop trees and shrubs during delivery.

1.4.5. General

a. Handle balled and burlapped stock by the root ball.
b. Deliver trees, shrubs, ground covers, and plants after preparations for planting have been completed and install immediately. If planting is delayed more than 6 hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.

(1) Do not remove container-grown stock from containers before time of planting.
(2) Do not deliver plant material to the site any more than 48 hours prior to installation.

1.5 PROJECT CONDITIONS

1.5.1. Utilities

a. Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required.
b. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

1.5.2. Excavation

a. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Contracting Officer before planting.

1.6 COORDINATION AND SCHEDULING

1.6.1. General

a. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

1.7 WARRANTY

1.7.1. General Warranty

a. The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

1.7.2. Special Warranty

a. Warrant the following living planting materials for a period of one year after date of Substantial Completion, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.

(1) Trees.
(2) Shrubs.
(3) Ground covers.
(4) Plants.

1.7.3. Dead Planting Materials

a. Remove and replace dead planting materials immediately unless required to plant in the succeeding planting season.

1.8 TREE AND SHRUB MAINTENANCE

1.8.1. General

a. Maintain trees and shrubs by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings.
b. Spray as required to keep trees and shrubs free of insects and disease.
c. Restore or replace damaged tree wrappings.
d. Maintain trees and shrubs for 12 months following building occupancy date

1.9 LAWN MAINTENANCE

1.9.1. General

a. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

(1) Seeded Lawns: 12 months following building occupancy date.

(a) When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established at that time, continue maintenance during next planting season.

(2) Sodded Lawns: 12 months following building occupancy date.

b. Maintain and establish lawns by watering, fertilizing, weeding, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

c. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawns uniformly moist to a depth of 4 inches.

d. The Contractor shall not be responsible for watering of the lawn after the building occupancy date.

(1) Water lawn at the minimum rate of 1 inch per week.

e. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted.

f. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings.

g. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

h. Post-fertilization: Apply fertilizer to lawn after first mowing and when grass is dry.

(1) Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. of lawn area.

1.10 SATISFACTORY LAWN

1.10.1. Seeded Lawns

a. Seeded lawns will be satisfactory provided requirements, including maintenance, have been met and a healthy, uniform, close stand of grass is established, free from weeds, bare spots exceeding 5 by 5 inches, and surface irregularities.

1.10.2. Sodded Lawns

a. Sodded lawns will be satisfactory provided requirements, including maintenance, have been met and a health, well-rooted, even-colored, viable lawn is established, free of weeds, open joints, bare areas and surface irregularities.

1.10.3. Lawn Replacement

a. Replant lawns that do not meet requirements and continue maintenance until lawns are satisfactory.

PART 2 - PRODUCTS

2.1 TREE AND SHRUB MATERIAL

2.1.1. General

a. Furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning.
b. Provide well-shaped, fully-branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

2.1.2. Grade

a. Provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for type of trees and shrubs required.
b. Trees and shrubs of a larger size may be used if acceptable to Contracting Officer, with a proportionate increase in size of roots or balls.

2.1.3. Labeling

a. Label each tree and shrub with securely attached, waterproof tag bearing legible designation of botanical and common name.

2.2 SHADE AND FLOWERING TREES

2.2.1. Shade Trees

a. Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, conforming to ANSI Z60.1 for type of trees required.

2.2.2. Small Trees

2.2.3. Small upright or spreading type, branched or pruned naturally according to species and type, and with relationship of caliper, height, and branching recommended by ANSI Z60.1, and stem form as follows:

(1) Form: Single stem.
(2) Form: Multi-stem, clump, with 2 or more main stems.

2.2.4. All trees provided shall be balled and burlapped.

2.3 DECIDUOUS SHRUBS

2.3.1. Form and Size

a. Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

2.3.2. All deciduous shrubs shall be provided balled and burlapped unless specifically allowed otherwise in the plant list in the plans.

a. Any container-grown deciduous shrubs are subject to meeting ANSI Z60.1 limitations for container stock.

2.4 CONIFEROUS EVERGREENS

2.4.1. Form and Size

a. Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, conforming to ANSI Z60.1.

2.4.2. Form and Size

a. Specimen-quality, exceptionally heavy, tightly knit, symmetrically shaped coniferous evergreens of the following grade:

2.4.3. All coniferous evergreens shall be provided balled and burlapped unless specifically allowed otherwise in the plant list in the plans.

a. Any container-grown coniferous evergreens are subject to meeting ANSI Z60.1 limitations for container stock.

2.5 BROADLEAF EVERGREENS

2.5.1. Form and Size

a. Normal-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, conforming to ANSI Z60.1.

2.5.2. All broadleaf Evergreens shall be provided balled and burlapped unless specifically allowed otherwise in the plant list in the plans.

a. Any container-grown broadleaf evergreens are subject to meeting ANSI Z60.1 limitations for container stock.

2.6 GROUND COVERS AND PLANTS

2.6.1. General

a. Provide ground covers and plants established and well rooted in removable containers or integral peat pots and with not less than the minimum number and length of runners required by ANSI Z60.1 for the pot size indicated.

2.7 GRASS MATERIALS

2.7.1. Approved Grasses Are As Follows:

a. SHA (State Highway Administration) Turfgrass Seed Mix in accordance with Article 920.06.07(a) of the Maryland Department of Transportation Standard Specifications..

2.7.2. Grass Seed

a. Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.

2.7.3. Sod

a. Certified turfgrass sod complying with ASPA specifications for machine-cut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable native grasses.
b. Provide viable sod of uniform density, color, and texture of the following turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.

2.7.4. Seeding Dates

a. Spring seeding: between March 1 and May.
b. Fall seeding: between August 1 and October 31.

2.8 TOPSOIL

2.8.1. Topsoil

a. ASTM D 5268, pH range of 5.5 to 7.8, 4 percent organic material minimum, free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth.
b. Reuse surface soil stockpiled on the site as the primary source for topsoil.
c. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary.
d. Supplement with imported topsoil when quantities are insufficient.
e. Clear topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

2.9 SOIL AMENDMENTS

2.9.1. Lime

a. ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve. Apply according to soil tests.

2.9.2. Aluminum Sulfate

a. Commercial grade, unadulterated.

2.9.3. Sand

a. Clean, washed, natural or manufactured sand, free of toxic materials.

2.9.4. Perlite

a. Horticultural perlite, soil amendment grade.

2.9.5. Peat Humus (Low Acid)

a. Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.

2.9.6. Peat Humus (High Acid)

a. For acid-tolerant trees and shrubs, provide moss peat, with a pH range of 3.2 to 4.5, coarse fibrous texture, medium-divided sphagnum moss peat or reed-sedge peat.

2.9.7. Manure

a. Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.9.8. Herbicides

a. EPA registered and approved, of type recommended by manufacturer.

2.9.9. Water

a. Potable.

2.10 FERTILIZER FOR LAWNS

2.10.1. Commercial Fertilizer

a. Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:

(1) Composition: Nitrogen 20, phosphorous 16, and potassium 12.
(2) Rate: 1000 lbs. of fertilizer nutrient per acre.

2.11 MULCHES

2.11.1. Organic Mulch

a. Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

(1) Type: Shredded hardwood. (for planting beds)
(2) Type: Grain Straw (for seeded areas at a rate of 4000 lb/acre)

2.11.2. Fiber Mulch

a. Biodegradable dyed-wood cellulose-fiber mulch, nontoxic, free of plant growth- or germination-inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

2.11.3. Non-asphaltic Tackifier

a. Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application, nontoxic and free of plant growth- or germination-inhibitors.

2.12 WEED-CONTROL BARRIERS

2.12.1. Nonwoven Fabric

a. Polypropylene or polyester fabric, 3 oz. per sq. yd. minimum.

2.13 STAKES AND GUYS

2.13.1. Upright and Guy Stakes

a. Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches by length indicated, pointed at one end.

2.13.2. Guy and Tie Wire

a. ASTM A 641, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch in diameter.

2.13.3. Hose Chafing Guard

a. Reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.

2.13.4. Flags

a. Standard surveyor's plastic flagging tape, white, 6 inches long.

2.14 LANDSCAPE EDGINGS

2.14.1. Steel Edging

a. ASTM A 569, rolled edge, standard steel edging, fabricated in sections with loops stamped from or welded to face of sections approximately 30 inches apart to receive stakes.

(1) Edging Size: 3/16 inch wide by 4 inches deep.
(2) Stakes: Tapered steel, 15 inches long.
(3) Accessories: Standard tapered ends, corners, and splicers as required.
(4) Finish: ASTM A 525, G 90 zinc coated.

2.15 MISCELLANEOUS MATERIALS

2.15.1. Trunk-Wrap Tape

a. Two layers of crinkled paper cemented together with bituminous material, 4 inches wide minimum, with stretch factor of 33 percent.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section.
b. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Lay out individual tree and shrub locations and areas for multiple plantings.
b. Stake locations, outline areas, and secure Contracting Officer's acceptance before the start of planting work.
c. Make minor adjustments as may be required.

3.3 PLANTING SOIL PREPARATION

3.3.1. General

a. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
b. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.
c. For tree pit or trench backfill, mix planting soil before backfilling and stockpile at site.
d. For planting beds and lawns, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

3.4 LAWN PLANTING PREPARATION

3.4.1. General

a. Limit subgrade preparation to areas that will be planted in the immediate future.
b. Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous materials.
c. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen.

(1) Allow for sod thickness in areas to be sodded.

d. Preparation of Unchanged Grades: Where lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:

(1) Remove and dispose of existing grass, vegetation, and turf. Do not turn over into soil being prepared for lawns.
(2) Till surface soil to a depth of at least 6 inches. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.
(3) Clean surface soil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
(4) Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Installation.

e. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
f. Remove trash, debris, stones larger than 1-1/2 inches in any dimension, and other objects that may interfere with planting or maintenance operations.
g. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
h. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.5 GROUND COVER AND PLANT BED PREPARATION

3.5.1. General

a. Loosen subgrade of planting bed areas to a minimum depth of 6 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous materials.
b. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.

3.6 EXCAVATION FOR TREES AND SHRUBS

3.6.1. Pits and Trenches

a. Excavate with vertical sides and with bottom of excavation slightly raised at center to assist drainage. Loosen hard subsoil in bottom of excavation.

(1) Balled and Burlapped Trees and Shrubs: Excavate approximately 1-1/2 times as wide as ball diameter and equal to ball depth, plus the following setting layer depth:

(a) Setting Layer: Allow 3 inches of planting soil.

(2) Container-Grown Trees and Shrubs: Excavate to container width and depth, plus the following setting-layer depth:

(a) Setting Layer: Allow 3 inches of planting soil.

3.6.2. Disposal

a. Dispose of subsoil removed from landscape excavations. Do not mix with planting soil or use as backfill.

3.7 PLANTING TREES AND SHRUBS

3.7.1. General

a. Set balled and burlapped stock plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.

(1) Place stock on setting layer of compacted planting soil.
(2) Remove burlap and wire baskets from tops of balls and partially from sides, but do not remove from under balls. Remove pallets, if any, before setting.
(3) Do not use planting stock if ball is cracked or broken before or during planting operation.
(4) Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

b. Set container-grown stock plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.

(1) Carefully remove containers so as not to damage root balls.
(2) Place stock on setting layer of compacted planting soil.
(3) Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

c. Dish and tamp top of backfill to form a 3-inch-high mound around the rim of the pit. Do not cover top of root ball with backfill.
d. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.
e. Inspect tree trunks for injury, improper pruning, and insect infestation and take corrective measures required before wrapping.

3.8 TREE AND SHRUB PRUNING

3.8.1. General

a. Prune, thin, and shape trees and shrubs according to standard horticultural practice.
b. Prune trees to retain required height and spread.
c. Unless otherwise directed, do not cut tree leaders; remove only injured or dead branches from flowering trees.
d. Prune shrubs to retain natural character.
e. Shrub sizes indicated are size after pruning.

3.9 TREE AND SHRUB GUYING AND STAKING

3.9.1. Upright Staking and Guying

a. Stake all trees of 2-inch through 5-inch in caliper.
b. Stake trees of less than 2-inch caliper only as required to prevent wind tip-out.
c. Use a minimum of 2 stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 72 inches above grade.
d. Set vertical stakes and space to avoid penetrating balls or root masses.
e. Support trees with 2 strands of tie wire encased in hose sections at contact points with tree trunk.
f. Allow enough slack to avoid rigid restraint of tree.

3.10 PLANTING GROUND COVER AND PLANTS

3.10.1. General

a. Space ground cover and plants as indicated.
b. Dig holes large enough to allow spreading of roots, and backfill with planting soil.
c. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
d. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.11 MULCHING

3.11.1. General

a. Mulch backfilled surfaces of pits, trenches, planted areas, and other areas indicated.
b. Apply organic mulch the following average thickness of organic mulch and finish level with adjacent finish grades. Do not place mulch against trunks or stems.

(1) Thickness: 3 inches.

3.12 SEEDING NEW LAWNS

3.12.1. General

a. Sow seed with a spreader or a seeding machine.
b. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
c. Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other.
d. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
e. Sow seed at the following rates:

(1) Seeding Rate: 175 lbs. per acre.

f. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.
g. Protect seeded areas against hot, dry weather or drying winds by applying peat mulch within 24 hours after completion of seeding operations.
h. Soak and scatter uniformly to a depth of 3/16 inch thick and roll to a smooth surface.

3.13 HYDROSEEDING NEW LAWNS (Contractor's Option)

3.13.1. Hydroseeding

a. Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.

(1) Mix slurry with non-asphaltic tackifier.
(2) Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1500 lb per acre dry weight but not less than the rate required to obtain specified seed-sowing rate.

3.14 SODDING NEW LAWNS

3.14.1. General

a. Lay sod within 24 hours of cutting.
b. Do not lay sod if dormant or if ground is frozen.
c. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap.
d. Stagger sod strips or pads to offset joints in adjacent courses.
e. Avoid damage to subgrade or sod during installation.
f. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface.
g. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
h. Place or anchor sod as follows on slopes:

(1) Lay sod across angle of slopes exceeding 1:1.
(2) Anchor sod on slopes exceeding 1:4 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

i. Saturate sod with fine water spray within 2 hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below the sod.

3.15 INSTALLATION OF EDGINGS

3.15.1. Steel Edging

a. Install steel edging where indicated according to manufacturer's recommendations.
b. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.

3.16 CLEANUP AND PROTECTION

3.16.1. General

a. During landscaping, keep pavements clean and work area in an orderly condition.
b. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers.
c. Maintain protection during installation and maintenance periods.

d. Treat, repair, or replace damaged landscape work as directed.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

3.17.1. Disposal

a. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Installation.

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END OF SECTION

CONSTRUCTION ISSUE

SECTION 02997

COMMISSIONING SITE CONSTRUCTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
1. Division 2 responsibilities in the commissioning process.
2. Commissioning of Underground Utilities including Water, Sewer and Storm Drainage.

B. Related Sections
1. Section 01810 - Commissioning Requirements.

1.2 DEFINITIONS

A. CA: Commissioning Agent.

B. CO: Contracting Officer.

C. GC: Contractor; General Contractor, not a Subcontractor.

D. O&M: Operations and Maintenance.

E. QC: Contractor's Quality Control Manager.

F. TI: Technical Inspector.

1.3 DESCRIPTION

A. This Section describes commissioning requirements applicable to commissioned items and systems specified in Division 2 to ensure that all systems are operating in a manner consistent with the Contract Documents.

B. Conform to commissioning requirements and the commissioning plan.

1.4 RESPONSIBILITIES

A. Construction and Acceptance Phases
1. Include the cost of commissioning in the contract price.
2. In each purchase order or subcontract written, include requirements for submittal data, O&M data and training.
3. Conduct a commissioning scoping meeting and other meetings necessary to facilitate the Commissioning process.
4. Provide requested documentation to the TI, developed for functional testing procedures.
5. Provide functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
6. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the prefunctional checklists for all commissioned equipment. Submit to QC for review prior to

startup. TI will verify plan for compliance. Refer to Section 01810 for further details related to start-up.

7. During the startup and initial checkout process, execute the prefunctional checklists for all commissioned equipment.
8. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the QC and TI.
9. Correct system deficiencies before functional testing.
10. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
11. Provide all test equipment necessary to fulfill specified testing requirements.
12. Assist the CA and TI in interpreting the monitoring data, as necessary.
13. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, TI and A/E and retest the equipment.
14. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
15. During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).
16. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

B. Operation Manuals shall include:
1. A table of all setpoints and implications when changing them.
2. Schedules.
3. Instructions for operation of each piece of equipment for emergencies.
4. Seasonal adjustment.
5. Startup and shutdown.
6. Instructions for energy savings operations and descriptions of the energy savings strategies in the facility (from O&M Manuals).
7. Recommendations for recommissioning frequency by equipment type.
8. Energy tracking recommendations.

C. Warranty Period
1. Execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
2. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 STARTUP

A. Contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section and in 01810. Division 2 has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the Commissioning Agent, Technical Inspector, or Government.

B. Functional testing will generally begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CO. Beginning system testing before full completion does not relieve the Contractor from fully completing the system, including all prefunctional checklists.

3.2 OPERATION AND MAINTENANCE (O&M) MANUALS

A. The following O&M manual requirements are in addition to O&M manual documentation requirements elsewhere in these specifications.

B. Division 2 shall compile and prepare documentation for all commissioned systems covered in Division 2 and deliver this documentation to the GC for inclusion in the O&M manuals prior to the training of Government personnel.

3.3 TRAINING OF GOVERNMENT PERSONNEL

A. The GC shall be responsible for training coordination and scheduling to ensure that training is completed.

B. The QC shall be responsible for reviewing the content and adequacy of the training of Government personnel for commissioned equipment or systems. TI will verify compliance.

C. The Subcontractor shall have the following training responsibilities for the commissioned systems:
1. Provide the TI with a training plan four weeks before the planned training.
2. Provide designated Government personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of commissioned equipment.
3. Training shall start with classroom sessions followed by hands-on training on each piece of equipment.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
6. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
7. Training shall include:
   a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
   b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
   c. Discussion of relevant health and safety issues and concerns.
   d. Discussion of warranties and guarantees.
   e. Common troubleshooting problems and solutions.
   f. Explanation of information included in the O&M manuals.
   g. Discussion of any peculiarities of equipment installation or operation.
   h. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.

8. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
9. Fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
10. Training shall occur after functional testing is complete, unless approved otherwise by the Project Manager.
11. Minimum Duration of Training. Subcontractor shall provide 8 hours of training.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

(1) Footings.
(2) Foundation walls.
(3) Slabs-on-grade (Do not place floor slabs until building spaces are enclosed and weathertight)
(4) Procedures and timing for saw cutting contraction joints in slabs-on-grade.
(5) Procedures and timing for application of liquid floor treatments.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.
b. Division 3 Section “Special Concrete Floor Finish” for concrete floor slabs receiving a polished finish.
c. Division 9 Sections for floor finishes requiring specially finished cast-in place concrete floor slabs.
d. Division 11 Section "Loading Dock Equipment" for concrete work for recessed loading dock equipment.
e. Division 12 Section "Recessed Floor Mats and Frames" for slab depression for recessed mats and frames.

1.2 REFERENCES

1.2.1. NRMCA

a. National Ready Mixed Concrete Association: Concrete In Practice, Technical Series, 900 Spring Street, Silver Spring, Maryland 20910, (301) 587-1400, ext.101, www.nrmca.org.

1.2.2. PCA

a. Portland Cement Association: Concrete Slab Surface Defects: Causes, Prevention, Repair, 5420 Old Orchard Road, Skokie, IL 60077, (847) 966-6200, www.cement.org.

1.3 DEFINITIONS

1.3.1. Cementitious Materials:

a. Portland cement alone or in combination with one or more of the following: fly ash, subject to compliance with requirements.

1.3.2. Drainage Course:

a. Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

1.4 SUBMITTALS

1.4.1. Product Data

a. Admixtures.
b. Vapor retarders.
c. Floor slab treatments.

1.4.2. Design Mixtures

a. For each concrete mixture. Submit data and test documentation on materials and mixture proportions. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4.3. Ready-Mixed Concrete

a. Furnish batch ticket information, prepared and distributed in accordance with ASTM C 94.
b. Statement of Material Content and Proportions Selected: Prior to actual delivery of concrete, furnish a statement giving the dry masses of cement and saturated surface-dry-masses of fine and coarse aggregate and quantities, type, and name of admixtures (if any) and of water per cubic yard or cubic meter of concrete that will be used in the manufacture of each class of concrete specified. Furnish evidence that the materials to be used and proportions selected will produce concrete of the quality specified.

1.4.4. Shop Drawings

a. Shop and placing drawings that detail fabrication, bending, and placement of steel reinforcement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.4.5. Samples

a. Vapor retarder.

1.4.6. Field Quality-Control Tests and Inspection Reports

1.4.7. Submittal Requirements in ACI 301

a. "Specification for Structural Concrete" Sections 1 through 5

1.4.8. Special Inspection Reports.

1.4.9. Saw-cutting system to be used.

1.4.10. Sustainable Design Submittals:

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each product applied on-site in the interior.

1.4.11. Concrete Placement Plan Drawings.

a. Floor plan of proposed concrete placement in areas receiving special concrete floor finish. Obtain approval of placement plan before concrete is placed.

1.4.12. Submittal List

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Design Mixtures	X	R
1.4.3	Ready-Mixed Concrete	X	R
1.4.4	Shop Drawings	X	R
1.4.5	Samples	X	R
1.4.6	Field Tests and Reports	X	R
1.4.7	ACI Submittals	X	R
1.4.8	Special Inspection Reports	X	R
1.4.9	Saw-cutting System	X	R
1.4.10	Sustainable Design Submittals	S	I
1.4.11	Concrete Placement Plan Drawings	X	R

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

1.5.1. Manufacturer Qualifications

a. A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

(1) Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.5.2. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.5.3. Testing Agency Qualifications

a. An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

(1) Personnel conducting field tests shall be qualified as ACI certified Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
(2) Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

1.5.4. Source Limitations

a. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

1.5.5. ACI Publications (other applicable construction industry standards indicated throughout this Section have the same force and effect as if listed below)

a. Comply with the following unless modified by requirements in the Contract Documents:

(1) ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
(2) ACI 302.1, “Guide for Concrete Floor and Slab Construction.”
(3) ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.5.6. ASTM Publications

a. Comply with the following unless modified by requirements in the Contract Documents (other applicable construction industry standards indicated throughout this Section have the same force and effect as if listed below):

(1) ASTM E 96, “Test Methods for Water Vapor Transmission of Materials.”
(2) ASTM E 1155, “Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers.”
(3) ASTM E 1643, “Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.”
(4) ASTM E 1745, “ Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.”

1.5.7. Special Inspector Qualifications.

a. Special inspections for reinforced concrete shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located. The personnel performing the inspections shall be ICC-certified Reinforced Concrete Special Inspector or an equivalent certification program.

1.5.8. Floor Finisher Qualifications:

a. The concrete floor finishing subcontractor, Lead Finisher and two additional members of the finishing crew, shall be certified under the Concrete Flatwork Finisher Training and Certification Program as granted by the American Concrete Institute.

b. The concrete floor finisher subcontractor shall have experience in finishing interior floors of similar size and scope in at least 5 previous projects.

1.5.9. Preinstallation Conference

a. Conduct conference at Project site to comply with requirements in Division 1 Sections "Coordination" and “Administrative Requirements.”

(1) Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

(a) Contractor's superintendent.
(b) Independent testing agency responsible for concrete design mixtures.
(c) Ready-mix concrete manufacturer.
(d) Concrete subcontractor.
(e) Concrete floor finishing subcontractor
(f) Special concrete floor finish installer (attendance may be telephonically).
(g) Special concrete floor finish system manufacturer (attendance may be telephonically).

(2) Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection. Unacceptable floor slab finishes include blisters, cracking, crazing, curling, delamination, surface discoloration, dusting, efflorescence, popouts, scaling, and spalling. Sources available to the Contractor identifying causes, prevention, and repair of concrete slab surface defects are available from the Portland Cement Association and the National Ready Mix Concrete Association as identified in Paragraph 1.2 “References”.

(3) Review protection precautions relating to the special concrete floor finish system as specified in Division 3 Section “Special Concrete Floor Finish” including, but not limited to, the following:

(a) No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete floor surface. Prevention is therefore essential.
(b) Diaper hydraulic powered equipment to avoid staining concrete.
(c) Do not park vehicles on concrete floor slab. Place drop cloths under vehicles if it is necessary to park vehicles on concrete slab to complete work.
(d) Do not use pipe cutting machines on the concrete floor slab.
(e) To avoid rust staining do not place steel on concrete floor slab.
(f) Do not allow acids and acidic detergents to come into contact with concrete floor slab.
(g) Inform all trades that the concrete floor slab must be protected at all times.
(h) Equip lifts with non-marking tires.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Steel Reinforcement

a. Contain no less than 80% of Post-consumer recycled content and 10% pre-consumer recycled content.

2.1.3. Concrete Materials

a. Contain Pre-consumer recycled content.
b. 90% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.4. Floor and Slab Treatments

a. Clear wood finishes, floor coatings, stains, primers & shellacs – Interior, On-Site Applied Only:
(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1113, Architectural Coatings, January 1, 2004.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 DRAINAGE COURSE BENEATH SLAB-ON-GRADE

2.3.1. Drainage Course

a. Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.4 FORM-FACING MATERIALS

2.4.1. Smooth-Formed Finished Concrete

a. Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

(1) Plywood, metal, or other approved panel materials.

2.4.2. Rough-Formed Finished Concrete

a. Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.4.3. Form-Release Agent

a. Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

(1) Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.4.4. Form Ties

a. Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

2.5 STEEL REINFORCEMENT

2.5.1. Reinforcing Bars

a. ASTM A 615/A 615M, Grade 60, deformed.

2.5.2. Plain-Steel Wire

a. ASTM A 82, as drawn.

2.6 CONCRETE MATERIALS

2.6.1. Cementitious Material

a. Portland Cement: ASTM C 150, Type I, of the same type, brand, and source, throughout Project:

2.6.2. Normal-Weight Aggregates

a. ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
b. Maximum Coarse-Aggregate Size: As indicated.
c. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

2.6.3. Water

a. ASTM C 94/C 94M and potable.

2.6.4. Fly Ash

a. ASTM C 618, Type F.

2.7 ADMIXTURES

2.7.1. General

a. Do not use admixtures unless specifically indicated or approved by Contracting Officer.

2.7.2. Air-Entraining Admixture

a. ASTM C 260.

2.8 VAPOR RETARDERS

2.8.1. Vapor Retarder

a. Vapor Retarder: ASTM E 1745, Class B or A, with the following minimum criteria:

(1) Thickness: Minimum 15 mil per ACI 302.1R, section 3.2.3.
(2) Water-vapor permeance: Maximum 0.3 Perms as tested per ASTM E 96.
(3) Basis-of-Design Products:

(a) “Stego Wrap” (15 mil) Vapor Barrier by Stego Industries LLC.
(b) “Griffolyn Vaporguard” by Reef Industries.
(c) “Soco-Shield” VB-15 or PL-15 by Socopac Company.
(d) “Plasmatic Core” pre-molded membrane by W.R. Meadows.

2.8.2. Accessories

a. Seam Tape: Minimum 4-inch width, of high density polyethylene with pressure sensitive adhesive on one side, or as recommended by the product manufacturer.
b. Barrier Penetration Boots: Constructed of the vapor retarder product or as recommended by the product manufacturer.

2.9 FLOOR AND SLAB TREATMENTS

2.9.1. Acrylic Liquid Floor Sealing Treatment

a. Waterborne solution, VOC compliant, 15% to 20% total solids, that drys to form a clear, glossy, protective film that seals concrete surfaces.
b. Basis-of-Design Products:

(1) Dress & Seal WB; L&M Construction Chemicals, Inc.
(2) Aqua Cure VOX; Euclid Chemical Co.
(3) Kure-N-Seal W; Sonneborn, Div. of ChemRex, Inc.

2.10 CURING MATERIALS

2.10.1. Evaporation Retarder
a. Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

b. Basis-of-Design Products.

(1) ChemMasters; Spray-Film.
(2) Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior company; Aquafilm.
(3) Dayton Superior Corporation; Sure Film.

2.10.2. Absorptive Cover Curing Materials

a. AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

2.10.3. Moisture-Retaining Cover

a. ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

2.10.4. Potable Water.

2.11 RELATED MATERIALS

2.11.1. Expansion- and Isolation-Joint-Filler Strips

a. ASTM D 1751, asphalt-saturated cellulosic fiber.

2.11.2. Semirigid Polyurea Joint Filler

a. Rapid setting, 100% solids, flexible, two part polyurea joint filler with a Type A Shore durometer hardness of at least 85 per ASTM D 2240 when cured. Designed to fill and protect joints in industrial floors that are subject to traffic such as trucks, forklifts or steel wheeled carts.
b. Color: Manufacturer's standard gray.
c. Basis-of-Design Product: Advanced Floor Products, Inc.; Crete-Fill Pro 85; (773) 622-2444 and www.retroplatesystem.com.
d. Performance Criteria:

(1) Tensile Strength: 1160psi per ASTM D 412-98.
(2) Can set rapidly and consistently in application temperatures ranging from minus 40 degrees F to 130 degrees F.
e. Elongation: Minimum of 300%.

2.11.3. Saw-cutting System

a. Power saw equipped with shatter-proof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface before concrete develops random contraction cracks. Use the following saw cutting system appropriate to procedures and timing for saw cutting contraction joints in slabs-on-grade.

(1) Early-Entry Dry-Cut Saws

(a) Basis-of-Design Products. "Soff-cut" early drycut saws by Soff-Cut International, Inc.

(2) Conventional Saws.

b. Saw-Cut Control Joint Dust Collection

(1) Connect a dust collection system directly to each saw being used.

(a) Basis-of-Design: ProVac Dust Collection System PVG-55 by Glad Tech Inc.

2.12 CONCRETE MIXTURES, GENERAL

2.12.1. Design Mixture Preparation

a. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

(1) Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

(2) Use Option A, ASTM C 94, as a basis for determining the proportions of the concrete to produce the required quality.

2.12.2. Cementitious Materials

a. Limit percent by weight of cementitious materials other than Portland cement in concrete as follows:

(1) Fly Ash; 5 percent maximum in floors receiving special concrete floor finish, 15 percent maximum elsewhere.

2.12.3. Concrete Mixtures

a. Subject to compliance with requirements, proportion normal-weight concrete mixtures and provide floor and slab final finishes for each mix type in accordance with the Concrete Mixture Schedule at the end of Part 3.

2.12.4. Chloride-Ion Content

a. Limit water-soluble, in hardened concrete to 0.30 percent by weight of cement.

2.12.5. Admixtures:

a. Where indicated or approved, use admixtures according to manufacturer's written instructions.

2.13 FABRICATING REINFORCEMENT

Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

2.14.1. Ready-Mixed Concrete

a. Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

(1) When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

3.1.1. General

a. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
b. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and ACI 301 except as specified herein.
c. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

(1) Class A, 1/8 inch for smooth-formed finished surfaces.
(2) Class C, ½ inch for rough-formed finished surfaces.

d. Construct forms tight enough to prevent loss of concrete mortar.
e. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

(1) Install keyways, reglets, recesses, and the like, for easy removal.
(2) Do not use rust-stained steel form-facing material.

f. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
g. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
h. Chamfer exterior corners and edges of permanently exposed concrete.
i. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
j. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
k. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
l. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
m. Provide slab side forms, of form materials specified, full depth, with beveled, level, and smooth top surface for all slabs where SOV is greater than FF 35 / FL 25.
n. Provide slab side forms such that by placing a 10-foot straightedge, form does not exceed 1/8 inch variation.

3.2 EMBEDDED ITEMS

3.2.1. General

a. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

(1) Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
(2) Install loading dock leveler pit framing angles and anchors in accordance with dock leveler manufacturer's written instructions.

3.3 REMOVING AND REUSING FORMS

3.3.1. General

a. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
b. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

3.3.2. Reused Forms

a. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
b. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets.

3.4 VAPOR RETARDERS

3.4.1. Vapor Retarder Installation

a. Place, protect, and repair vapor-retarders under the prepared aggregate base course material in accordance with ACI 302.1R and ASTM E 1643, as applicable.
b. Place the vapor retarder sheeting under the prepared aggregate base course material with the longest dimension parallel with the direction of the concrete slab.
c. Lap joints 6 inches and seal with seam tape (or manufacturer's recommended adhesive).
d. Lap vapor retarder over footings or onto foundation walls, or both, and seal around all penetrations such as utilities and columns in order to create a monolithic membrane between the moisture source below the slab and the slab.

3.4.2. Vapor Retarder Protection:

a. Take precautions to protect vapor retarder from damage during installation of utilities, and during aggregate base course placement.

b. Avoid use of stakes driven through the retarder.

(1) Inspect and repair all punctures, damage or opened seams in the membrane retarder immediately prior to subsequent placement of aggregate base course.

3.5 DRAINAGE COURSE MATERIAL PLACEMENT OVER VAPOR RETARDER

a. Inspect and repair all punctures, damage or opened seams in the membrane retarder immediately prior to drainage course placement.
b. Place 4 inches of drainage course on vapor retarder free of mud, frost, snow, or ice.

(1) Place drainage course 6 inches or less in compacted thickness in a single layer.
(2) Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.

c. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.6 STEEL REINFORCEMENT

3.6.1. General

a. Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
b. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
c. Use concrete brick type reinforcing bar supports or steel bar support chairs.
d. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
e. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

(1) For slabs-on-grade space reinforcing bar supports not to exceed 4 feet on center in each direction.

f. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.7 JOINTS

3.7.1. General

a. Construct joints true to line with faces perpendicular to surface plane of concrete.
b. Provide construction, isolation and contraction joints as indicated on Drawings and as noted below.
c. Bulkheads for construction joints shall be 1-1/2 inch minimum lumber. Do not use permanent preformed metal bulkheads.
d. Provide bulkheads full depth of member.
e. Space joints to allow one continuous placement between bulkheads.
f. Unless otherwise shown on drawings, maximum spacing between contraction, construction, or isolation joints in slabs on grade shall be lesser of the following:

(1) 36 x slab thickness in inches.

(2) Length-to-width ratio of 1-1/2: 1.

g. Unless otherwise shown on the Drawings, do not extend reinforcement, corner protection angles, bars or other fixed metal items through construction joints in slabs on grade or pavements or through joints between slabs on grade and vertical surfaces.

3.7.2. Construction Joints

a. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Contracting Officer.
b. Do not use keyed joints in floors.

3.7.3. Contraction Joints (Shrinkage/Crack Control Joints) in Slabs-on-Grade

a. Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints as follows:

(1) Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete before concrete starts to cool, when cutting action will not tear, abrade, or otherwise damage surface, and before concrete develops random contraction cracks.

(a) Early-Entry Dry-Cut Saw Cutting: Saw cut slab within 1 hour in hot weather to 2 hours in cold weather after completing finishing of the slab in that joint location. Sawcut depth one quarter of the slab depth with 1 inch minimum depth to 1.5 inch maximum depth. Clean out joints with a diamond impregnated saw blade equipped with a dustless vacuum system to ensure sides of joint walls are clean so that joint filler can bond with them.

(b) Conventional Saw Cutting: Saw cut slab within 4 hours in hot weather to 12 hours in cold weather after the slab has been finished in an area. Depth of saw cut using conventional saw shall be at one quarter of slab depth with 1 inch minimum depth to 1.5 inch maximum depth.

3.7.4. Isolation Joints in Slabs-on-Grade

a. After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
b. Extend joint-filler strips full width and depth of joint, terminating top of strip below finished concrete surface as indicated.
c. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
d. Form isolation joints of preformed joint-filler strips (PMEJ) where indicated.

(1) Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
(2) Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

3.8 CONCRETE PLACEMENT

3.8.1. General

a. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
b. Before test sampling and placing concrete, no water shall be added to the design mix after leaving the batch plant without approval from the Contracting Officer.
c. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

(1) Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
(2) Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
(3) Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

d. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

(1) Slab on Grade Thickness: Plus (+) as required to conform to slab finished surface flatness and levelness tolerances specified, and minus (-) ¼ inch, with the average of all thickness samples equal to or greater than the specified slab thickness.
(2) Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
(3) Maintain reinforcement in position on chairs during concrete placement.
(4) Screed slab surfaces with a straightedge and strike off to correct elevations.
(5) Slope surfaces uniformly to drains where required.
(6) Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.8.2. Cold-Weather Placement

a. Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
b. When average high and low temperature is expected to fall below 40 degrees F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
c. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
d. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
e. Immediately before placing concrete, metal embedments and other metal items in contact with concrete shall be at temperature above 32 degrees F if one or more of the following conditions are met:

(1) Metal item weighs more than 15 pounds per lineal foot.
(2) Metal item is compact and weighs more than 50 pounds total.
(3) Items noted on drawings

f. Subgrade shall be thawed to depth of 12 inches immediately before placing concrete.

g. Measure and record concrete temperature during protection period in each placement at regular time intervals, but not less than 3 times per 24-hour period.

h. Do not place concrete on subgrade, subbase, base or forms that have a temperature less than 35 degrees F. Warm subgrade, subbase, base, or deck to a temperature of 35 degrees F or more, but not more than 65 degrees F.

i. Do not use combustion heaters during first 48 hours without precautions to prevent exposure of concrete to exhaust gases containing carbon dioxide and carbon monoxide.

3.8.3. Hot-Weather Placement

a. Comply with ACI 301 and as follows:

(1) Maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

(2) Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

(3) Concreting in Hot, Dry or Windy Weather:

(a) When the concrete's rate of evaporation exceeds 0.2 pounds per square foot per hour, as determined by analysis, or any combination of concrete materials and weather conditions are favorable for the formation of plastic shrinkage cracks, the contractor shall employ all necessary precautions to avoid cracking.

(b) Maintain an accurate reading thermometer at the job site to check temperature of concrete

(c) Reject concrete based on following criteria: For slabs, reject concrete if its temperature before placement is 95 degrees F or above unless otherwise approved by Contracting Officer. During hot weather, mixing and delivery (discharge) time shall be shorter than specified in ASTM C94 as follows unless otherwise approved by the Contracting Officer:

1) When air temperature is between 85 degrees F and 90 degrees F, reduce allowable mixing and delivery time from 90 minutes to 75 minutes.

2) When air temperature is over 95 degrees F, reduce allowable mixing and delivery time to 60 minutes.

(d) Do not place concrete when forms, subgrade, subbase or reinforcing bars are more than 120 degrees F or the temperature differential between the forms, subbase, base, or reinforcing bars and concrete will create conditions favorable for settlement cracks or thermal cracking.

(e) Cool with water or water-soaked burlap as necessary, but allow no standing water on surface on which concrete is placed.

3.8.4. Precipitation Protection: Protect surfaces of exposed concrete from precipitation until adequate strength is gained to prevent damage.

3.8.5. Enclosed Environment: Limit internal combustion sources to prevent carbonation of slab surface.

3.9 FINISHING FORMED SURFACES

3.9.1. Rough-Formed Finish

a. As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

(1) Apply to concrete surfaces not exposed to public view.

3.9.2. Smooth-Formed Finish

a. As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

(1) Apply to concrete surfaces exposed to public view.

3.9.3. Related Unformed Surfaces

a. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

3.10.1. General

a. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces.

(1) Subject to compliance with requirements, and recommendations of floor surfacing materials manufactures, provide floor and slab final finishes indicated for each floor and slab Mix Type in the Concrete Mixture Schedule at the end of Part 3.

b. Do not place floor slabs until building spaces are enclosed and weathertight.
c. Do not add water to slab surface during finishing operations.
d. Do not add cement to slab surface during finishing operations.
e. Perform no finishing operation while water is present on slab surface.
f. If concrete is firm enough for floating but substantial amount of bleed water is still on surface, water may be removed by one of the following methods:

(1) Fans or blower heaters, provided that the airflow does not dry, dust, or crust the surface or cause cracking.
(2) If concrete surface is stiff enough to not be damaged, rubber hose may be dragged slowly over surface one time without disturbing surface.

g. Initial Leveling: Complete bull floating, darbying and straight-edging before any bleed water is present on slab surface.

h. Hand and Power Floating:

(1) Do not start floating until following conditions are met:

(a) Bleeding is finished.
(b) Bleed water is gone, including water sheen on slab surface.
(c) Concrete will sustain the weight of finishers without creating more than 1/8 to 1/4 inch indentations.
(d) Mortar is not thrown by rotating blades of power float.

(2) Do not use following tools for floating:

(a) Power troweling machines with trowel blades.
(b) Fresno or other type of wide metal trowel.
(c) Power floating machine with water attachment for wetting concrete.

(3) Float three times minimum with each floating at right angles to previous floating, and final pass at 45 degrees to previous pass.

i. Normal Trowel Finish:

(1) Hand or power float floor before starting troweling.
(2) Plastic (Nylon, etc.) blades will not permitted unless otherwise specified.
(3) For first troweling, keep blade as flat as possible and use low speed, minimizing "washboard" or "chatter marks" and "pitting".
(4) Trowel two times minimum with first two trowelings at right angles. Some burn marks are acceptable. Cease troweling before trowel blades scratch surface.
(5) Allow time between trowelings for concrete to stiffen and water sheen to disappear.
(6) Do not add water to slab surface during troweling.

(a) Do not ride trowels on existing slabs. Trowels shall be carried off of slab surfaces. When parking power trowels on fresh concrete, place on top of plywood or spray area with evaporation retarder before placing trowel on top of slab.

3.10.2. Hard Trowel Finish:

a. After applying normal trowel finish, apply hard trowel finish by hand and power-driven trowel. Power trowel a minimum of three times and finally hand trowel to render finished surface essentially free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings. Unless otherwise indicated follow the finishing operations described in ACI 302.1R, for Floor Classification, Class 5.

(1) Apply a hard trowel finish to surfaces indicated
(2) Where “Special Concrete Floor Finish” is indicated follow the finishing operations described in ACI 302.1R, for Floor Classification, Class 9 and as follows:

(a) Construct slabs in long strips less than 20 feet in width.
(b) Adjust the slump on site to within plus or minus ½ inch of the target slump.
(c) Provide concrete with sufficient slump at the point of deposit to permit use of a modified highway straightedge to close the floor surface without difficulty after the initial strikeoff.
(d) The “window of finishability” shall be sufficient to perform necessary finishing operations.
(e) Use enough trucks to ensure an uninterrupted concrete supply.

3.10.3. Floor Slab Finish Tolerances

a. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
(1) Unless otherwise indicated: Specified Overall Values (SOV) of flatness, F(F) 35; and of levelness, F(L) 25; with Minimum Local Values (MLV) of flatness, F(F) 26; and of levelness, F(L) 19 tolerance for troweled floors in accordance with ACI 117. An ACI certified Flatwork Finisher will not be required for finishing of these floors.

(2) Where "Special Concrete Floor Finish" is indicated: Specified Overall Values (SOV) of flatness, F(F) 50 and of levelness, F(L) 40; with Minimum Local Values (MLV) of flatness, F(F) 38; and of levelness, F(L) 26 tolerance for troweled floors in accordance with ACI 117.

(3) Remedies for out-of-tolerance work:

(a) Remove and replace slabs-on-grade measuring below either (or both) of specified minimum local F-numbers. Do not use repair materials specified in Part 2 to correct out of tolerance work.
(b) Remove and replace slab-on-grade areas containing craze cracking.
(c) Remedy other out-of-tolerance work as required by Contracting Officer.
(d) Slab areas requiring removal shall be removed to established joint pattern indicated on drawings.

3.10.4. Broom Finish

a. Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
b. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.11 MISCELLANEOUS CONCRETE ITEMS

3.11.1. Filling In

a. Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.11.2. Curbs

a. Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.11.3. Equipment Bases and Foundations

a. Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.12 CONCRETE PROTECTING AND CURING

3.12.1. General

a. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
b. Start curing as soon as concrete surface will not be damaged by curing operations.
c. Continuously cure concrete for at least 7 consecutive days.
d. During curing period, do not allow any part of the concrete to become dry.
e. Do not use polyethylene sheets on exposed interior floors.

3.12.2. Evaporation Retarder

a. Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

b. Do not use evaporation retarder on floor slabs receiving floor finish specified in Division 3 Section "Special Concrete Floor Finish" unless approved by special concrete floor finish manufacturer

3.12.3. Formed Surfaces

a. Cure formed concrete surfaces. Keep forms in contact with concrete wet during curing period unless type of form is impervious to water, such as metal or fiberglass. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period with other approved methods.

3.12.4. Unformed Surfaces

a. Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, and other surfaces.

3.12.5. Curing

a. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

(1) Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

(a) Water.
(b) Continuous water-fog spray.
(c) Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

(2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.13 JOINT FILLING OF EXPOSED CONCRETE SLAB-ON-GRADE FLOORS

3.13.1. General

a. Install semirigid polyurea joint filler only in joints of concrete slab-on-grade floors that are indicated to remain exposed. Do not fill joints of floors receiving special concrete floor finish, refer to Division 3 Section "Special Concrete Floor Finish," or finished flooring, refer to Division 9 Sections for floor finishes.

b. Prepare, clean, and install semirigid joint filler according to manufacturer's written instructions.

c. Defer joint filling until concrete has aged for time period recommended by joint filler manufacturer. Do not fill joints until construction traffic has permanently ceased.

d. Remove all foreign material from joint substrates that could interfere with adhesion of joint filler, including dust, paints (except for permanent, protective coatings tested and approved for filler adhesion and compatibility by joint filler manufacturer), old joint sealants and fillers, grease, dirt, debris, saw cuttings, and sealers from joints; leave contact faces of joint clean and dry.

3.13.2. Installation

a. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints in accordance with manufacturer's written recommendations.. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 LIQUID FLOOR TREATMENTS

3.14.1. Acrylic Liquid Floor Sealing Treatment

3.14.2. Apply two coats of sealer in accordance with manufacturer's recommendations. Apply first coat of sealer after concrete has cured to the extent required by the floor sealer manufacturer. Apply second coat of sealer just before completion of project.

3.15 CONCRETE SURFACE REPAIRS

3.15.1. Defective Concrete

a. Repair and patch defective areas when approved by Contracting Officer. Remove and replace concrete that cannot be repaired and patched to Contracting Officer's approval.

3.15.2. Patching Mortar

a. Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

3.15.3. Repairing Formed Surfaces

a. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

(1) Immediately after form removal, cut out honeycombs, rock pockets, and voids more than ½ inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

(2) Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

(3) Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Contracting Officer.

3.16 FIELD QUALITY CONTROL

3.16.1. Testing and Inspecting

a. The Contractor shall engage a testing agency to perform concrete tests.

b. The Contractor shall employ a concrete special inspector to perform special inspections.

3.16.2. Inspections

a. The inspection program by the Special Inspector shall comply with Table 1704.4 of the 2009 International Building Code.

3.16.3. Concrete Tests

a. Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
b. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
c. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
d. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
e. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
f. Compression Test Specimens: ASTM C 31/C 31M.

(1) Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

g. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

(1) Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
(2) A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

h. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
i. Test results shall be reported in writing to Contracting Officer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
j. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Contracting Officer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Contracting Officer.
k. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

(1) Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

3.17 Floor Flatness F(F)and Levelness F(L)

a. The Contractor shall engage a testing agency to perform floor slab flatness and levelness testing.
b. Test floor slab finished surface areas for flatness and levelness in accordance with ASTM E 1155 within 72 hours of finishing.
c. F-Number requirements shall be as follows for all interior floor slabs.

(1) Slabs on Grade: F(F)/F(L) minimum overall for composite of measured values (SOV) for entire day's concrete placement; F(F)/F(L) minimum for any individual floor section (MLV) as specified in Finishing Floors And Slabs article in Part 3 above.
(2) A test section shall consist of any subdivision of a test surface satisfying the following criteria:

(a) No test section shall measure less than 8 feet on a side, nor comprise an area less than 320 square feet.
(b) No portion of the test surface shall be associated with more than one test section.
(c) When testing a concrete floor no test section boundary shall cross any construction joint.
(d) No sample measurement line shall measure less than 11 feet in length.
(e) No portion of any sample measurement line shall fall within 2 feet of any slab boundary, construction joint, isolation joint, block-out, penetration, or other similar discontinuity (Exception: Shrinkage crack control joints formed either by partial depth saw cuts or by partial depth inserts shall be ignored).

(3) Complete testing, identify defective areas, and submit written report within 24 hours after testing.

CONCRETE MIXTURE SCHEDULE

Mix Type	Use	fc Min at 28 Days, psi	Agg Size Max[a] inches	Slump Limit, inches	w/c Ratio Max	Air Content, percent	Floor/Slab Final Finish
1	Footings	3000	1	4	0.68	None	NA
2	Foundation Walls Not Subject to Freezing and Thawing	4000	1	4	0.48	None	NA
3	Foundation Walls Subject to Freezing and Thawing - Retaining Walls	4000	1	4	0.48	5.5	NA
4	Interior Slabs-on-Grade Unless Otherwise Indicated, Floor Classification 5	4000	1	4	0.47 to 0.53	None	Hard trowel finish
5	Interior Slabs-on-Grade Slab Special Concrete Floor Finish, Floor Classification 9	4000	1	4	0.47 to 0.53	None	Hard trowel finish
6	Freezer Floor	4000	1	4	0.45	None	Hard trowel finish
7	Interior Miscellaneous Concrete, Non-Structural, Exposed Surface	2500	1	4	0.47 to 0.53	None	Hard trowel finish
8	Interior Equipment Pads, Non-Structural, Exposed Surface	2500	1	4	0.47 to 0.53	None	Hard trowel finish
9	Exterior Miscellaneous Concrete, Exposed Surface	4000	1	4	0.40	6	Broom finish
10	Exterior Equipment Pads, Exposed Surface	4000	1	4	0.40	6	Broom finish

Concrete Mixture Schedule Notes:

a. Maximum size of coarse aggregates: Comply with ACI 301 for minimum clearance between reinforcing bars, sides of forms, and slab or topping thickness (except in unbonded topping maximum aggregate size shall not exceed one-quarter topping thickness).

NA: Not applicable.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 03305

INSULATING CONCRETE FREEZER FLOORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Cast-in-place concrete floors on grade under cold storage room freezers.

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements."
b. Division 3 Section "Cast-in-Place Concrete" for vapor retarders.

1.2 SUBMITTALS

1.2.1. General

a. Provide submittals specified in Division 3 Section “Cast-In-Place Concrete” applicable to insulating concrete freezer floors

1.2.2. Sustainable Design Submittals:

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit Vendor’s invoice for all wood materials and all wood-containing materials.
(1) Materials to be identified on a line-item basis with individual cost and FSC type and content amount indicated on each line.
(2) Vendor’s FSC COC certificate number to be included on the invoice.
e. Submit a letter from the wood material Vendors stating the products provided are FSC Pure, FSC Mixed, or FSC Mixed [NN]%.
f. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.2	Sustainable Design Submittals	S	I

S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

Comply with quality assurance provisions of Division 3 Section "Cast-In-Place Concrete" for cast-in-place concrete

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Wood Blocking

a. All wood materials or wood containing materials permanently installed in the building will be Forest Stewardship Council (FSC) Certified and purchased from an FSC Certified Vendor.

2.1.3. Drainage Fill
a. To contain recycled content.
b. 100% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.2 MATERIALS

2.2.1. Drainage Fill

a. Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.2.2. Extruded-Polystyrene Board Insulation

a. Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C 578 for type and with other requirements indicated below:

(1) Type IV, 1.60-lb/cu. Ft. minimum density; 5.00 R-value of 1 inch thickness at mean temperature of 75 degrees Fahrenheit; 25 psi compressive resistance, unless otherwise indicated.

2.2.3. Wood Blocking

a. Provide either of the following:

(1) Wood-preservative-treated materials in accordance with requirements specified in Division 6 Section "Miscellaneous Carpentry."
(2) Garden Grade Redwood: Construction Heart or Merchantable Heart, vertical or flat grain, seasoned or unseasoned, surfaced or unsurfaced texture.

2.2.4. Vent Pipe and Fittings

a. For perforated-wall pipes and fittings 4 inches in diameter: PVC sewer pipe, ASTM D 2729, bell-and-spigot ends, for loose joints.
b. For solid-wall pipes and fittings: PVC sewer pipe, ASTM D 3034, SDR 35, bell-and-spigot ends, for gasketed joints.

2.2.5. Wire Cloth

a. Plain weave, No. 4 square mesh (1/4 inch center to center of wires), 0.120 inch (11 ga.) diameter wire, stainless steel, Type 304, mill finish.

PART 3 - EXECUTION

3.1 INSTALLATION OF VENT PIPE

3.1.1. General

a. Excavate for underfloor vent system after subgrade material has been compacted. Grade bottom of excavation to required elevation and compact to a firm, solid bed for vent system.
b. Install drainage fill to elevations indicated.
c. Install piping according to ASTM D 2321, unless otherwise indicated.
d. Join non-perforated pipe and fittings according to ASTM D 3034 with solvent cement according to ASTM D 2321.Lay perforated vent pipe solidly bedded in drainage fill material. Provide full bearing for each pipe section throughout its length to true grades and alignment. Lay perforated pipe with perforations down.
e. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected.
f. Cap open ends with wire cloth secured to pipe.

3.2 INSTALLATION OF INSULATING CONCRETE FREEZER FLOORS

3.2.1. General

a. Place drainage fill material under concrete slabs and around vent pipes.
b. Install vapor retarder over drainage fill material. Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions. Maintain continuity of retarder. Fully seal all seams. Repair rips and tears that occur prior to placing concrete.
c. Install concrete sub-slab over vapor retarder. Float finish sub-slab in accordance with requirements under Division 3 Section "Cast-In-Place Concrete" for interior sub-slabs on grade.

d. Install wood blocking at perimeter of freezer floor as indicated.
e. Install insulation over sub-slab in multiple layers of 2 inches thick each; stagger joints.
f. Install vapor retarder over insulation and up face of wood blocking as indicated. Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions. Maintain continuity of retarder. Fully seal all seams. Repair rips and tears that occur prior to placing concrete.
g. Install concrete freezer floor slab over vapor retarder. Trowel finish freezer floor slab and cure in accordance with requirements under Division 3 Section “Cast-In-Place Concrete” for freezer floor slab.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 03361

SPECIAL CONCRETE FLOOR FINISH

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. General

a. Work in this section applies to the mechanical polishing of interior concrete floor surfaces. Verify flatness and levelness of concrete slabs meet or exceed Specified Overall Values (SOV) of flatness, F(F) 50 and of levelness, F(L) 40; with Minimum Local Values (MLV) of flatness, F(F) 38; and of levelness, F(L) 26. Do not proceed until unsatisfactory conditions are corrected. Floor grinding and polishing shall be started using a metal disc, as needed to remove all low spots and trowel marks. No low spots or trowel marks are to be left in the slab. A concrete grinding machine with planetary or counter-rotating heads must be used. Use hand grinders and burnishers along edges and other areas of floor slab, exposed to view, that are not reachable using a planetary floor grinder.

1.1.2. Section Includes

a. Concrete floor polishing system:

(1) Surface preparation.
(2) Densifying agent.
(3) Polishing System.
(4) Stain protection.
(5) Joint filler.

1.1.3. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”
b. Division 3 Section “Cast-In-Place Concrete” for concrete floor slab formwork, reinforcement, concrete materials, mixture design, placement procedures, flatness and levelness, and trowel finishes.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product and system indicated.

(1) Submit manufacturer's polishing system specifications.
(2) Submit products to be provided, giving manufacturer's name and product name for the specified materials proposed to be provided under this section
(3) Submit manufacturer's recommended installation procedures; which when approved by the Contracting Officer, will become the basis for accepting or rejecting actual installation procedures used on the work.

(a) Include proposed grinding equipment, vacuum systems, and diamond tooling for approval.

(4) Submit technical data sheet giving descriptive data, curing time, and application requirements.

1.2.2. Qualification Data

a. For Special Concrete Floor Finish System manufacturer.
b. For Installer of concrete floor finish including field supervisors and floor finish workers.
c. Provide Installer training certifications

1.2.3. Maintenance Data and Repair Data

a. Provide two copies of the recommended maintenance and repair instructions for the installed floor system.

1.2.4. Installation Procedures

a. Provide two copies of the recommended installation procedures for the installed floor system.

1.2.5. Installer Qualification Data

a. Provide two copies of the Installer qualifications including project references as indicated in paragraphs 1.4.1 and 1.6.3.

1.2.6. Sustainable Design Submittals:
a. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each product applied on-site in the interior.

1.2.7. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Qualification Data (Paragraph 1.4.2)	X	R
1.2.3	Maintenance Data and Repair Data	X	I
1.2.4	Submit manufacturer's recommended installation procedures	X	R
1.2.5	Installer Qualification Data / Project References (See Paragraph 1.4.1 and 1.6.3)	X	R

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 EXTRA STOCK

1.3.1. Repair Materials

a. Polishing contractor shall furnish 5 gallons of the stain blocker and repair instructions to the technical inspector for future repair by the Government. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. A qualified firm that is regularly engaged in the installation of polished concrete floor system with a minimum of 3 years experience with proposed system. Contractor shall furnish documentation regarding the successful completion of a minimum of five projects with proposed system on projects of similar magnitude and complexity. The installer must have been certified in writing by the special concrete floor finish manufacturer within 12 months prior to start of this project, certifying that the installer is:

(1) Current on the latest application means and methods of special concrete floor finish.
(2) Eligible to receive manufacturer's special warranty.

b. The special concrete finish manufacturer shall certify, in writing, that the installer designated for this project is qualified for the scope of this project and has qualified personnel to perform the work.

1.4.2. Special Concrete Floor Finish System Manufacturer's Qualifications

a. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.

1.4.3. Source Limitations

a. Obtain each type of material for special concrete floor finish system from one source approved by special concrete floor finish system manufacturer with resources to provide materials of consistent quality in appearance and physical properties.

1.4.4. Mockups

a. Provide benchmark sample of special concrete floor finish system to verify finish indicated and to demonstrate aesthetic effects and set quality standards for materials and execution, i.e., typical joints, surface finish, color variation (if any), and standard of workmanship.

(1) Provide mock-up of approximately 100 square feet at location directed by the Contracting Officer.
(2) Notify Contracting Officer and special concrete floor finish manufacturer seven days in advance of date and time when mock-up will be constructed.
(3) Obtain from the Contracting Officer approval of mock-up before starting application of special concrete floor finish.
(4) If the Contracting Officer determines that mock-up does not meet requirements, re-polish floor sample until mock-up is approved.
(5) Maintain mock-up during construction in an undisturbed condition as a standard for judging the completed work.
(6) Approved mock-up may become part of the completed work if undisturbed at time of substantial completion.
(7) Apply benchmark sample after permanent lighting and other environmental services have been activated.

1.4.5. Pre-Pour and Preinstallation Conferences

a. The polishing contractor shall participate telephonically before the placement of the concrete slab related to this section with the general contractor, technical inspector, and concrete finishing contractor to review requirements necessary for a successful polished floor surface.
b. The polishing contractor shall also conduct a conference at the Project site to comply with requirements in Division 1 Section "Coordination."
c. Include Contracting Officer, Contractor, Installer, Concrete Subcontractor, and Special Concrete Floor Finish System Manufacturer's representative to establish guidelines and expectations for finished concrete work including floor flatness, levelness, and finish appearance of troweled floor slab. Unacceptable finishes include blisters, ghosting, cracking, crazing, curling, delamination, surface discoloration, dusting, efflorescence, popouts, scaling, and spalling. Review methods and procedures related to the special concrete floor finish system including, but not limited to, the following protection precautions:

(1) No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete floor surface. Prevention is therefore essential.
(2) Diaper hydraulic powered equipment to avoid staining concrete.
(3) Do not park vehicles on concrete floor slab. Place drop cloths under vehicles if it is necessary to park vehicles on concrete slab to complete work.
(4) Do not use pipe cutting machines on the concrete floor slab.
(5) To avoid rust staining do not place steel on concrete floor slab.
(6) Do not allow acids and acidic detergents to come into contact with concrete floor slab.
(7) Inform all trades that the concrete floor slab must be protected at all times.
(8) Equip lifts with non-marking tires.
(9) Do not use poly sheeting PVC or plastic protection sheets as cover or protection of finished floor.

1.5 DELIVERY, STORAGE AND HANDLING

Deliver materials in original containers, with seals unbroken, bearing manufacturer labels indicating brand name and directions for storage. Dispense special concrete finish material from factory numbered and sealed containers. Maintain record of container numbers.

1.6 PROJECT CONDITIONS

1.6.1. General

a. Close spaces to traffic during special concrete floor finish system application.

1.6.2. Environmental Limitations

a. Comply with special concrete floor finish system manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting special concrete floor finish system application.

1.6.3. Grinding Operations

a. Planetary or counter rotating 3 head and 4 head variable speed floor grinder. Minimum size of grinding head shall be 32-inch diameter. Tilt-back machines shall be used for grinding and polishing operations.
b. Dust extraction system for above grinders incorporating HEPA filters.
c. Protect adjacent construction from detrimental effects of grinding operations.
d. Hand or edge grinders with dust extraction or dust suppression attachment.

e. Grinding heads must include both metal bonded diamonds and resin bonded diamonds using a flexible head system.
f. High speed burnisher with minimum 2500 RMN and minimum 20-inch diameter head.
g. Diamond impregnated burnishing pads
h. Provide dustproof partitions and temporary enclosures to limit dust migration and to isolate areas from noise.
i. All grinding diamonds used shall be approved by concrete polishing system manufacturer.

1.7 WARRANTY

1.7.1. Special Warranty

a. Manufacturer's standard form in which manufacturer agrees to repair or replace special concrete floor finish system that fails in materials or workmanship within specified warranty period.

(1) Special warranty includes penetrating liquid concrete floor densifying agent, joint filler, finish, and other components of special concrete floor finish system.
(2) Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements”.

2.1.2. Special concrete Floor Finish

a. Clear wood finishes, floor coatings, stains, primers & shellacs – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1113, Architectural Coatings, January 1, 2004.

2.1.3. Stain Repellent

a. Clear wood finishes, floor coatings, stains, primers & shellacs – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1113, Architectural Coatings, January 1, 2004.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's products and system are named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 SPECIAL CONCRETE FLOOR FINISH SYSTEM

2.3.1. Penetrating Liquid Floor Densifying Agent

a. Clear, chemically reactive, waterborne solution of inorganic materials, catalyzed sodium silicate, and proprietary components; odorless and colorless; that penetrates, hardens, and densifies concrete surfaces. Do not use siliconates, meta silicate, siloxane or inorganic siloxane, magnesium fluorosilicates.

(1) Basis-of-Design Products:

(a) Advanced Floor Products, Inc.; Retro-Plate 99; (773) 622-2444 and www.retroplatesystem.com.

2.3.2. Concrete Polishing System

a. Patented process of metal bond diamond grinding and polishing in graduated grits from coarse to fine.

b. Basis-of-Design Systems:

(1) Advanced Floor Products, Inc.; Retro-Plate Concrete Polishing System; (773) 622-2444 and www.retroplatesystem.com.
(2) Finish: Level 3 light reflective mirror finish. . Standing on the floor, looking directly down, the floor shall have depth and clarity. Overhead light fixtures shall be clearly visible and defined and the reflection shall appear to be 8’-12’ deep.

c. The Basis-of-Design Special Concrete Floor Finish System manufacturer asserts compliance to the following performance criteria:

(1) General

(a) Abrasion Resistance: Up to 400% increase in abrasion resistance per ASTM C 779.
(b) Impact Strength: Up to 21% increase impact strength per ASTM C 805.
(c) Ultra Violet Light and Water Spray: No adverse effect to ultra violet and water spray per ASTM G 23-81.
(d) Coefficient of Friction: All levels of finish exceed OSHA and ADA recommendations per ASTM C 1028.
(e) Reflectivity: Up to 30% increase in reflectivity.

2.4 STAIN REPELLENT

2.4.1. Penetrating Stain Repellent

a. Non-film forming, water-based, penetrating stain repellent specifically formulated for the protection of polished concrete from oil and water-based stains.
b. Basis-of-Design Products:

(1) Advanced Floor Products, Inc.; RetroGuard; (773) 622-2444 and www.retroplatesystem.com.

2.5 JOINT FILLER

2.5.1. Semi-Rigid Polyurea Joint Filler

a. Rapid setting, 100% solids, flexible, two part polyurea joint filler with a Type A Shore durometer hardness of at least 85 per ASTM D 2240 when cured. Designed to fill and protect joints in industrial floors that are subject to traffic such as trucks, forklifts or steel wheeled carts.
b. Color: Manufacturer's standard gray.
c. Basis-of-Design Product: Advanced Floor Products, Inc.; Crete-Fill Pro 85; (773) 622-2444 and www.retroplatesystem.com.
d. Performance Criteria:

(1) Tensile Strength: 1160psi per ASTM D 412-98.
(2) Sets rapidly and consistently in application temperatures ranging from minus 40 degrees F to 130 degrees F.
(3) Elongation: 312%.
(4) Hardness: 85 (Shore A) per ASTM D 2240-02.

PART 3 - EXECUTION

3.1 GENERAL

a. Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting special concrete floor finish system performance.
b. Verify concrete floor slab has cured a minimum of 28 days or as directed by the special concrete floor finish system manufacturer before beginning application of system.
c. Apply special concrete floor finish system prior to installation of equipment, provide a complete, uninhibited concrete slab for application.
d. Close areas to traffic during floor application and for 2 hours after application.

3.2 SURFACE CONDITIONS

a. Examine substrate, with special floor finish installer present, for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.
b. Verify that concrete floor slab meet finish and surface profile requirements in Division 3 Section "Cast-In-Place Concrete".
c. Prior to application, verify that floor surfaces are free of construction latents.

3.3 APPLICATION GENERAL

3.3.1. General

a. Start floor finish applications in presence of manufacturer's representative.
b. Densifying and polishing of concrete surface.

(1) Only a certified applicator shall apply the penetrating liquid densifying agent. Applicable procedures shall be followed as recommended by the product manufacturer and as required to match approved benchmark sample.
(2) Achieve waterproofing, hardening, dust-proofing, and abrasion resistance of the surface without changing the natural appearance of the concrete, except for the sheen.

(3) Polish to required sheen level.

3.4 POLISHING SYSTEM

a. Repair and fill all cracks.
b. Thoroughly clean the floor surface as required by manufacturer's instructions.
c. Start the process with the appropriate metal diamond grinding head (for example: 40, 80, 120 grit) depending on condition of concrete floor slab. Continue with additional grinding steps as necessary to achieve a consistent and uniform salt and pepper concrete slab appearance (showing sand aggregate only) and void of random scratches. All metal bond grinding shall be performed wet.
d. Install penetrating densifyer at a rate of 200 square feet per gallon, scrubbing product into floor and allowing product to soak until turning slick, leaving the product on floor for a minimum of 60 minutes. Remove excess material using water to neutralize product and dispose of IAW environmental regulations.
e. Begin the polishing process with a 100 grit resin bonded diamond grinding head followed in succession with a 200, 400, 800, and finally a 1500 grit resin bonded diamond grinding head as necessary, to achieve specified sheen. Complete final polishing prior to installation of refrigerated display cases and gondolas shelving.
f. Use hand grinders and burnishers along edges and other areas of floor slab, exposed to view, that are not reachable using a planatary floor grinder

3.5 STAIN PROTECTION

3.5.1. Preparation

a. Complete all densification, grinding, and polishing before application of stain repellent.
b. Clean substrate of substances that might interfere with penetration or performance of stain repellent. Check surface for water, according to stain repellent manufacturer's written instructions, to ensure that surface is totally dry.
c. Install per manufacturer requirements.

(1) Remove oil, laitance, and other substances that could prevent adhesion or penetration of stain repellent.

d. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5.2. Application

a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of stain repellent and to instruct Applicator on the product and application method to be used. Comply with manufacturer's written application instructions.

(1) Apply two light "film" coats with application devices recommended by manufacturer's field representative. Apply second coating, repeating first application. Burnish floor between applications. Comply with manufacturer's written instructions for limitations on drying time between coats.

3.6 JOINT FILLING

3.6.1. General

a. Prepare, clean, and install joint filler according to manufacturers written instructions and the following requirements.

(1) Defer joint filling until after concrete floor polishing and application of stain protection are completed. Do not fill joints until construction traffic has permanently ceased in areas receiving joint filler.
(2) Remove all foreign material from joint substrates that could interfere with adhesion of joint filler, including dust, paints (except for permanent, protective coatings tested and approved for filler adhesion and compatibility by joint filler manufacturer), old joint sealants and fillers, grease, dirt, debris, and saw cuttings; leave contact faces of joint clean and dry.
(3) Clean out joints with a diamond impregnated saw blade equipped with a dustless vacuum system to ensure sides of joint walls are clean so that joint filler can bond with them.

b. Install joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with floor surface after hardening.

3.7 WORKMANSHIP AND CLEANING:

3.7.1. General

a. Keep premises clean and free of debris at all times.
b. Remove spatter from adjoining surfaces that are to remain exposed.
c. Repair damages to surface caused by cleaning operations.
d. Remove debris from job site

3.8 PROTECTION:

Protect finished work until project is turned over to the Government.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 04810

UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Concrete masonry units (CMUs).
b. Face brick.
c. Cast stone.
d. Precast concrete trim.
e. Mortar and grout.
f. Reinforcing steel.
g. Masonry joint reinforcement.
h. Ties and anchors.
i. Miscellaneous masonry accessories.
j. Water-resistive coating.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”

1.2 REFERENCES

Specification for Masonry Structures: ACI 530.1-08 /ASCE 6-08 /TMS 602-08.

1.3 DEFINITIONS

Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

1.4.1. Unit Masonry Compressive Strength

a. Provide units with minimum average net area compressive strengths as follows:

(1) For Concrete Masonry Units: 1900 psi .
(2) For Face Brick: 3000 psi.

1.4.2. Determine net-area compressive strength (f'_m) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602. Provide Type S mortar at all locations.

1.5 SUBMITTALS

1.5.1. Product Data

a. Manufacturers' current data sheets for water-resistive coating

1.5.2. Shop Drawings

a. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement" showing bar schedules, stirrup spacing, diagrams of bend control joints, framing or special conditions affecting the work. Provide ¼" scale elevations of all walls with all openings and reinforcing shown. Coordinate with mason the type of grouting techniques to be used and provide bar lengths accordingly.

1.5.3. Material Certificates:

a. Include statements of material properties indicating compliance with requirements including compliance with standards and type designation within standards. Provide for each type and size of the following:

(1) Masonry units.

(a) Include material test reports substantiating compliance with requirements.

(2) Face brick.

(a) Include material test reports substantiating compliance with requirements.
(b) Material rest reports efflorescence according to ASTM C 67.

(3) Cementitious materials. Include brand, type, and name of manufacturer.
(4) Reinforcing bars.
(5) Joint reinforcement.
(6) Anchor, ties, and metal accessories.
(7) Aggregate certificates for mortar and grout.
(8) Preblended, dry mortar mixes. Include description, type, and proportions of ingredients.

1.5.4. Samples for Verification

a. For each type and color of the following:

(1) Cast stone.
(2) Face brick.
(3) Precast concrete trim.
(4) Pigmented mortar.

1.5.5. Mix Designs

a. For each type of mortar and grout. Include description of type and proportions of ingredients.

1.5.6. Statement of Compressive Strength of Masonry

a. For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.5.7. Field Quality-Control Tests and Inspection Reports.

1.5.8. Special Inspection Reports.

1.5.9. Sustainable Design Submittal:

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior. Paint and coating MSDS for each material applied on-site in the interior.

1.5.10. Submittal List

Reference	Submittal Item	Quantity	Action
1.5.1	Product Data	X	R
1.5.2	Shop Drawings	X	R
1.5.3	Material Certificates	X	R
1.5.4	Samples for Verification	X	R
1.5.5	Mix Designs	X	R
1.5.6	Statement of Compressive Strength of Masonry	X	I
1.5.7	Field Tests and Reports	X	R
1.5.8	Special Inspection Reports	X	R
1.5.9	Sustainable Design Submittal	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.6 QUALITY ASSURANCE

1.6.1. Source Limitations for Masonry Units

a. Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

1.6.2. Source Limitations for Mortar Materials

a. Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

1.6.3. Source Limitations for Water-Resistive Coating

a. Obtain water-resistive coating from a single manufacturer regularly engaged in manufacturing the product.
b. Provide products which comply with state and local regulations controlling use of volatile organic compounds (VOC).

1.6.4. Fire-Resistance Ratings

a. Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

1.6.5. Mockup

a. Build mockup to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
b. Build mockup to include each type of typical exterior wall in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes, precast concrete trim, and accessories.

(1) Include a sealant-filled control joint.
(2) Include water-resistive coating.
(3) Include through-wall flashing installed approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view.
(4) Include metal studs, cavity backup masonry, insulation, veneer anchors, flashing, and weep holes.
(5) Clean exposed faces of mockups with masonry cleaner as indicated.
(6) Protect accepted mockups from the elements with weather-resistant membrane.
(7) Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

1.6.6. Testing Agency Qualifications

a. Qualified according to ASTM C 1093 for testing indicated.

(1) Personnel conducting field tests shall be qualified as ACI-certified Concrete Field Testing Technician, Grade I, or an equivalent certification program.
(2) Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician, Grade I, or an equivalent certification program. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician – Grade II, or an equivalent certification program.

1.6.7. Special Inspector Qualifications

a. Special inspections for structural masonry shall be performed under the direct supervision of a Professional Structural Engineer registered in the state in which the project is located. The personnel performing the inspections shall be ICC-certified Structural Masonry Special Inspector or an equivalent certification program.

1.7 DELIVERY, STORAGE, AND HANDLING

1.7.1. Storage

a. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
b. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
c. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
d. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7.2. Preblended Dry Mortar Mix

a. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

1.8 PROJECT CONDITIONS

1.8.1. Protection of Masonry

a. During construction, cover tops of walls, projections, and sills exposed to weather with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
b. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

1.8.2. Applied Loads

a. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls.

1.8.3. Stain Prevention

a. Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
b. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
c. Protect sills, ledges, and projections from mortar droppings.
d. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
e. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

1.8.4. Cold-Weather Requirements

a. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.8.4.2. Cold-Weather Cleaning

a. Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

1.8.5. Hot-Weather Requirements

a. Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Concrete Masonry Units and Decorative Concrete Masonry Units

a. 90% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.3. Brick & Face Brick

a. 90% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.4. Cast Stone

a. 90% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.5. Concrete Materials and Concrete Trim

a. 90% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.6. Masonry Lintels

a. 90% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.7. Mortar and Grout

a. 90% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.8. Steel Reinforcement

a. Steel to contain no less than 80% of Post-consumer recycled content and 10% pre-consumer recycled content.

b. 90% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 MASONRY UNITS, GENERAL

Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not uses units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.4 CONCRETE MASONRY UNITS (CMUs)

2.4.1. Shapes

a. Provide shapes indicated
b. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
c. Provide square-edged units for outside corners, unless otherwise indicated.

2.4.2. Concrete Masonry Units: ASTM C 90.

a. Weight Classification: Normal weight.
b. Standard face dimensions of:

(1) Length: 16 inches nominal; 15-5/8 inches actual.
(2) Height: 8 inches nominal; 7-5/8 inches actual.

2.5 BRICK

2.5.1. General

a. Provide shapes indicated.
b. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
c. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
d. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
e. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

2.5.2. Face Brick

a. ASTM C 216, Grade SW, Type FBX.
b. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
c. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
d. Size: Modular, 3-5/8- by 2-1/4- by 7-5/8-inches.
e. Color and Texture: As indicated.
f. Basis-of-Design Product: The Belden Brick Company

2.6 CAST STONE

2.6.1. Calcium Silicate Units: Calcium silicate pressure formed and autoclaved:

a. Manufacturer: Arriscraft International Inc.

(1) Renaissance Masonry Units.

(a) Height: 11-5/8 inches.
(b) Length: 23-5/8 inches.
(c) Bed depth: 3-5/8 inches.
(d) Finish on exposed faces: Smooth.
(e) Special shapes: None.
(f) Color: Limestone.

2.7 PRECAST CONCRETE TRIM

2.7.1. Materials:

a. Portland Cement: ASTM C 150, Type I or Type III.

(1) Color: As indicated.

b. Aggregates: ASTM C 33. Provide aggregates that are hard, durable, selected, and graded; free of material that causes staining or reacting with cement.

c. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
d. Connection materials:

(1) Stainless steel shapes: AISI Type 302/304.Anchor bolts: ASTM A 307, low carbon steel bolts, regular hexagon nuts and carbon steel washers; hot-dipped galvanized.

e. Air Entrainment Admixture: ASTM C260.
f. Water: Clean and potable.

2.7.2. Concrete

a. Minimum 3000 psi, unless otherwise indicated, 28 day strength, air entrained in accordance with ACI 301.

2.7.3. Fabrication:

a. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.
b. Reinforce sills and lintels with not less than two No. 4 bars.
c. Reinforce sills and lintels for full length and a sufficient length beyond ends to allow splicing or tieing to building reinforcement, if any.
d. Maintain 3/4 inch minimum clearance between reinforcement and unit face.
e. Place and embed flashing reglets continuous and straight.
f. Provide drip grooves on underside where units overhang walls.
g. Provide sills with washes. Fabricate sills for windows and mullions in sections with head joints at mullions and a 1/4 inch allowance for mortar joints. The ends, except at exposed surfaces, shall be roughened for bond.
h. Finish: Provide smooth, dense finish on exposed-to-view surfaces. Exposed surfaces shall be free of surface voids, spalls, cracks, and chipped and broken edges.

2.8 MASONRY LINTELS AND BOND BEAMS

Built-in-place horizontal grouted masonry element made from concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built-in-place element until cured.

2.9 MORTAR AND GROUT MATERIALS

2.9.1. Portland Cement

a. ASTM C 150, Type II..

2.9.2. Hydrated Lime

a. ASTM C 207, Type S.

2.9.3. Portland Cement-Lime Mix

a. Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207. Mix proportions shall be per ASTM C270, proportion specification based on volume.

2.9.4. Aggregate for Mortar

a. ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

2.9.5. Aggregate for Grout

a. ASTM C 404.

2.9.6. Cold-Weather Admixture

a. Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.

2.9.7. Water-Repellent Admixture

a. Liquid water-repellent mortar admixture intended for use with decorative concrete masonry units, containing integral water repellent by same manufacturer.
b. Basis-of Design Product: Dry-Block; W. R. Grace & Co., Construction Products Division.

2.9.8. Water: Potable.

2.9.9. Colored Cement Product: Packaged blend made from portland cement and lime or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

a. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
b. Premix cement and pigment at plant. Do not mix cement and pigment at job site.
c. Pigments shall not exceed 10 percent of portland cement by weight.
d. Pigments shall not exceed 5 percent of mortar cement by weight.
e. Products:

(1) Colored Portland Cement-Lime Mix:

(a) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
(b) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
(c) Lafarge North America Inc.; Eaglebond Portland & Lime.
(d) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

(2) Colored Mortar Cement: Lafarge North America Inc.; Magnolia Superbond Mortar Cement.

f. Mortar Color

(1) Face Brick Units: Natural color.
(2) Concrete Masonry Units: Natural color.
(3) Cast Stone Units: Limestone.

2.10 REINFORCEMENT

2.10.1. Uncoated Steel Reinforcing Bars

a. ASTM A 615 or ASTM A996, Grade 60.

2.10.2. Masonry Joint Reinforcement, General

a. ASTM A 951.
b. Interior Walls: Mill-galvanized, carbon steel wire.
c. Exterior Walls (including backup wythes): Hot-dip galvanized, carbon steel wire.
d. Wire Size for Side, Cross, and Veneer Rods: W1.7 or 0.148-inch (9 gage) diameter.
e. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
f. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

2.10.3. Masonry Joint Reinforcement for Single-Wythe Masonry

a. Either ladder or truss type with single pair of side rods.

2.10.4. Cavity Wall Joint Reinforcement

a. Brick veneer on concrete masonry-unit back-up:

(1) Adjustable (two-piece) type, ladder design, with one side rod at each face shell of backing wythe and with separate ties (pintles) that extend into facing wythe. Ties have two hooks that engage eyes or slots in reinforcement and resist movement perpendicular to wall. Ties extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
(2) Wire size for veneer ties (pintles): W2.8 or 0.188-inch (3/16 inch) diameter.
(3) Basis-of-design product for ladder type with adjustable ties:

(a) Dayton Superior Corporation, Dur-O-Wal Division DA3600 I.L.E. Ladur-Eye, including pintles.

2.11 TIES AND ANCHORS

2.11.1. Materials

a. Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with subparagraphs below, unless otherwise indicated.
b. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 641/A 641M, Class 1 coating.
c. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
d. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
e. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
f. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.11.2. Wire Ties, General

a. Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

2.11.3. Adjustable Anchors for Connecting to Structure: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
a. Anchor Section for Welding to Steel Frame

(1) Crimped 1/4-inch- diameter, wire.
(2) Tie Section for Steel Frame: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.188-inch- diameter, wire.

2.11.4. Rigid Anchors

a. Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins, unless otherwise indicated. Connect T-intersections of CMU shear walls with rigid anchors in lieu of masonry bonding or bond beams, unless otherwise indicated.
b. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.11.5. Adjustable Masonry-Veneer Anchors for Attachment to Cold-Formed Metal Framing

a. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:

(1) Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

b. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

(1) Anchor Section: Sheet metal plate, 1-1/2 inches wide by 6 inches long, with screw holes top and bottom and with raised rib-stiffened strap stamped into center to provide a slot between strap and plate for inserting wire tie.
(2) Fabricate sheet metal anchor sections and other sheet metal parts from 0.067-inch- (nominal 14 gage) thick, steel sheet, galvanized after fabrication.
(3) Fabricate Triangular wire ties from 0.187-inch- diameter, hot-dip galvanized steel wire.
(4) Basis-of-Design Product: Dayton Superior Corporation, Dur-O-Wal Division; DA213 Veneer Anchor Screw On Plate with DA700 Series Triangular Ties.

c. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

(1) Basis-of-Design Product: Dayton Superior Corporation, Dur-O-Wal Division; D/A 807.

2.12 MISCELLANEOUS ANCHORS

2.12.1. Anchor Bolts

a. Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.13 EMBEDDED FLASHING MATERIALS

2.13.1. Flexible Flashing

For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:

a. Copper-Laminated Flashing: 5-oz./sq. Ft. copper sheet bonded with asphalt between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

(1) Available Products:

(a) Advanced Building Products Inc.; Copper Fabric Flashing.
(b) AFCO Products Inc.; Copper Fabric.
(c) Hohmann & Barnard, Inc.; H & B C-Fab Flashing.
(d) Phoenix Building Products; Type FCC-Fabric Covered Copper.
(e) Polytite Manufacturing Corp.; Copper Fabric Flashing.
(f) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
(g) York Manufacturing, Inc.; York Copper Fabric Flashing.

b. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.

(1) Available Products:

(a) Advanced Building Products Inc.; Peel-N-Seal.
(b) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
(c) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier-44.
(d) Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
(e) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
(f) Hohmann & Barnard, Inc.; Textroflash.
(g) Polyguard Products, Inc.; Polyguard 300.
(h) Polytite Manufacturing Corp.; Poly-Barrier Self-Adhering Wall Flashing.
(i) Williams Products, Inc.; Everlastic MF-40.

c. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy as follows:

(1) Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch thick.
(2) Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of rubberized-asphalt adhesive.
(3) Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches from edge.
(4) Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
(5) Available Products:

(a) Hyload, Inc.; Hyload Cloaked Flashing System.

d. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, 0.040 inch thick.

(1) Available Products:

(a) Carlisle Coatings & Waterproofing; Pre-Kleened EPDM Thru-Wall Flashing.
(b) Firestone Building Products; FlashGuard.
(c) Heckmann Building Products Inc.; No. 81 EPDM Thru-Wall Flashing.

2.13.2. Metal Drip Edge

a. Provide metal drip edge, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual."
b. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
c. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
d. Extend at least 3 inches into wall and ½ inch out from wall, with outer edge bent down 30 degrees and hemmed.

2.13.3. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.14 MISCELLANEOUS MASONRY ACCESSORIES

2.14.1. Compressible Filler

a. Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.

2.14.2. Preformed Control-Joint Gaskets

a. Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

2.14.3. Bond-Breaker Strips

a. Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.14.4. Reinforcing Bar Positioners

a. Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

b. Basis-of-Design Product: Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.

2.14.5. Weeps

a. Wicking Material: Absorbent rope, made from cotton or UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity between wythes.

2.14.6. Pea Gravel

a. Rounded, river run granular material of mineral composition; non-compactable; approximately 3/8 inch in diameter.

2.15 CAVITY-WALL INSULATION

2.15.1. Extruded-Polystyrene Board Insulation

a. ASTM C 578, Type IV, closed-cell product extruded with an integral skin.

2.15.2. Adhesive

a. Type recommended by insulation board manufacturer for application indicated.

2.16 MASONRY CLEANERS

2.16.1. Cleaning Solutions

a. Not harmful to masonry work or adjacent materials; expressly approved for intended use by manufacturers of masonry units and mortar being cleaned.

2.17 MORTAR AND GROUT MIXES

2.17.1. General

a. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
b. Do not use calcium chloride in mortar or grout.
c. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement, mortar cement, and lime

2.17.2. Preblended, Dry Mortar Mix

a. Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

2.17.3. Mortar for Unit Masonry

a. Comply with ASTM C 270, Proportion Specification. Provide Type S mortar unless another type is indicated or needed to provide required compressive strength of masonry.

2.17.4. Pigmented Mortar

a. Use colored cement product.

2.17.5. Grout for Unit Masonry

a. Comply with ASTM C 476, delete reference to mix proportion per compressive strength in Paragraph 5.2 of ASTM C476.
b. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.2 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
c. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

2.18 WATER-RESISTIVE COATING

2.18.1. Provide water-resistive coating specified in Division 7 Section “Exterior Insulation and Finish Systems.”

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
b. Verify that foundations are within tolerances specified.
c. Verify that reinforcing dowels are properly placed.
d. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
e. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

3.2.1. Thickness

a. Build masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

3.2.2. Chases and Recesses

a. Build chases and recesses to accommodate items specified in this and other Sections.

3.2.3. Openings For Equipment

a. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

3.2.4. Cutting of Units

a. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.2.5. Blending of Colors and Textures

a. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
b. Mix units from several pallets or cubes as they are placed.
c. Face Brick Color Range: Lay face brick with color range evenly distributed throughout. Do not install brick so that colors are concentrated in wall areas that result in an uneven, blotchy color distribution.

3.2.6. Wetting of Face Brick

a. Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.2.7. Retempering of Colored Mortar

a. Do not retemper colored mortar unless samples of retempered colored mortar have been made and no significant change in appearance of the color of the mortar is evident, as acceptable to the Contracting Officer.

3.2.8. Tolerances

a. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

(1) For conspicuous vertical lines, such as external corners, door jambs, reveals, and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or ½ inch maximum.
(2) For conspicuous horizontal lines do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or ½ inch maximum.
(3) For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to ½ inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
(4) For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

3.3 LAYING MASONRY WALLS

3.3.1. General

a. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

3.3.2. Bond Pattern for Exposed Masonry

a. Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

3.3.3. Concealed Masonry

a. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

3.3.4. Stopping and Resuming Work

a. Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

3.3.5. Built-in Work

a. As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

3.3.6. Steel Frames

a. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
b. If additives are used in mortar, field coat steel door frames in contact with mortar with a bituminous compound to prevent corrosion.

3.3.7. Built-In Items

a. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

3.3.8. Grouting of CMU's

a. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.3.9. Interior Partitions

a. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
b. Install compressible filler in joint between top of partition and underside of structure above.
c. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

3.4 MORTAR BEDDING AND JOINTING

3.4.1. Lay Hollow Masonry Units As Follows

a. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
b. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
c. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
d. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

3.4.2. Solid Masonry Units

a. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

3.4.3. Cast Stone Units

a. Set calcium silicate units in full bed of mortar with full head joints, unless otherwise indicated. Build anchors and ties into mortar joints as stone is set.

(1) Set calcium silicate units in accordance with manufacturer's product data.
(2) Provide 1-inch, minimum, air space between calcium silicate units and back-up construction, unless otherwise indicated. Keep air space free of mortar droppings and debris.

(a) Place mortar spots in cavity at anchors and ties to maintain 1-inch spacing.

(b) Slope beds toward air space to minimize mortar protrusions into air space. As work progresses, trowel mortar fins protruding into air space flat against back of veneer.

(3) Lay calcium silicate units horizontally, in pattern indicated.
(4) Break joints so that vertical joints are not directly over each other in any two courses and horizontal joints are not straight and continuous.

3.4.4. Precast Concrete Trim

a. Set precast concrete trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

3.4.5. Joints

a. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
b. Rake out mortar in preparation for application of sealants where sealants are indicated in mortar joints.
c. Strike joints flush where water-resistive coating will be applied.

3.5 COMPOSITE MASONRY

3.5.1. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

a. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.
b. Intersecting and Abutting Walls: Unless vertical control joints are shown at juncture, bond walls together as follows:

(1) General:

(a) Provide continuity with masonry joint reinforcement by using prefabricated T-shaped joint reinforcement units spaced at a maximum vertical distance of 16 inches and extending at least 30 inches in each direction at the intersection.
(b) Provide rigid metal anchors not more than 48 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.
(c) Connect T-intersections of CMU shear walls with rigid anchors in lieu of masonry bonding or bond beams, unless otherwise indicated.

(2) Provide joint reinforcement spaced at a maximum vertical distance of inches 16.

3.6 CAVITY WALLS

3.6.1. Bond

a. Face brick veneer on concrete masonry-unit back-up. Bond wythes of cavity walls together using cavity wall joint reinforcement.

(1) Adjustable (two-piece) type, ladder design, with one side rod at each face shell of backing wythe and with separate ties that extend into facing wythe. Provide ties installed in horizontal joints, but not less than one metal tie for 1.77 sq. ft. of wall area spaced not to exceed 16 inches o.c. horizontally and 16 inches o.c. vertically. Provide additional ties around openings larger than 16 inches in either dimension. Place anchors within 12 inches of openings.

3.6.2. Cavities

a. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

3.6.3. Water-Resistive Coating

a. Apply air barrier membrane in accordance with manufacturers' written instructions.
b. Apply to surfaces that are sound, dry, clean and free of oil, grease, dirt, excess mortar and other contaminants. Fill voids and gaps in substrate to provide an even plane.
c. Do not proceed with application of water-resistive coating when rain is expected within 24 hours.
d. Apply by spray a complete and continuous unbroken film of water-resistive coating.
e. Spray apply around projections and penetrations ensuring a complete and continuous water-resistive coating.
f. Allow water-resistive coating to dry in accordance with manufacturers' recommendations prior to placement of insulating materials.

3.6.4. Installing Cavity-Wall Insulation

a. Coordinate application of insulation with installation of water-resistive coating.
b. Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
c. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 MASONRY JOINT REINFORCEMENT

3.7.1. General

a. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on either side of walls, ½ inch elsewhere. Lap reinforcement a minimum of 6 inches.
b. Space reinforcement not more than 16 inches o.c.
c. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

(1) Reinforcement above is in addition to continuous reinforcement.

d. Interrupt joint reinforcement at control joints.
e. Provide continuity at wall intersections by using prefabricated T-shaped units.
f. Provide continuity at corners by using prefabricated L-shaped units.

3.8 ANCHORING MASONRY TO STRUCTURAL MEMBERS

3.8.1. Anchoring To Structural Members

a. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

(1) Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure as indicated on the Contract Drawings.
(2) Space anchors as indicated per the Contract Documents.

3.9 CONTROL JOINTS

3.9.1. General

a. Install control joint materials in unit masonry as masonry progresses. Do not allow materials to span control joints without provision to allow for in-plane wall or partition movement. If locations of vertical control joints are not shown, locate as follows:

(1) In concrete masonry unit single-wythe walls and in the CMU wythe of cavity walls space control joints at 1.5 times the wall height or 25 feet on center, whichever is lesser, unless noted on drawings.
(2) In the brick wythe of cavity walls and brick veneer walls, where the brick is made from clay or shale: 30 feet on center, maximum.
(3) Provide vertical joints at one side of wall openings 6 feet or less in width and at both sides of wall openings over 6 feet in width.
(4) Provide vertical joints at abutment of walls and columns, where wall thickness changes, at chases and recesses in walls, at pilasters, at return or reverse corners of walls, approximately 4 feet from corners, and where wall height changes.
(5) Provide movement joints in accordance with the foregoing if locations shown on drawings exceed the preceding specified movement joint spacings.
(6) Verify locations of field-located movement joints and revised movement joint locations with Contracting Officer before proceeding.

b. Form control joints in concrete masonry using one of the following methods unless otherwise indicated:

(1) Install preformed control-joint gaskets designed to fit standard sash block.
(2) Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.

3.10 LINTELS

3.10.1. Steel Lintels

a. Provide steel lintels where indicated and where openings of more than 12 inches for brick size units and 24 inches for block size units are shown without structural steel or other supporting lintels.
b. Steel lintel size per Contract Drawings..
c. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.10.2. Masonry Lintels

a. In concrete masonry walls provide masonry lintels where shown and where openings of more than 8 inches for brick-size units and 16 inches for block-size units are shown without structural steel or other supporting lintels. Match color and texture of adjacent units.
b. Reinforcement bars: Place reinforcement per Contract Drawings.

3.11 FLASHING, WEEP HOLES, AND CAVITY DRAINAGE

3.11.1. General

a. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

3.11.2. Flashing And Metal Edge Drip Installation:

a. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

(1) Install metal drip edge beneath flashing at exterior face of wall. Adhere flashing to top of metal.
(2) Lap ends of flashing a minimum of 6 inches. Seal flashing lap with mastic or adhesive compatible with flashing material if flashing is not self-adhering.

b. Cavity walls:

(1) Install concealed through-wall flexible flashing ½ inch back from exterior face of outer wythe of masonry, over metal drip edge, through outer wythe, and turn up a minimum of 8 inches.

(a) Where interior face of masonry wall is exposed to building interior and is not scheduled to be concealed, extend flexible flashing through inner wythe to within 1/2 inch of the interior face of the wall.
(b) Where interior face of inner wythe is not exposed to building interior and is scheduled to be concealed, extend flexible flashing completely through inner wythe and turn flashing up approximately 2 inches.
(c) For support of pea gravel place through-wall flashing on sloping bed of mortar conforming to the curve of the flashing.

c. Masonry-veneer walls:

(1) Install concealed flexible flashing ½ inch back from exterior face of veneer, over metal drip edge, through veneer, across air space behind veneer, and up face of sheathing at least 8 inches, with upper edge tucked under building paper or building wrap lapping at least 4 inches.

d. Below wall openings in masonry, extend flexible flashing under sills ½ inch back from exterior face of masonry, over metal drip edge, and turn up flashing as specified for type of wall construction.
e. At lintels install metal drip edge beneath flashing at exterior face of wall in continuous bed of adhesive applied directly to steel lintels. Turn up flashing over lintel and as specified for type of wall construction.

(1) Lay masonry unit directly on flashing over steel lintels.

f. Install flashing and metal drip edge continuous around corners and jogs in walls.
g. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
h. Seal end dams to end of masonry unit.
i. Install end dams wherever flashing meets non-masonry wall components. Seal end dams to non-masonry wall components.
j. Seal underside of metal drip edge with elastomeric sealant complying with requirements in Division 7 Section "Joint Sealants" for application indicated.

3.11.3. Weeps

a. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

(1) Use specified weep products to form weep holes.
(2) Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
(3) Space weep holes 16 inches o.c.
(4) Trim wicking material flush with outside face of wall after mortar has set.

3.11.4. Cavity Drainage

a. Place pea gravel in cavities as soon as practical to a minimum height of 3 inches, to maintain drainage.

3.12 REINFORCED UNIT MASONRY INSTALLATION

3.12.1. Basic Requirement

a. Reinforce concrete masonry unit cores with reinforcement bars and grout.

3.12.2. Temporary Formwork and Shores

a. Construct formwork and shores as needed to support reinforced masonry elements during construction.
b. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
c. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.12.3. Placing Reinforcement

a. Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
b. Lap and tie reinforcement to bars extending from concrete foundation.

3.12.4. Keying

a. To form key for subsequent lift, terminate grout lift 1-1/2 inches below top course.

3.12.5. Grouting

a. Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
b. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
c. Limit height of vertical grout pours to not more than 60 inches.
d. Consolidate pours by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.

3.13 BOND BEAMS

Use specially formed U-shaped bond beam units. Place horizontal reinforcement in bond beams; lap at corners and intersections. Fill bond beam course with grout or concrete as indicated.

3.14 FIELD QUALITY CONTROL

3.14.1. Testing and Inspections

a. The Contractor shall employ a qualified testing laboratory to perform tests.
b. The Contractor shall employ a structural masonry special inspector to perform inspections.

3.14.1.2. Inspections

a. The inspection program by the Special Inspector shall comply with Table 1704.5.1 of the 2009 International Building Code.

3.14.1.3. Sampling and Testing Mortar, Grout, and CMU:

(1) Mortar and grout samples shall be secured from field mixed materials. Do not use retempered mortar.
(2) Concrete Masonry Unit Testing: Units shall be tested prior to construction and test unit during construction for each 5,000 sq. ft. of wall. The testing shall be per ASTM C140 and show compliance with IBC Table 2105.2.2.1.2.
(3) Compressive Strength Tests: ASTM C780 for mortar and ASTM C1019 for group; one set (four molds) for each material the first day it is used and averaging every third day that the material is used thereafter, but not less than one set for each 5,000 sq. ft. of wall for each material; one specimen for each material tested at seven days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

(a) When acceptable to the Contracting Officer, strength level of mortar and grout will be considered satisfactory if average of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 300 psi.

(4) Test results will be reported in writing on same day that tests are made. Reports of compressive strength tests will contain the project identification name and number, date of material placement, name of testing service, location of material in structure, design compressive strength at 28 days, material mix proportions and materials; compressive breaking strength for both seven-day and 28-day tests.
(5) If testing service reports and inspections indicated specified material strengths and other characteristics have not been attained in the structure, the testing service will make additional tests of in-place mortar or grout, as directed by the Contracting Officer. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable material is verified.

b. Complete cost of retesting and/or reinspection shall be the Contractor's responsibility.

3.15 REPAIRING, POINTING, AND CLEANING

3.15.1. General

a. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

3.15.2. Pointing

a. During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

3.15.3. In-Progress Cleaning

a. Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

3.15.4. Final Cleaning

a. After mortar is thoroughly set and cured, clean exposed masonry as follows:

(1) Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
(2) Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
(3) Clean brick by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised, using cleaners appropriate for conditions requiring cleaning. Apply cleaners in compliance with directions of cleaner manufacturer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Structural steel.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product specified.

1.2.2. Shop Drawings

a. Detailing fabrication of structural steel components.

(1) Include details of cuts, connections, splices, camber, holes, and other pertinent data.
(2) Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
(3) Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
(4) Include Shop Drawings signed and sealed by a qualified professional engineer responsible for their preparation.

1.2.3. Welding Certificates.

1.2.4. Mill Test Reports

(1) Structural steel including chemical and physical properties.
(2) Bolts, nuts, and washers including mechanical properties and chemical analysis.
(3) Direct-tension indications.
(4) Shop primers.

1.2.5. Special Inspection reports on shop and field bolted connections, and welded connections.

1.2.6. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.

d. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.7. Submittal List:

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Welding Certificates	X	R
1.3.4	Mill Test Reports	X	R
1.3.5	Special Inspection Reports	X	R
1.3.6	Sustainable Design Submittal	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications

a. Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.3.2. Fabricator Qualifications

a. Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

1.3.3. Comply With Applicable Provisions Of The Following Specifications And Documents

a. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
b. AISC's "Specification for Allowable Stress Design of Single-Angle Members.
c. AISC's "Seismic Provisions for Structural Steel Buildings."
d. ASTM A 6 "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
e. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
f. AISC's "Specification for the Design of Steel Hollow Structural Sections."

1.3.4. Professional Engineer Qualifications

a. A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

1.3.5. Welding Standards

a. Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel."

1.3.6. Special Inspector Qualifications

a. Special Inspections for bolted and welded connections, and steel details shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located. The personnel performing the inspections shall be ICC-certified Structural Steel and Welding Special Inspection or an equivalent certification program.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1. Delivery

a. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.

1.4.2. Storage and Handling

a. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
b. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
c. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.5 SEQUENCING

Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Steel

a. Steel to contain no less than 80% of Post-consumer recycled content and 10% pre-consumer recycled content.
b. 50% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.2 STRUCTURAL-STEEL MATERIALS

2.2.1. Structural Steel W Shapes: ASTM A 992, Grade 50.

2.2.2. Channel Shapes, Angle Shapes: ASTM A 36.

2.2.3. Plate and Bar: ASTM A 36

2.2.4. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural

2.2.5. Hot-Formed Structural Steel Tubing: ASTM A 501.

2.2.6. Steel Pipe: ASTM A 53, Type E or S, Grade B.

a. Finish: Black.

2.2.7. Welding Electrodes

a. Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

2.3.1. Unheaded Anchor Rods: ASTM F1554, Grade 36.

a. Nuts: ASTM A563, hex carbon steel.
b. Washers: ASTM F 436 hardened carbon steel.

2.3.2. Threaded Rods: ASTM A36

a. Nuts: ASTM A563, hex carbon steel.
b. Washers: ASTM F 436, Type 1, hardened carbon steel.

2.3.3. Non high-Strength Bolts, Anchor Bolts, Nuts, and Washers: ASTM A 307, Grade A.

a. Carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers.
b. Finish: Plain, uncoated.

2.3.4. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1.

a. Heavy hex steel structural bolts, heavy hex carbon-steel nuts, ASTM A 563, Grade C, and hardened carbon-steel washers, ASTM F 436 Type 1.
b. Direct-Tension Indicators: ASTM F 959, Type 325compressible-washer type with plain finish.
c. Finish: Plain, uncoated.

2.3.5. Shear Connectors: ASTM A 108, Grades 1015 through 1020.

a. Headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

2.4 PRIMER

2.4.1. Comply with MPI#79

a. Lead- and chromate-free, rust inhibiting primer compatible with field applied topcoat indicated.
b. Where field applied topcoat is not indicated provide fabricator's standard lead- and chromate-free, rust inhibiting primer
c. Do not use asphaltic primers or primers containing red oxide.
d. Color: Gray.
e. Galvanizing repair paint: ASTM A780.

2.5 GROUT

2.5.1. General

a. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

2.6 FABRICATION

2.6.1. General

a. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

(1) Camber structural steel members where indicated.
(2) Identify high-strength structural steel according to ASTM A 6 and maintain markings until steel has been erected.
(3) Mark and match-mark materials for field assembly.
(4) Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
(5) Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
(6) Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

2.6.2. Thermal Cutting

a. Perform thermal cutting by machine to greatest extent possible.
b. Plane thermally cut edges to be welded.

2.6.3. Finishing

a. Accurately mill ends of columns and other members transmitting loads in bearing.

2.6.4. Holes

a. Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.
b. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
c. Weld threaded nuts to framing and other specialty items as indicated to receive other work.

2.7 SHOP CONNECTIONS

2.7.1. General

a. Shop install and tighten non high-strength bolts, except where high-strength bolts are indicated.
b. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

(1) Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
(2) Connection Type: Slip-critical, direct-tension, or tensioned shear/bearing connections as indicated.

2.7.2. Weld Connections

a. Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
b. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
c. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

2.7.3. Beam Connections

a. Unless otherwise indicated, beam connections shall develop one-half of the maximum shear capacity of the beam.

2.8 SHOP PRIMING

2.8.1. Shop Prime Steel Surfaces, Except The Following

a. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
b. Surfaces to be field welded.
c. Surfaces to be high-strength bolted with slip-critical connections.
d. Galvanized surfaces.

2.8.2. Surface Preparation

a. Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems,"

2.8.3. Primer Application

a. Apply 1-coat primer in accordance with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.9 GALVANIZING

2.9.1 Hot-Dip Galvanized Finish

a. Apply zinc coating by the hot-dip process to structural steel according to ASTM a 123A/123M

(1) Fill vent and drain holes that will be exposed in the finished work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

(2) For galvanizing items that will be painted. Do not quench of apply post galvanizing treatments that might interfere with paint adhesion.

PART 3 - EXECUTION

3.1 EXAMINATION

Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

3.3.1. General

a. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

3.3.2. Base and Bearing Plates

a. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

(1) Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
(2) Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

(3) Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

(a) Comply with manufacturer's instructions for proprietary grout materials.

3.3.3. Erection Tolerances

a. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3.4. Alignment

a. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
b. Level and plumb individual members of structure.
c. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

3.3.5. Modifications

a. Splice members only where indicated.
b. Do not use thermal cutting during erection.
c. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

3.4.1. General

a. Install and tighten non high-strength bolts, except where high-strength bolts are indicated.
b. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

(1) Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
(2) Connection Type: Slip-critical, direct-tension, or tensioned shear/bearing connections as indicated.

3.4.2. Weld Connections

a. Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
b. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
c. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
d. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

3.5 QUALITY CONTROL

3.5.1. Quality Control Compliance

a. Field quality control shall be in accordance with the Quality Control Plan.

3.5.2. Testing and Inspection

a. Engage a special Inspector to perform field inspections and tests and to prepare test reports.
b. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.
c. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
d. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
e. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

(1) Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.

f. In addition to visual inspection, field-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at Special Inspector’s option.

(1) Liquid Penetrant Inspection: ASTM E 165.
(2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
(3) Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
(4) Ultrasonic Inspection: ASTM E 164.

g. In addition to visual inspection, shear connector stud welds will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

(1) Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
(2) Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

3.6 CLEANING

3.6.1. Touchup Painting

a. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
b. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 05210

STEEL JOISTS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Open-web K-series steel joists.
b. Long-span steel joists.
c. Joist girders.
d. Joist accessories.

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements."

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of joist, accessory, and product indicated.

(1) Include manufacturer's certification that joists comply with SJI "Specifications".
(2) Include manufacturer's certification of membership in Steel Joist Institute.

1.2.2. Shop Drawings

a. Show layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories; splice and connection locations and details; and attachments to other construction.
b. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.
c. Calculations: Submit calculations sealed by a Professional Engineer registered in the State in which the project is located for all roof joists and special joists to be designed by the manufacturer for the loads and configuration indicated.

1.2.3. Mill Certificates

a. Signed by manufacturers of bolts certifying that their products comply with specified requirements.

1.2.4. Field quality-control test reports.

1.2.5. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.

d. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.6. Submittal List:

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Shop Drawings	X	R
1.2.3	Mill Certificates	X	I
1.2.4	Field Quality-Control Test Reports	X	R
1.2.5	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Manufacturer Qualifications

a. A firm experienced in manufacturing joists similar to those indicated for this Project and with a record of successful in-service performance.

b. Manufacturer must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.

1.3.2. SJI Specifications

a. Comply with SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, "Specifications"), applicable to types of joists indicated.

1.3.3. Welding

a. Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel"; and AWS D1.3 "Structural Welding Code--Sheet Steel."

1.3.4. Special Inspector Qualification

a. Special inspections for bolted and welded connections and steel details shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located. The

personnel performing the inspections shall be ICC-certified Structural Steel and Welding Special Inspector or an equivalent certification program.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle joists as recommended in SJI's "Specifications." Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.5 SEQUENCING

Deliver steel bearing plates and other devices to be built into concrete and masonry construction.

PART 2 - PRODUCTS

2.1 Sustainable Design Requirements:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Steel

a. Steel to contain no less than 80% of Post-consumer recycled content and 10% pre-consumer recycled content.
b. 50% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.2 MATERIALS

2.2.1. Steel

a. Comply with SJI's "Specifications" for chord and web members.

2.2.2. Steel Bearing Plates: ASTM A 36/A 36M.

2.2.3. Carbon-Steel Bolts and Threaded Fasteners

a. ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
b. Finish: Plain, uncoated.

2.2.4. High-Strength Bolts and Nuts

a. ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
b. Finish: Plain, uncoated.

2.2.5. Welding Electrodes

a. Comply with AWS standards.

2.3 PRIMERS

2.3.1. Primer

a. Lead- and chromate-free, rust inhibiting primer compatible with field applied topcoat indicated.
b. Where field applied topcoat is not indicated provide fabricator's standard lead- and chromate-free, rust inhibiting primer
c. Do not use asphaltic primers or primers containing red oxide.
d. Color: Gray.

2.4 OPEN-WEB K-SERIES STEEL JOISTS

2.4.1. General

a. Manufacture steel joists according to "Standard Specifications for Open Web Steel Joists, K-Series," in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord; of joist type indicated.
b. Joist Type: K-series steel joists.
c. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
d. Provide holes in chord members for connecting and securing other construction to joists.
e. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
f. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
g. Camber joists according to SJI's "Specifications."
h. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.5 LONG-SPAN STEEL JOISTS

2.5.1. General

a. Manufacture steel joists according to "Standard Specifications for Long-Span Steel Joists, LH-Series," with steel-angle top and bottom chord members; of joist type indicated.
b. Joist Type: LH-series steel joists.
c. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in connecting welding work.
d. Provide holes in chord members for connecting and securing other construction to joists.
e. Camber long-span steel joists according to SJI's "Specifications".
f. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds ¼-inch per 12 inches.

2.6 JOIST GIRDERS

2.6.1. General

a. Manufacture joist girders according to "Standard Specifications for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as indicated.
b. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
c. Provide holes in chord members for connecting and securing other construction to joist girders.
d. Camber joist girders according to SJI's "Specifications."
e. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.7 JOIST ACCESSORIES

2.7.1. Bridging

a. Fabricate as indicated and according to SJI's "Specifications."
b. Furnish additional erection bridging if required.

2.7.2. Bearing Plates

a. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated. Shop prime paint.
b. Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."

2.7.3. Ceiling Extensions

a. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.

2.7.4. Miscellaneous Accessories

a. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.8 CLEANING AND SHOP PAINTING

2.8.1. Cleaning

a. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

2.8.2. Surface Preparation

a. Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems,"

2.8.3. Primer Application

a. Apply 1-coat primer in accordance with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine supporting substrates, embedded bearing plates, and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Do not install joists until supporting construction is in place and secured.
b. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

(1) Before installation, splice joists delivered to Project site in more than one piece.
(2) Space, adjust, and align joists accurately in location before permanently fastening.
(3) Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
(4) Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.

c. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
d. Bolt joists to supporting steel framework using high-strength structural bolts, unless otherwise indicated. Comply with RCSC's “Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts” for high-strength structural bolt installation and tightening requirements.
e. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

3.3.1. General

a. Field quality control shall be in accordance with the Quality Control Plan.
b. Contractor shall engage a Special Inspector to inspect field welds and high-strength bolted connections and prepare test reports.
c. Field welds shall be visually inspected according to AWS D1.1
d. Bolted connections shall be visually inspected.
e. High-strength, field-bolted connections shall be tested and verified according to procedures in RCSC's “Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts.”

f. Correct deficiencies in Work that inspections and test reports have indicated are not in compliance with specified requirements.
g. Additional testing shall be performed to determine compliance of corrected Work with specified requirements.

3.4 REPAIRS AND PROTECTION

3.4.1. Touchup Painting

a. After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories , bearing plates and abutting structural steel.
b. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
c. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.

3.4.2. Protection

a. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure joists and accessories are without damage or deterioration at time of final acceptance.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 05310

STEEL DECK

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Roof deck.

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements."

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of deck, accessory, and product indicated.

1.2.2. Shop Drawings

a. Show layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.

1.2.3. Field quality-control test and inspection reports.

1.2.4. Welding certificates.

1.2.5. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.6. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Shop Drawings	X	R
1.2.3	Field Quality-Control Test and Inspection Report	X	R
1.2.4	Welding Certificate	X	R
1.2.5	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications

a. An experienced installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.3.2. Special Inspector Qualifications

a. Special inspections for welding shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located. The personnel performing the inspections shall be ICC-certified Structural Steel and Welding Special Inspector or an equivalent certification program.

1.3.3. Welding

a. Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.3.4. AISI Specifications

a. Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."

1.4 DELIVERY, STORAGE, AND HANDLING

Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 Sustainable Design Requirements:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Steel

a. Steel to contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.
b. 50% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.2 ROOF DECK

2.2.1. Steel Roof Deck

a. Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and the following:
(1) Hot-Dipped Galvanized and Pretreated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, and pretreated for field painting.
(2) Deck Profile: Type B.
(3) Profile Depth: 1-1/2 inches
(4) Design Uncoated-Steel Thickness: As indicated on Project Documents.
(5) Side Laps: As indicated on Project Documents.
(6) Span Condition: Triple span or more.

2.3 ACCESSORIES

2.3.1. General

a. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
b. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
c. Side-Lap Fasteners: As noted on the Contract Documents.
d. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
e. Steel Sheet Accessories: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
f. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth
g. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
h. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 5/8-inch minimum diameter.

i. Roof Sump Receiver (Flat Sump Plate): Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field. Exclude roof sump receiver if specified with drains under work of Division 15.
j. Galvanizing Repair Paint: ASTM A 780.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION

3.2.1. General

a. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
b. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
c. Locate decking bundles to prevent overloading of supporting members.
d. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
e. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
f. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.
g. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
h. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.2.2. Roof Deck Installation

a. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds and mechanical fasteners as indicated on the Contract Documents.

(1) Weld Diameter: As indicated on the Contract Documents.
(2) Weld Spacing: As indicated on Contract Documents.
(3) Mechanical Fastener: As indicated on the Contract Documents.
(4) Mechanical Fastener Spacing: As indicated on the Contract Documents.

b. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated on the Contract Documents, and as follows:

(1) Mechanically button punch side laps as indicated on Contract Documents.
(2) Perimeter edge fastening as indicated on the Contract Documents.

c. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

(1) End Joints: Lapped 2 inches minimum.

d. Roof Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches apart with at least 1 weld at each corner.

e. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

3.3 FIELD QUALITY CONTROL

3.3.1. General

a. Field quality control shall be in accordance with the Quality Control Plan.

b. Contractor shall engage a Special Inspector to inspect field welds and all deck connections.

c. Field welds shall be subject to inspection.

(1) In addition to visual inspection, shear connector stud welds shall be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

(a) Bend tests shall be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.

(b) Tests shall be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

d. Special Inspector shall report test results promptly and in writing to Contractor and Contracting Officer.

e. Remove and replace work that does not comply with specified requirements.

f. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of corrected work with specified requirements.

3.4 REPAIRS AND PROTECTION

3.4.1. Galvanizing Repairs

a. Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

3.4.2. Protection

a. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of final acceptance.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 05400

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Wall framing.
b. Ceiling joist framing.
c. Metal supports for exterior soffits.
d. Roof trusses.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”
b. Division 9 Section "Gypsum Board Assemblies" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.2 DEFINITIONS

1.2.1. Minimum Uncoated Steel Thickness

a. Minimum uncoated thickness of cold-formed framing delivered to the Project site shall be not less than 95 percent of the thickness used in the cold-formed framing design. Lesser thicknesses shall be permitted at bends due to cold forming.

1.2.2. Producer

a. Entity that produces steel sheet coil fabricated into cold-formed members.

1.3 SUBMITTALS

1.3.1. Product Data

(1) For each type of cold-formed metal framing product and accessory indicated.

1.3.2. Truss Shop Drawings

a. Show layout, spacing, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

b. For the roof truss designs, include structural analysis calculations bearing the seal of a qualified Professional Engineer currently registered in the state in which the project is located. Calculations shall show special details required at bearing points.

1.3.3. Truss manufacturer, truss installer, and truss engineer written certification letter.

1.3.4. Welding Certificates.

1.3.5. Special Inspection reports on shop and field bolted connections, and welded connections.

1.3.6. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.3.7. Submittal List:

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Truss Shop Drawings	X	R
1.3.3	Certification Letters	X	R
1.3.4	Welding Certificates	X	R
1.3.5	Special Inspection Reports	X	R
1.3.6	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. An experienced installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.4.2. Welding

a. Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.4.3. AISI Specifications

a. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.

1.4.4. Special Inspector Qualifications

a. Special Inspections for bolted and welded connections, and steel details shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located. The personnel performing the inspections shall be ICC-certified Structural Steel and Welding Special Inspection or an equivalent certification program.

1.4.5. Professional Engineer Qualifications

a. A professional engineer who is legally qualified to practice in the state in which the project is located and who is experienced in providing engineering services of the roof truss kind indicated. If the Structural Engineer of Record has not sized members, detailed connections, and specific fasteners, then engage the Engineer to prepare design calculations, shop drawings, connection details, and other structural data.

1.5 DELIVERY, STORAGE, AND HANDLING

Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Steel

a. Steel to contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.

2.1.3. Galvanized Paint Repair

a. Shall meet the VOC limits of Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.

2.2 MATERIALS

2.2.1. Steel Sheet

a. ASTM A 1003, structural steel, Type H, metallic coated, of grade and coating as follows:

(1) Grade: ST33H for minimum uncoated steel thickness of 0.0428 inch (SSMA designation 43, nominal 18 gage) and less; ST50H for minimum uncoated steel thickness of 0.0538 inch (SSMA designation 54, nominal 16 gage) and greater.
(2) Coating: G60, hot-dip galvanized, unless otherwise indicated.
(3) Coating: G90, hot-dip galvanized for exterior masonry backup framing, unless otherwise indicated.

2.3 METAL SUPPORTS FOR SUSPENDED EXTERIOR SOFFITS

2.3.1. Channels

a. Cold-rolled steel, minimum 0.0598-inch- thick base (uncoated) metal, and as follows:

(1) Carrying Channels: 1-1/2 inches deep, 475 lb/1000 feet and minimum 7/16-inch- wide flanges.
(2) Channel Hangers: 3/4 inch deep, 300 lb/1000 feet and minimum 7/16-inch- wide flanges.

b. Fasteners: 3/8-inch diameter, minimum, cadmium plated bolts.
c. Wire for Ties: ASTM A 641, Class 1 zinc coating, soft temper.

2.4 WALL FRAMING

2.4.1. Steel Studs

a. Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM A 1003, and as follows:

(1) Minimum Uncoated-Steel Thickness: As indicated on Contract Documents.
(2) Track: Manufacturer's standard U-shaped steel track, unpunched, with straight flanges, manufacturer's standard flange width, and. as indicated on Contract Documents.

2.5 CEILING JOIST FRAMING

2.5.1. Steel Ceiling Joists

a. Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, complying with ASTM C 955, and as follows:

(1) Minimum Uncoated-Steel Thickness: 0.0329 inch.

2.6 ROOF TRUSSES

2.6.1. Roof Truss Members

a. Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, complying with ASTM C 955, and as follows:

(1) .Minimum Base-Metal Thickness: 0.0428 inch.
(2) Flange Width: 1-5/8 inches, minimum.

b. Connector Devices: Connect all truss components to provide proper alignment of web and chord members and load transfer to supporting structure, by connectors designed by truss manufacturer.

2.7 FRAMING ACCESSORIES

2.7.1. General

a. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi.
b. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

(1) Supplementary framing.
(2) Bracing, bridging, and solid blocking.
(3) Web stiffeners.
(4) Anchor clips.
(5) End clips.
(6) Foundation clips.
(7) Gusset plates.
(8) Stud kickers, knee braces, and girts.
(9) Joist hangers and end closures.
(10) Hole reinforcing plates.
(11) Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

2.8.1. Steel Shapes and Clips

a. ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.

2.8.2. Power-Actuated Anchors

a. Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

2.8.3. Mechanical Fasteners

a. Corrosion-resistant-coated, self-drilling, self-threading steel drill screws. Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.8.4. Welding Electrodes

a. Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

2.9.1. Galvanizing Repair Paint

a. SSPC-Paint 20 or DOD-P-21035.

2.9.2. Nonmetallic, Nonshrink Grout

a. Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

2.10 FABRICATION

Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.

a. Fabricate framing assemblies using jigs or templates.
b. Cut framing members by sawing or shearing; do not torch cut
c. Fasten cold-formed metal framing members by welding (no welding is allowed for member thicknesses less than 16 gage) or screw fastening, as standard with fabricator. Bolt framing members together where indicated. Wire tying of framing members is not permitted.

(1) Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
(2) Locate mechanical fasteners and install with screws penetrating joined members by not less than three exposed screw threads.
(3) Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening.

d. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
e. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

(1) Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
(2) Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 INSTALLATION

3.3.1. General

a. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
b. Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.
c. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

(1) Bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

d. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.

(1) Cut framing members by sawing or shearing; do not torch cut.
(2) Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

(a) Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
(b) Locate mechanical fasteners and install with screw penetrating joined members by not less than three exposed screw threads.

e. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.
f. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
g. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
h. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
i. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

(1) Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3.2. Installation Of Exterior Soffit Suspension Systems

a. Preparation and Coordination: Coordinate installation of suspension system with installation of overhead structural systems to ensure anchorage provisions have been installed to receive hangers in a manner that will develop their full strength and at spacings required to support soffits.
b. Hanger Installation: Attach hangers to comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring,"

(1) Do not attach hangers to metal deck tabs.
(2) Bolt hangers to anchorage devices of structural framing and to members supported by hangers. Draw nuts of bolts up tight.

c. Install hangers and members supported by hangers at spacings indicated, but not greater than that required by the following:

(1) Hangers: Space hangers not over 36 inches o.c., parallel with and not over 36 inches perpendicular to direction of carrying channels, unless otherwise indicated, and within 6 inches of carrying channel ends.
(2) Carrying Channels: Space carrying channels not over 36 inches o.c.

3.3.3. Wall Framing

a. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure. Space studs as indicated; set plumb, align, and fasten both flanges of studs to track, unless otherwise indicated.

(1) Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
(2) Install horizontal bridging in studs, spaced in rows not more than 54 inches apart. Fasten at each stud intersection.
(3) Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.3.4. Joist Installation

a. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
b. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

(1) Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
(2) Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

c. Space joists not more than 2 inches from abutting walls, and as follows:

(1) Joist Spacing: As indicated.

d. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
e. Install bridging at each end of joists and at intervals not exceeding 4 feet. Fasten bridging at each joist intersection in accordance with one of the following:

(1) Bridging: Cold-rolled steel channel, welded or mechanically fastened to bottom flange of joists.
(2) Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
(3) Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

f. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.3.5. Truss Installation

a. Install, bridge, and brace trusses according to Shop Drawings and requirements in this Section.
b. Truss Spacing: As indicated on Contract Drawings
c. .Do not alter, cut, or remove framing members or connections of trusses.
d. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.
e. Erect trusses without damaging framing members or connections.
f. Align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.
g. Install continuous bridging and permanently brace trusses as indicated[on Shop Drawings .

3.4 REPAIRS AND PROTECTION

3.4.1. Galvanizing Repairs

a. Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

3.4.2. Protection

a. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure cold-formed metal framing is without damage or deterioration at time of final acceptance.

3.5 QUALITY CONTROL

3.5.1. Quality Control Compliance

a. Field quality control shall be in accordance with the Quality Control Plan.

3.5.2. Testing and Inspection

a. Contractor shall engage a special Inspector to perform field inspections and tests and to prepare test reports.
b. Field and shop welds will be subject to testing and inspecting.
c. Testing agency will report test results promptly and in writing to Contractor and Contracting Officer.
d. Remove and replace work where test results indicate that it does not comply with specified requirements.
e. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5.3. Truss Installation

a. The truss manufacturer, and the truss installer, and the truss engineer, shall each provide a written certification to the Contracting Officer that the trusses have been installed and constructed in conformance with the truss plans and truss specifications.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Steel framing and supports for mechanical and electrical equipment.
b. Steel framing and supports for applications where framing and supports are not specified in other Sections.
c. Loose bearing and leveling plates.
d. Steel weld plates and angles for casting into concrete not specified in other Sections.
e. Structural-steel door frames for traffic doors.
f. Miscellaneous steel trim including wall mounted steel angle corner guards and loading-dock edge angles.
g. Metal ladders.
h. Metal bollards (bumper posts).
i. Bumper post sleeves.
j. Metal column covers.
k. Stainless steel wall panels.
l. Table/counter metal grout-in base

1.1.2. Products furnished, but not installed, under this Section include the following:

a. Loose steel lintels.
b. Anchor bolts and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.1.3. Related Sections

a. Division 1 Section "Sustainable Design Requirements."
b. Division 10 Section "Storage Racks" for floor mounted corner guards.
c. Division 10 Section "Wall and Equipment Guards" for stock-manufactured wall and equipment guards.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Thermal Movements

a. Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

1.3.1. Shop Drawings

a. Show fabrication and installation details for metal fabrications.

(1) Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
(2) Provide templates for anchors and bolts specified for installation under other Sections.

1.3.2. Welding Certificates.

1.3.3. Special Inspection reports on shop and field bolted connections, and welded connections.

1.3.4. Product Data

a. Bumper post sleeves.

1.3.5. Sustainable Design Submittals:

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.

d. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

(2) Paint and coating MSDS for each product applied on-site in the interior.

1.3.6. Submittal List:

Reference	Submittal Item	Quantity	Action
1.3.1	Shop Drawings	X	R
1.3.2	Welding Certificates	X	R
1.3.3	Special Inspection Reports	X	R
1.3.4	Product Data	X	R
1.3.5	Sustainable Design Submittals	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Welding

a. Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

1.4.2. Special Inspector Qualifications

a. Special Inspections for bolted and welded connections, and steel details shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located. The personnel performing the inspections shall be ICC-certified Structural Steel and Welding Special Inspection or an equivalent certification program.

1.5 PROJECT CONDITIONS

1.5.1. Field Measurements

a. Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Steel

a. Steel to contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.

2.1.3. Galvanized Paint Repair

a. Shall meet the VOC limits of Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.

2.2 METALS, GENERAL

2.2.1. Metal Surfaces

a. Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

2.3.1. Steel Plates, Shapes, and Bars ASTM A 36/A 36M.

2.3.2. Steel Pipe ASTM A 53/A 53M

a. Standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

2.3.3. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666.

2.4 FASTENERS

2.4.1. General

a. Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

(1) Provide stainless-steel fasteners for fastening stainless steel.

2.5 MISCELLANEOUS MATERIALS

2.5.1. Welding Rods and Bare Electrodes

a. Select according to AWS specifications for metal alloy welded.

2.5.2. Shop Primers

a. Provide primers that comply with Division 9 painting Sections.

2.5.3. Universal Shop Primer

a. Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
b. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
c. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

2.5.4. Zinc-Rich Primer

a. Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
b. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5.5. Galvanizing Repair Paint

a. High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.5.6. Bituminous Paint

a. Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5.7. Nonshrink, Nonmetallic Grout

a. Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5.8. Concrete Materials and Properties

a. Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.6 FABRICATION, GENERAL

2.6.1. Shop Assembly

a. Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
b. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
c. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
d. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
e. Weld corners and seams continuously to comply with the following:

(1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
(2) Obtain fusion without undercut or overlap.
(3) Remove welding flux immediately.
(4) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

f. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
g. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
h. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
i. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

(1) Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

2.7.1. General

a. Provide steel framing and supports not specified in other Sections as needed to complete the Work.
b. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
c. Furnish inserts if units are installed after concrete is placed.
d. Galvanize miscellaneous framing and supports where indicated.

2.8 LOOSE STEEL LINTELS

2.8.1. Fabrication

a. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
b. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.
c. Galvanize loose steel lintels located in exterior walls.

2.9 LOOSE BEARING AND LEVELING PLATES

Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting. Prime plates with zinc-rich primer.

2.10 STEEL WELD PLATES AND ANGLES

Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.11 STRUCTURAL-STEEL DOOR FRAMES

2.11.1. Fabrication, General

a. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Reinforce frames and drill and tap as necessary to accept finish hardware.
b. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.
c. Unless otherwise indicated provide anchors 1/8 thick by 2 inches wide, with a minimum 6-inch embedment and 2-inch hook for securing door frames into adjoining concrete or masonry. Weld anchors to frame jambs no more than 12 inches from both bottom and head of frame, and space anchors not more than 30 inches apart.

2.11.2. Traffic Door Structural-Steel Door Frames

a. Structural steel jambs and head of size and shape as indicated.
b. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.

2.11.3. Finish

a. Galvanize exterior steel frames.
b. Prime interior steel frames.

2.12 MISCELLANEOUS STEEL TRIM

2.12.1. General

a. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

2.12.2. Fabrication

a. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
b. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
c. Unless otherwise indicated provide anchors 1/8 thick by 2 inches wide, with a minimum 6-inch embedment and 2-inch hook for securing steel trim into adjoining concrete or masonry. Weld anchors to steel trim no more than 12 inches from ends of opening, and space anchors not more than 16 inches apart.

2.12.3. Wall mounted steel angle corner guards

a. 4- by 4- by 1/4-inch steel angle, unless otherwise indicated.

2.12.4. Concrete Slab Edgings

a. Unless otherwise indicated provide edgings of sizes as follows:

(1) Loading dock edge angles: 4- by 4- by 1/4-inch.

2.12.5. Finish

a. Prime interior miscellaneous steel trim.
b. Galvanize exterior miscellaneous steel trim.

2.13 METAL LADDERS

2.13.1. General:

a. Comply with ANSI A14.3, unless otherwise indicated.
b. Space siderails 18 inches apart, unless otherwise indicated.
c. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted brackets, made from same metal as ladder.

2.13.2. Above-Cooler-Access Ladder and Platform:

a. Ladder Side rails: Continuous, tubular, assembled from two interlocking aluminum extrusions, NL-1 channel rail and NL-2 cover plate, 3 inches wide, 1/8 inch wall thickness. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.
b. Ladder Rungs: Not less than 1-1/4 inches square, serrated extruded tubular aluminum, and shall withstand a 1,500 lb load without deformation or failure.
c. Fit rungs in centerline of side rails and fasten with self tapping screws.
d. Mill finish.
e. Landing Platform: Minimum 1-1/2-inch diameter serrated extruded tubular aluminum.
f. Landing Platform Guard Rails: 1.666-inch diameter Schedule 40 aluminum pipe.
g. Basis-of-Design Product: O'Keeffe's, Inc. Ladder Model 501 and LP Landing Platform. Phone (415) 822-4222 or www.okeeffes.com.

2.14 METAL BOLLARDS (BUMPER POSTS)

2.14.1. Fabrication

a. Fabricate metal bollards from Schedule 40 steel pipe.
b. Galvanized finish.

2.15 BUMPER POST SLEEVES

2.15.1. Plastic Bumper Post Sleeve

a. Basis-of-Design Product: Ideal Shield, Standard Bumper Post Sleeve, 2525 Clark Street, Detroit, MI 48209-1355. Telephone: (877)323-0769.
b. Low-density polyethylene thermoplastic (LDPE) tubes having ultra-violet resistance and anti static properties, nominal thickness 0.250 inch. OSHA yellow color unless otherwise indicated.

(1) Size sleeve shield diameter for pipe diameters indicated on drawings.
(2) Sleeve height as indicated on drawings.
(3) Sleeve surface: Smooth with round top. No ribbed or two-piece systems acceptable.

2.16 METAL COLUMN COVERS

Stainless Steel: 20 gage, Type 304 stainless steel sheet metal with #4 finish.

2.17 STAINLESS STEEL WALL PANELS

18 gage (0.0500 inch) thick, Type 304 stainless steel with #4 finish, 4-inch by 4-inch quilted pattern. Perimeter edges of panel shall be turned-in against wall with 15 degree break, to increase rigidity of panel and provide tight fit against wall. Secure to ceramic wall tile with construction adhesive.

2.18 FINISHES, GENERAL

2.18.1. Metal Finishes

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Finish metal fabrications after assembly.

2.19 STEEL AND IRON FINISHES

2.19.1. Galvanizing

a. Hot-dip galvanize items as indicated to comply with applicable standard listed below:
b. ASTM A 123/A 123M, for galvanizing steel and iron products.
c. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

2.19.2. Preparation for Shop Priming

a. Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
b. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

2.19.3. Shop Priming

a. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
b. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.20 STAINLESS-STEEL FINISHES

2.20.1. General

a. Provide stainless steel free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
b. Remove tool and die marks and stretch lines or blend into finish.
c. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

2.20.2. Finish

a. Bright, Directional Satin Finish: No. 4.
b. When polishing is completed, rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.21 METAL GROUT-IN BASE (Food Court Tables and Counter Base)

2.21.1. Fabrication

a. Fabricated metal column from 10 Ga., 3” steel tubing

b. 10 Ga. Sheet steel spider to stabilize the table/counter welded to column.
c. Electrostatic, non-toxic powder coat paint finish, heat cured.
d. Grout-in base with matching escutcheon plate.
e. Basis-of-Design Product: Plymold, Standard Metal Grout-in Base, 1-800-759-6653, www.plymold.com

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
b. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

3.1.2. Field Welding

a. Comply with the following requirements:

(1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
(2) Obtain fusion without undercut or overlap.
(3) Remove welding flux immediately.
(4) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.1.3. Fastening to In-Place Construction

a. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

3.1.4. Built-In Construction

a. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

3.2.1. General

a. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING BEARING AND LEVELING PLATES

3.3.1. Preparation

a. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

3.3.2. Setting

a. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 INSTALLING CONCRETE SLAB EDGINGS

Install edgings flush with edge of concrete.

3.5 INSTALLING PIPE BOLLARDS (BUMPER POSTS)

3.5.1. Concrete Embedment

a. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.. Slope concrete up approximately 1/8 inch toward bollard.

3.5.2. Pipe Fill

a. Fill bollards solidly with concrete, mounding top surface to shed water.

3.6 INSTALLING BUMPER POST SLEEVES

3.6.1. location

a. Install bumper post sleeves over interior pipe bollards (bumper posts) located in non-customer areas and where indicated on drawings
b. Secure sleeve to pipe with manufacturer’s neoprene adhesive tape in accordance with manufacturer’s installation guidelines. Do not use screws, glue, or clamps.

3.7 QUALITY CONTROL

3.7.1. Quality Control Compliance

a. Field quality control shall be in accordance with the Quality Control Plan.

3.7.2. Testing and Inspection

a. Engage a special Inspector to perform field inspections and tests and to prepare test reports.
b. Field and shop welds will be subject to testing and inspecting.
c. Testing agency will report test results promptly and in writing to Contractor and Contracting Officer.
d. Remove and replace work where test results indicate that it does not comply with specified requirements.
e. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 ADJUSTING AND CLEANING

3.8.1. Touchup Painting

a. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
b. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.8.2. Galvanized Surfaces

a. Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 05511

METAL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Industrial-type stairs and landings with steel floor plate treads, unless otherwise indicated.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.
b. Division 5 Section "Pipe Railings" for pipe railings.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Structural Performance of Stairs

a. Provide metal stairs capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

(1) Uniform Load: 100 lbf/sq. Ft..
(2) Concentrated Load: 300 lbf applied on an area of 4 sq. in..
(3) Uniform and concentrated loads need not be assumed to act concurrently.
(4) Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
(5) Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

1.2.2. Seismic Performance

a. Provide metal stairs capable of withstanding the effects of earthquake motions determined according to the following:

(1) Refer to Division 1 Section "Description of Work" for seismic-load design criteria.
(2) Determine seismic loads using the appropriate exposure coefficient for the metal stair assemblies.

1.2.3. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.3 SUBMITTALS

1.3.1. Shop Drawings

a. Include plans, elevations, sections, details, and attachments to other work.
b. Provide templates for anchors and bolts specified for installation under other Sections.

(1) For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3.2. Welding Certificates.

1.3.3. Special Inspection reports on shop and field bolted connections, and welded connections.

1.3.4. Delegated-Design Submittal

a. For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3.5. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.3.6. Submittal List:

Reference	Submittal Item	Quantity	Action
1.3.1	Shop Drawings	X	R
1.3.2	Welding Certificates	X	R
1.3.3	Special Inspection Reports	X	R
1.3.4	Delegated- Design	X	R
1.3.5	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Fabricator of products.

1.4.2. NAAMM Stair Standard

a. Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

(1) Industrial-Type Stairs: Industrial class.

1.4.3. Welding

a. Qualify procedures and personnel according to the following:

(1) AWS D1.1, "Structural Welding Code--Steel."
(2) AWS D1.3, "Structural Welding Code--Sheet Steel."

1.4.4. Special Inspector Qualifications

a. Special Inspections for bolted and welded connections, and steel details shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located. The personnel performing the inspections shall be ICC-certified Structural Steel and Welding Special Inspection or an equivalent certification program.

1.5 COORDINATION

Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Steel

a. Steel to contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.

2.1.3. Touch Up Paint
a. Shall meet the VOC limits of Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.

2.2 METALS, GENERAL

Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

2.3.1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3.2. Rolled-Steel Floor Plate: ASTM A 786/A 786M

a. Rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

2.3.3. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M

a. Either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.

2.4 FASTENERS

Select fasteners for type, grade, and class required.

2.5 MISCELLANEOUS MATERIALS

2.5.1. Welding Rods and Bare Electrodes

a. Select according to AWS specifications for metal alloy welded.

2.5.2. Shop Primer

a. Provide primers that comply with Division 9 painting Sections.

2.6 FABRICATION, GENERAL

a. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
b. Join components by welding, unless otherwise indicated.
c. Use connections that maintain structural value of joined pieces.
d. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
e. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
f. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
g. Weld connections to comply with the following:

(1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
(2) Obtain fusion without undercut or overlap.
(3) Remove welding flux immediately.
(4) Weld exposed corners and seams continuously, unless otherwise indicated.
(5) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

h. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.7 STEEL-FRAMED STAIRS

2.7.1. Stair Framing:

a. Fabricate stringers of steel channels.
b. Construct platforms of steel headers and miscellaneous framing members as indicated and needed to comply with performance requirements.
c. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.
d. Where stairs are enclosed by gypsum board assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
e. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

2.7.2. Metal Floor Plate Stairs

a. Form treads and platforms to configurations shown from raised-pattern rolled-steel floor plate of thickness needed to comply with performance requirements but not less than 1/4 inch (of flat plate, exclusive of height of the raised pattern).
b. Form treads with integral nosing and back edge stiffener. Form risers from steel sheet not less than 0.0966 inch thick, welded to tread nosings and stiffeners and to platforms.
c. Weld steel supporting brackets to stringers and weld treads to brackets.
d. Fabricate platforms with integral nosings matching treads and weld to platform framing.

2.8 FINISHES

2.8.1. Reference Standard

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Finish metal stairs after assembly.

2.8.2. Shop Priming

a. Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:
b. Interior Stairs (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
c. Apply shop primer to uncoated surfaces of metal stair components. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

3.1.1. Fastening to In-Place Construction

a. Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

3.1.2. Cutting, Fitting, and Placement

a. Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
b. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
c. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
d. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

3.2 QUALITY CONTROL

3.2.1. Quality Control Compliance

a. Field quality control shall be in accordance with the Quality Control Plan.

3.2.2. Testing and Inspection

a. Engage a special Inspector to perform field inspections and tests and to prepare test reports.
b. Field and shop welds will be subject to testing and inspecting.
c. Testing agency will report test results promptly and in writing to Contractor and Contracting Officer.
d. Remove and replace work where test results indicate that it does not comply with specified requirements.
e. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.3 ADJUSTING AND CLEANING

3.3.1. Touchup Painting

a. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
b. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 05521

PIPE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Steel pipe railings.

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements" for recycled content of steel products.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. General

a. In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

(1) Steel: 72 percent of minimum yield strength.

1.2.2. Structural Performance

a. Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

b. Handrails and Top Rails of Guards:

(1) Uniform load of 50 lbf/ ft. applied in any direction.
(2) Concentrated load of 200 lbf applied in any direction.
(3) Uniform and concentrated loads need not be assumed to act concurrently.

c. Infill of Guards:

(1) Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
(2) Infill load and other loads need not be assumed to act concurrently.

1.2.3. Thermal Movements

a. Allow for thermal movements from ambient and surface temperatures acting on exterior railings by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.2.4. Control of Corrosion

a. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.2.5. Delegated Design

a. Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.3 SUBMITTALS

1.3.1. Shop Drawings

a. Include plans, elevations, sections, details, and attachments to other work.

(1) For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3.2. Welding Certificates.

1.3.3. Special Inspection reports on shop and field bolted connections, and welded connections.

1.3.4. Delegated-Design Submittal

a. For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3.5. Sustainable Design Submittals:

a. Materials shall comply with requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each product applied on-site in the interior.

1.3.6. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Shop Drawings	X	R
1.3.2	Welding Certificates	X	R
1.3.3	Special Inspection Reports	X	R
1.3.4	Delegated-Design Submittal	X	R
1.3.5	Sustainable Design Submittals	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Source Limitations

a. Obtain each type of railing through one source from a single manufacturer.

1.4.2. Welding Qualifications

a. Qualify procedures and personnel according to the following:

(1) AWS D1.1/D1.1M, "Structural Welding Code--Steel."

1.4.3. Special Inspector Qualifications

a. Special Inspections for bolted and welded connections, and steel details shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located. The personnel performing the inspections shall be ICC-certified Structural Steel and Welding Special Inspection or an equivalent certification program.

1.5 PROJECT CONDITIONS

1.5.1. Field Measurements

a. Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

1.6 COORDINATION AND SCHEDULING

1.6.1. Coordinate Installation Of Anchorages For Railings

a. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.6.2. Scheduling

a. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Steel

a. Steel to contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.

2.1.3. Galvanized Paint Repair

a. Shall meet the VOC limits of Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.

2.2 METALS, GENERAL

2.2.1. Metal Surfaces, General

a. Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.2.2. Brackets, Flanges, and Anchors

a. Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.3 STEEL

2.3.1. Pipe: ASTM A 53/A 53M

a. Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
b. Provide galvanized finish for exterior installations.

2.3.2. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.4 FASTENERS

2.4.1. Steel Railings

a. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 25 for electrodeposited zinc coating.
b. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.

2.4.2. Fasteners for Anchoring Railings to Other Construction

a. Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

2.4.3. Fasteners for Interconnecting Railing Components

a. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
b. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

2.4.4. Anchors

a. Provide cast-in-place, chemical, or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

(1) Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
(2) Material for Exterior Locations: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

2.5.1. Welding Rods and Bare Electrodes

a. Select according to AWS specifications for metal alloy welded.

2.5.2. Shop Primers

a. Provide primers that comply with Division 9 painting Sections.

2.5.3. Galvanizing Repair Paint

a. High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.5.4. Nonshrink, Nonmetallic Grout

a. Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5.5. Anchoring Cement

a. Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

(1) Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

2.6.1. General

a. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
b. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
c. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
d. Form work true to line and level with accurate angles and surfaces.
e. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
f. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
g. Connections: Fabricate railings with welded connections, unless otherwise indicated.
h. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

(1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
(2) Obtain fusion without undercut or overlap.
(3) Remove flux immediately.
(4) At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

i. Form changes in direction as detailed.
j. Close exposed ends of railing members with prefabricated end fittings.
k. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
l. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

(1) At brackets and fittings fastened to gypsum board partitions, provide fillers made from crush-resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

m. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
n. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than ½ inch greater than outside dimensions of post, with steel plate forming bottom closure.

2.7 STEEL FINISHES

2.7.1. Galvanized Railings:

a. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
b. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
c. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.

2.7.2. General

a. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
b. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
c. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves.
d. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
e. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

(1) Do not apply primer to galvanized surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION

3.2.1. General

a. Fit exposed connections together to form tight, hairline joints.
b. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

(1) Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
(2) Set posts plumb within a tolerance of 1/16 inch in 3 feet.
(3) Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

c. Adjust railings before anchoring to ensure matching alignment at abutting joints.
d. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

3.3.1. Welded Connections

a. Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

3.3.2. Expansion Joints

a. Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

3.4.1. General

a. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
b. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
c. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch buildup, sloped away from post.

3.5 ANCHORING RAILING ENDS

3.5.1. General

a. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.
b. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using nonwelded connections.

3.6 ATTACHING HANDRAILS TO WALLS

3.6.1. General

a. Attach handrails to wall with wall brackets. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
b. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
c. Secure wall brackets to building construction as follows:

(1) For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
(2) For hollow masonry anchorage, use toggle bolts.

d. For steel-framed gypsum board partitions, fasten brackets directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads.

3.7 QUALITY CONTROL

3.7.1. Quality Control Compliance

a. Field quality control shall be in accordance with the Quality Control Plan.

3.7.2. Testing and Inspection

a. Engage a special Inspector to perform field inspections and tests and to prepare test reports.
b. Field and shop welds will be subject to testing and inspecting.
c. Testing agency will report test results promptly and in writing to Contractor and Contracting Officer.
d. Remove and replace work where test results indicate that it does not comply with specified requirements.
e. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 ADJUSTING AND CLEANING

3.8.1. Touchup Painting

a. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

3.8.2. Galvanized Surfaces

a. Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.9 PROTECTION

3.9.1. Protection

a. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of final acceptance.

3.9.2. Restoration

a. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 06105

MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Wood nailers and blocking.
b. Miscellaneous lumber.
c. Plywood backing panels.

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements."

1.2 SUBMITTALS

1.2.1. Sustainable Design Submittals

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit Vendor's invoice for all wood materials and all wood-containing materials.

(1) Materials to be identified on a line-item basis with individual cost and FSC content amount indicated on each line.
(2) Vendor's FSC COC certificate number to be included on the invoice.

d. Submit a letter from the wood material Vendors stating the products provided are FSC Pure, FSC Mixed, or FSC Mixed [NN]%.
e. Submit manufacturer's product data indicating that all composite wood materials and laminating adhesives contain no added urea-formaldehyde resins.

f. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R

1.3.2	Shop Drawings	X	R
1.3.3	Samples for Verification	X	R
1.3.4	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.

I Submittal is for information or record purposes only. No action will be taken.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1. General

a. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
b. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Lumber

a. All wood materials or wood containing materials permanently installed in the building will be Forest Stewardship Council (FSC) Certified and purchased from an FSC Certified Vendor.

2.1.3. Plywood

a. All wood materials or wood containing materials permanently installed in the building will be Forest Stewardship Council (FSC) Certified and purchased from an FSC Certified Vendor.

b. All composite wood and laminating adhesives to contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.4. Sealants and Adhesives, Interior on-site applied only.
a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 LUMBER, GENERAL

2.2.1. Lumber Standards

a. Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

2.2.2. Sizes

a. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
b. Provide dressed lumber, S4S, unless otherwise indicated.
c. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

2.3.1. General

a. Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
b. Do not use chemicals containing chromium or arsenic.

2.3.2. Pressure Treatment

a. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. Ft.. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

(1) Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing.
(2) Wood blocking, stripping, and similar concealed members in contact with masonry or concrete.

2.3.3. Application: Treat items indicated on Drawings, and the following:

a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
b. Wood blocking, and similar concealed members in contact with masonry or concrete.
c. Wood framing attached directly to the interior of below-grade exterior masonry or concrete walls.
d. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
e. Wood floor plates that are installed over concrete slabs-on-grade.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

2.4.1. General

a. Comply with performance requirements in AWPA C27 (plywood).

(1) Use treatment that does not promote corrosion of metal fasteners.

b. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

c. Application: Treat items indicated on Drawings, and the following:

(1) Plywood backing panels.

2.5 MISCELLANEOUS LUMBER

2.5.1. General

a. Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, stripping, and similar members.

b. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

c. Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.

d. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.6 WOOD-BASED STRUCTURAL-USE PANELS

2.6.1. Structural-Use Panel Standards

a. Provide all-veneer, mat-formed, or composite panels complying with DOC PS 2, "Performance Standard for Wood-Based Structural-Use Panels," unless otherwise indicated. Provide plywood panels complying with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood," where plywood is indicated.

2.6.2. Trademark

a. Factory mark structural-use panels with APA trademark evidencing compliance with grade requirements.

2.6.3. Miscellaneous Concealed Plywood

a. C-C Plugged Exterior, thickness as indicated but not less than 1/2 inch.

2.6.4. Miscellaneous Exposed Plywood

a. A-D Interior, thickness as indicated but not less than 1/2 inch.

2.6.5. Plywood Backing Panels

a. For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 3/4-inch nominal thickness.

2.7 FASTENERS

2.7.1. General

a. Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

(1) Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153 or of Type 304 or Type 316 stainless steel.

2.7.2. Nails, Wire, Brads, and Staples: FS FF-N-105.

2.7.3. Power-Driven Fasteners: CABO NER-272.

2.7.4. Bolts: Steel bolts complying with ASTM A 307

a. Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.7.5. Screws for Fastening to Cold-Formed Metal Framing, Unless Otherwise Indicated: ASTM C 954

a. Except with wafer heads and reamer wings.
b. Length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
b. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
c. Fit carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of nailers, blocking, and similar supports to allow attachment of other construction.
d. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.
e. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
f. Countersink nail heads on exposed carpentry work and fill holes with wood filler.
g. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

3.2 WOOD NAILERS AND BLOCKING

3.2.1. General

a. Install where shown and where required for screeding or attaching other work. Cut and shape to required size. Coordinate locations with other work involved.
b. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
c. Anchor wood nailers for roofing system work as follows:

(1) Wood nailer to concrete masonry units: Provide 1/2 inch diameter steel bolt by length required for 8-inch embedment into concrete filled core. Space anchors 4'-0" on center, staggered, except at corners space anchors 2'-0" on center from corner for a distance of 8'-0".

(2) Wood nailer to concrete masonry unit bond beam: Provide 1/2 inch diameter steel bolt with 2-inch hook with embedment length of 5 inches into concrete filled concrete masonry unit bond beam. Space anchors 4'-0" on center, staggered, except at corners space anchors 2'-0" on center from corner for a distance of 8'-0".

(3) Wood nailer to metal deck: Provide No. 10 cadmium plated sheet metal screws with 5/8 inch diameter galvanized washers. Install in two rows. Space 2'-0" on center in each row except at corners space screws 1'-0" on center from corner for a distance of 8'-0". Stagger spacing between rows.

(4) Wood member to wood nailer: Provide 10d threaded nail by length required for 1-1/2 inches penetration into nailer. Install in two rows. Space 2'-0" on center in each row except at corners space nails 1'-0" on center from corner for a distance of 8'-0". Stagger spacing between rows.

(5) Wood nailer to metal stud: Provide No. 10 cadmium plated sheet metal screws with 5/8 inch diameter galvanized washers. Anchor 2'-0" on center except at corners space screws 1'-0" on center from corner for a distance of 8'-0".

3.3 WOOD STRUCTURAL PANEL INSTALLATION

3.3.1. General

a. Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.

3.3.2. Fastening Methods

a. Plywood Backing Panels: Screw to supports.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 06160

SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Wall sheathing.
b. Sheathing joint-and-penetration treatment.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.
b. Division 7 Section "Exterior Insulation and Finish System" for soffit direct-applied exterior finish system.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.2.2. Sustainable Design Submittals:

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
c. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each product applied on-site in the interior.

1.2.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Sheathing

a. 50% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.3. Sealants and Adhesives, Interior on-site applied only.

a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 WALL SHEATHING

2.3.1. Glass-Mat Gypsum Sheathing Board

a. Basis-of-Design Product: "Dens-Glass Gold" by G-P Gypsum Corporation.
b. ASTM C 1177/C 1177M.
c. Type: Regular, 1/2 inch thick.
d. Size: 48 by 96 inches, minimum, for vertical installation.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIAL

a. Sealant for Paper-Surfaced and Glass-Mat Gypsum Sheathing Board: Silicone emulsion sealant complying with ASTM C 834, and recommended by tape and sheathing manufacturers.
b. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, of type recommended by sheathing and tape manufacturers.

2.5 FASTENERS

2.5.1. General

a. Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

b. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2.5.2. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing

a. Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

(1) For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C 1002.
(2) For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C 954.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
b. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
c. Securely attach to substrate by fastening as indicated.
d. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
e. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
f. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

3.2.1. General

a. Comply with GA-253 and with manufacturer's written instructions.
b. Fasten gypsum sheathing to cold-formed metal framing with screws.
c. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
d. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
e. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

3.2.2. Horizontal Installation

a. Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
b. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.2.3. Vertical Installation

a. Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
b. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.3 SHEATHING JOINT-AND-PENETRATION TREATMENT

a. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed tape in sealant. Apply sealant to exposed fasteners. Seal other penetrations and openings

END OF SECTION

CONSTRUCTION ISSUE

SECTION 06250

PREFINISHED PANELING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Interior prefinished wood fiber paneling installed over gypsum board substrate.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”

1.2 DEFINITIONS

1.2.1 MDF: Medium-density fiberboard.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1.3.2. Samples For Verification

a. Panel products with factory-applied finish, 8 by 10 inchesfor panels for each finish system and color.

1.3.3. Sustainable Design Submittals

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

c. Submit manufacturer’s product data indicating that all composite wood materials and laminating adhesives contain no added urea-formaldehyde resins.

d. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

(2) Paint and coating MSDS for each material applied on-site in the interior.

1.3.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Samples for Verification	X	R

X Submit quantity specified in Division 1 Section "Administrative Requirements".
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Engage an experienced Installer who has completed finish carpentry similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. General

a. Stack panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
b. Deliver materials only when environmental conditions meet requirements specified for installation areas. If interior materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.6 FIELD CONDITIONS

1.6.1. Environmental Limitations

a. Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.6.2. General

a. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

(1) Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
(2) Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. MDF

a. Contain recycled content.

b. 90% of the materials: Manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

c. All composite wood and laminating adhesives to contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.3. Sealants and Adhesives, Interior on-site applied only.

a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 MATERIALS, GENERAL

2.2.1. MDF

a. ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

2.3 MANUFACTURER

2.3.1. Interior Prefinished Paneling

a. Basis-of-Design Product: Marlite; Connections 44.

2.4 PREFINISHED PANELING

2.4.1. Interior Factory-Finished Fiberboard Paneling

a. Plastic-Laminate Cladding: High-pressure decorative laminate.

(1) Formica Corporation, #5904 Wild Cherry.
(2) Faces: Grade VGF.
(3) Backs: Grade BKL.
(4) Grain direction: Vertical.

b. Thickness: 7/16 inch
c. Based on 4 foot wide and 5 foot wide by 10 foot high panels sizes.

d. Fire-Retardant-Treated Paneling: Provide panels consisting of fire-retardant plastic laminate and fire-retardant medium-density fiberboard. Panels shall have a flame-spread index of 75 or less and a smoke-developed index of 450 or less per ASTM E 84.

2.5 MISCELLANEOUS MATERIALS

2.5.1. General

a. Steel drill screws complying with ASTM C 1002 for fastening metal trim to steel members less than 0.033 inch thick.
b. Trim:

(1) Basis-of-Design Product: Marlite, CON X44-385 Trim Batten, with CON X44-325 Reciever.
(2) Extruded aluminum with black anodized finish.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and performance of prefinished paneling. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Clean substrates of projections and substances detrimental to application.
b. Condition prefinished paneling to average prevailing humidity conditions in installation areas before installation, for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION

3.3.1. General

a. Do not use prefinished paneling materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

(1) Do not use manufactured units with defective surfaces, sizes, or patterns.

b. Install prefinished paneling plumb, level, true, and aligned with adjacent materials. Use concealed shims where required for alignment.

(1) Scribe and cut prefinished paneling to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
(2) Install to tolerance of 1/8 inch in 96 inchesfor plumb and level. Install adjoining finish carpentry with 1/32-inchmaximum offset for flush installation and 1/16-inchmaximum offset for reveal installation.

(3) Coordinate prefinished paneling with materials and systems in or adjacent to standing and running trim and rails. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim and rails.

3.4 PANELING INSTALLATION

3.4.1. Prefinished Paneling: Install according to manufacturer's recommendations.

a. Install perimeter trim where required.

3.5 ADJUSTING

Repair damaged or defective prefinished paneling where possible to eliminate functional or visual defects. Where not possible to repair, replace prefinished paneling. Adjust joinery for uniform appearance.

3.6 CLEANING

Clean prefinished paneling on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.7 PROTECTION

Provide final protection and maintain conditions that ensure prefinished paneling is without damage or deterioration at the time of Substantial Completion.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 06402

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Plastic-laminate-faced cabinets.

(1) 4CKT Kitchen Counter (less sink).

b. Plastic-laminate-faced countertops.
c. Solid-surfacing-material countertops.
d. Hardware and accessory materials.
e. Articulating key board tray.
f. Utility shelving.
g. Silver paracube grid.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”
b. The following items of architectural woodwork are specified in Division 15 Section "Plumbing Fixtures."

(1) Sink for 4CKT Kitchen Counter.
(2) Sink and disposal for 4CKT/D Counter, Kitchen.

c. Division 1 Section "Miscellaneous Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.2 DEFINITIONS

Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction prior to woodwork installation.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of product indicated, including cabinet hardware and accessories, and finishing materials and processes.

1.3.2. Shop Drawings

a. Show location of each cabinet, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1.3.3. Samples For Verification

a. Standing and running trim with transparent finish, 12 inches long, for each species and cut, finished on one side and one edge.
b. Plastic-laminate and solid-surfacing material color, pattern, and texture selected.

1.3.4. Sustainable Design Submittals

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer (post-industrial) recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit Vendor's invoice for all wood materials and all wood-containing materials.

(1) Materials to be identified on a line-item basis with individual cost and FSC content amount indicated on each line.
(2) Vendor's FSC COC certificate number to be included on the invoice.

d. Submit a letter from the wood material Vendors stating the products provided are FSC Pure, FSC Mixed, or FSC Mixed [NN]%.
e. Submit manufacturer's product data indicating that all composite wood materials and laminating adhesives contain no added urea-formaldehyde resins.

f. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.3.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Samples for Verification	X	R
1.3.4	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Fabricator Qualifications

a. Firm experienced in producing architectural woodwork that employs skilled workers who custom fabricate products similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.

1.4.2. Installer Qualifications

a. Arrange for interior architectural woodwork installation by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this Project.

1.4.3. Quality Standard

a. Except as otherwise indicated, comply with the following standard:

(1) “Architectural Woodwork Standards” for grades of interior architectural woodwork, construction, finishes, and other requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration. Do not deliver woodwork until painting and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."

1.6 PROJECT CONDITIONS

1.6.1. Environmental Limitations

a. Do not deliver or install woodwork until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.6.2. Field Measurements

a. Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

b. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.

1.7 COORDINATION

1.7.1. General

a. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Hardboard

a. Use composite wood and agrifiber building products on the interior of the building that contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.3. Medium-Density Fiberboard

a. Use composite wood and agrifiber building products on the interior of the building that contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.4. Particleboard

a. Use composite wood and agrifiber building products on the interior of the building that contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.5. Plywood

a. All wood materials or wood containing materials permanently installed in the building will be Forest Stewardship Council (FSC) Certified and purchased from an FSC Certified Vendor.

b. Use composite wood and agrifiber building products on the interior of the building that contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.6. Plastic Laminate Cabinets and Countertops

a. Use composite wood and agrifiber building products on the interior of the building that contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.7. Sealants and Adhesives, Interior on-site applied only.

a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 MATERIALS

2.3.1. General

a. Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated and, where the following products are part of interior woodwork, with requirements of the referenced product standards that apply to product characteristics indicated:

(1) Hardboard: AHA A135.4.
(2) Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
(3) Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
(4) Softwood Plywood: DOC PS 1.

b. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
c. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a precoated finish.

(1) Basis-of-Design Products: Corian; DuPont Polymers.

2.4 HARDWARE AND ACCESSORY MATERIALS

2.4.1. General

a. Provide hardware and accessory materials associated with interior architectural woodwork.

2.4.2. Hardware Standard

a. Comply with BHMA A156.9 for items indicated by reference to BHMA numbers or referenced to this standard.

2.4.3. Exposed Hardware Finishes

a. For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA code number indicated.

(1) Satin Chromium Plated Steel, BHMA 652.

2.4.4. Concealed Hardware Finishes

a. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of BHMA A156.9.

2.4.5. Hardware:

a. Hinges: B01602, 95 degree opening.
b. Pulls: B02011, 5/16 inch diameter wire pull, 4-inch centers, 1-5/16-inch projection.
c. Shelf Supports: B04013.
d. Adjustable Shelf Standards: B04102, 1-1/4-inch wide by ½ inch, double slot.
e. Adjustable Knife Brackets: B04112, double knife bracket.
f. Drawer Slides: B05011.
g. Locks for Reveal Overlay On Face Frame Type Cabinet:

(1) Basis-of-Design Products: Olympus Lock, Inc., Series 721.
(2) Provide lock cylinder, keying, and finish as specified in Division 8 Section "Door Hardware;" interchangeable core, key projects and retracts dead bolt, key may be withdrawn in locked or unlocked position.
(3) Key locks of cabinets in same room alike unless otherwise indicated.

2.5 INSTALLATION MATERIALS

2.5.1. Furring, Blocking, Shims, and Hanging Strips

a. Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

2.5.2. Screws

a. Select material, type, size, and finish required for each use. Comply with ASME B18.6.1 for applicable requirements. For metal framing supports, provide screws as recommended by metal-framing manufacturer.

2.5.3. Nails

a. Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

2.5.4. Anchors:

a. Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.

2.6 FABRICATION, GENERAL

2.6.1. Interior Woodwork Grade

a. Provide interior woodwork complying with the referenced quality standard and of the following grade:

(1) Grade: Premium.

2.6.2. Wood Moisture Content

a. Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.

2.6.3. Fabrication

a. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

(1) Corners of cabinets and edges of solid-wood (lumber) members 3/4 inch thick or less: 1/16 inch (1.5 mm).
(2) Edges of rails and similar members more than 3/4 inch thick: 1/8 inch.

b. Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
c. Shop-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.

2.7 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

2.7.1. Quality Standard

a. Comply with requirements of referenced quality standard for plastic laminate-faced cabinets.

2.7.2. Grade

a. Premium.

2.7.3. Type of Cabinet Construction

a. Type B, Style 1 (Reveal overlay on face frame).
b. Reveal Dimension: 1/2 inch.

2.7.4. Laminate Cladding for Exposed Surfaces

a. High-pressure decorative laminate complying with the following requirements:

(1) Horizontal Surfaces Other Than Plastic-Laminate Countertops: HGS.

(2) Postformed Surfaces: HGP.
(3) Vertical Surfaces: VGS.
(4) Edges: HGS.

2.7.5. Materials for Semiexposed Surfaces:

a. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.

(1) For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
(2) Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.

b. Drawer Sides and Backs: Thermoset decorative panels.
c. Drawer Bottoms: Thermoset decorative panels.

2.7.6. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces

a. High-pressure decorative laminate, NEMA LD3, Grade BKL.

2.7.7. Colors, Patterns, and Finishes

a. Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

(1) Match color, pattern, and finish as indicated by laminate manufacturer's designations for these characteristics.

2.7.8. Drawer Construction

a. Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

(1) Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

2.8 PLASTIC-LAMINATE COUNTERTOPS

2.8.1. Quality Standard

a. Comply with requirements of referenced quality standard for high-pressure decorative laminate countertops.
b. Grade: Premium.
c. High-Pressure Decorative Laminate Grade: HGS.
d. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

(1) Match color, pattern, and finish as indicated by manufacturer's designations for these characteristics.

e. Grain Direction: Parallel to cabinet fronts.
f. Edge Treatment: HGS.
g. Core Material: Industrial grade medium-density particleboard.

h. Core Material at Sinks and Sink Splashes: Veneer core plywood with Type II adhesive, industrial-grade particleboard or fiberboard with a 24-hour thickness swell factor of 5 percent or less and a 24-hour water-absorption factor of 10 percent or less for the entire countertop elevation and return elevation.

2.8.2. Fabrication

a. Assembly 2 (deck mount) back- an end-splash construction.

2.9 SOLID-SURFACING-MATERIAL COUNTERTOPS

2.9.1. Quality Standard

a. Comply with requirements of referenced quality standard for solid-surface countertops.
b. Grade: Premium.
c. Solid-Surfacing-Material Thickness: ½ inch.
d. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:

(1) Match color, pattern, and finish as indicated by manufacturer's designations for these characteristics.

2.9.2. Fabrication

a. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

2.10 ARTICULATING KEY BOARD TRAY

2.10.1. Counter Keyboard System

a. Under counter-mounted, full-extension, black powder-coated steel keyboard tray and slides with steel carburized ball bearings, and as follows:

(1) Basis-of-Design Products: Accuride; Standard Keyboard System, Model CBERGO-TRAY300.
(2) Unit Profile: Width: 29-19/32 inches; depth: 19-13/16 inches.
(3) Slide Travel: Typing position 10-9/32 inches, fully open 15-9/32 inches.
(4) Tray Profile: Inside tray width: 25-1/2 inches; Inside tray depth: 8-19/32 inches.
(5) Mounting Space: Minimum 30 inches.
(6) Slides Rated Capacity: 100 lbf.
(7) Brackets: Variable height, inboard/outboard.
(8) Tray Tilt: At minus 7 degrees, minus 3.5 degrees, and neutral (flat).
(9) Features:

(a) Ergonomic design.
(b) Slides fully concealed from view.
(c) No rough edges or pinch points.
(d) Accommodates any size keyboard by removing palm rest.
(e) Large tray width provides unhanded mouse surface.
(f) Foam mouse pad and removable full-length gel palm rest.
(g) Cable management fixtures incorporated in rear of tray.

(h) Slides silenced in the open and closed positions.
(i) Detent in the full open, typing, and closed positions.
(j) Rear storage compartments for office supplies.

2.10.2. Grommets for Cable Passage through Countertops

a. 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
b. Basis-of-Design Products: " SG series," Doug Mockett and Co., Inc.

2.11 SHELVING

2.11.1. Utility Shelving:

a. Softwood Boards: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; C Select (Choice), D Select (Quality), Finish or 1 Common (Colonial), Premium or 2 Common (Sterling); NeLMA, NLGA, or WWPA; kiln dried.

(1) 3/4 inch by 1-½-inch solid lumber dropped edge, glued and nailed to shelf.
(2) Shelf Width: As indicated.
(3) Finish: Opaque painted finish as specified in Division 9 Section “Painting” and color as indicated on drawings

b. Adjustable Shelf Standards:

(1) Double slot, 1-1/4-inch wide by ½-inch high, 1-inch adjustment.
(2) Knape & Vogt Mfg. Co., No. 85.
(3) Maximum Standard Spacing: 48 inches on center.
(4) Fasten standards to solid backing in wall with No. 10 screws, minimum, 12 inches on center.

c. Adjustable Double Knife Brackets:

(1) Length: Maximum length consistent with width under shelf.
(2) Knape & Vogt Mfg. Co., No. 185.

d. Shelf Rest:

(1) Mount shelves to brackets with two shelf rests per bracket. Fasten with 2-No. 10 wood screws per shelf rest.
(2) Knape & Vogt Mfg. Co., No. 106.

2.12 SILVER PARACUBE GRID

2.12.1. Basis-of-Design Products

a. A.L.P. Lighting Components, Inc., Para-Lite 1 (Style 2) with Avoida-Notch frame.

(1) Material: One-piece injection molded polystyrene or acrylic parabolic louver.
(2) Cell Dimensions: Square cell 5/8 by 5/8 by 7/16-inch.
(3) Finish: Primary undercoat and highly specular vacuum metalized silver finish.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1. General

a. Condition woodwork to average prevailing humidity conditions in installation areas before installing.
b. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.2 INSTALLATION

3.2.1. General

a. Quality Standard: Install interior architectural woodwork to comply with referenced quality standard for the same grade specified in Part 2 of this Section for type of woodwork involved.
b. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 96 inches for plumb and level (including tops).
c. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
d. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed nailing, countersunk and filled flush with woodwork and using filler matching final finish.
e. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.

(1) Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
(2) Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. as follows:

(a) No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.
(b) No. 10 wafer-head sheet metal screws or toggle bolts through metal backing or metal framing behind wall finish.

f. Tops: Anchor securely to base units and other support systems as indicated. Calk space between backsplash and wall with clear single-component mildew-resistant acid-curing silicone sealant.

(1) Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

3.3 ADJUSTING AND CLEANING

3.3.1. General

a. Repair damaged and defective woodwork where possible to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
b. Clean, lubricate, and adjust hardware.

c. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

3.4 PROTECTION

Provide final protection and maintain conditions in a manner acceptable to fabricator and Installer that ensures that woodwork is without damage or deterioration at the time of final acceptance.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 06604

FIBERGLASS REINFORCED PANELS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Glass-fiber reinforced plastic (FRP) wall paneling and trim accessories

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.

1.2 SUBMITTALS

1.2.1. Product Data

a. Manufacturer’s data sheets on each product to be used, including:

(1) Preparation instructions and recommendations.
(2) Storage and handling requirements and recommendations.
(3) Installation methods.

1.2.2. Sustainable Design Submittal:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements”.
b. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements”.

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Sustainable Design Submittals	S	R

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements”.

2.1.2. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 WALL PANELS

2.3.1. Basis-of-Design Product

a. Kemlite Company, Inc., Fire-X Glasbord with Surfaseal, Embossed, 85 White.

2.3.2. Materials

a. Fiberglass reinforced polyester plastic sheets: Sheets shall comply with fire-test-response characteristics specified, be chemical and stain resistant, and be USDA acceptable for incidental food contact. Provide manufacturer's standard matching moldings and trim as indicated.
b. Size: 4 ft. by 8 ft., minimum.
c. Thickness: 0.09 in.
d. Do not furnish material in roll form.

2.3.3. Fire Classification

a. NFPA Class A interior finish in accordance with ASTM E 84.
b. Flame spread: 0 to 25.
c. Smoke development: 0 to 450.

2.3.4. Panel Finish

a. Exposed surface: White glossy, pebbled texture.
b. Back, concealed surface: Smooth finish.

2.3.5. Accessories

a. Moldings: Manufacturer's standard one-piece white, extruded polyvinyl chloride plastic designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
b. Adhesive: Manufacturer's approved adhesive for substrate to which panels are applied.

(1) VOC Content: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

c. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
d. Sealant: Provide silicone type sealant specified in Division 7 Section "Joint Sealants" for joints between panels occurring in rooms exposed to moisture.

(1) VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1. General

a. Ensure surfaces to receive wall paneling are clean, true and free of irregularities.
b. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
c. Ensure wall surface flatness tolerance do not vary more than 1/8 inch in 10 feet.
d. Schedule installation of panels as late as possible to prevent damage during construction and movement of materials.

3.2 WALL PANEL INSTALLATION

3.2.1. General

a. Handle and apply wall panels in accordance with manufacturer's written instructions.
b. Install panels in a full spread of adhesive.
c. Where fasteners are required for additional support use noncorroding fasteners where concealed and Nylon drive rivets where exposed. Install in accordance with manufacturer’s written instructions allowing for expansion and contraction of panels.
d. Install with edges inserted into moldings. Allow clearance for expansion and contraction of panels when fitting into moldings.
e. Install trim accessories with adhesive. Do not fasten through panels.
f. Apply a continuous bead of sealant into molding slots prior to insertion of panels.

3.3 CLEANING

Clean panels after installation with materials recommended by panel manufacturer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 07210

BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Concealed building insulation.
b. Exposed building insulation.
c. Foamed-in-place air seal.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.
b. Division 3 Section "Insulating Concrete Freezer Floors" for freezer floor slab rigid board insulation.
c. Division 4 Section "Unit Masonry Assemblies" for cavity-wall rigid board insulation.
d. Division 7 Section "Thermoplastic Membrane Roofing" for insulation specified as part of roofing construction.
e. Division 7 Section “Exterior Insulation and Finish Systems” for insulation specified as part of EIFS systems.
f. Division 9 Section "Gypsum Board Assemblies" for sound attenuation blankets.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of insulation product specified.

1.2.2. Sustainable Design Submittal:

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.

d. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.2.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Sustainable Design Submittal:	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Single-Source Responsibility for Insulation Products

a. Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

1.4 DELIVERY, STORAGE, AND HANDLING

Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

a. Protect Plastic Insulation: Do not expose to sunlight, except to extent necessary for period of installation and concealment.
b. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
c. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Unfaced Mineral-Fiber Blanket Insulation

a. To contain recycled content.

2.2 AUXILIARY INSULATING MATERIALS

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

b. Aerosol Adhesives – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the Green Seal Standard for Commercial Adhesives GS-36, October 19, 2000.

2.3 INSULATING MATERIALS

2.3.1. General

a. Provide insulating materials that comply with requirements and with referenced standards.

2.3.2. Preformed Units

a. Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

2.3.3. Extruded-Polystyrene Board Insulation

a. ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:

(1) Type IV, 1.60 lb/cu. Ft..

2.3.4. Unfaced Mineral-Fiber Blanket Insulation

a. Mineral-Fiber Type: Fibers manufactured from glass-fiber or slag-wool-fiber/rock-wool-fiber.

(1) ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.3.5. Foil-Faced Mineral-Fiber Blanket Insulation

a. Mineral-Fiber Type: Fibers manufactured from glass-fiber or slag-wool-fiber/rock-wool-fiber.

(1) ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.

2.4 FOAMED-IN-PLACE PLASTIC AIR SEAL

2.4.1. General

a. Two-component polyurethane spray froth foam air seal utilizing non-ozone depleting, non-flammable, HFC propellant blowing agent dispensed through a two-component dispensing unit.

(1) Basis-of-design product: Fomo Products, Inc., Handi-Foam, www.fomo.com.

2.5 AUXILIARY INSULATING MATERIALS

Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

3.3 INSTALLATION

3.3.1. General

a. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
b. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.
c. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
d. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF FOAM BOARD INSULATION

On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

3.5.1. General

a. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
b. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
c. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
d. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
e. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

(1) Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
(2) Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

f. Install appropriate type insulation in cavities created in exterior walls and other typically insulated areas resulting from construction operations during alterations. Stuff Type 2, unfaced mineral fiber blanket, insulation into miscellaneous voids and cavity spaces where required for thermal protection and air-infiltration reduction in exterior walls. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. Ft. Completely fill voids and cavity spaces.

3.6 INSTALLATION OF FOAMED-IN-PLACE PLASTIC AIR SEAL

3.6.1. General

a. Install air seal at roof deck ribs at top of walls and where indicated.
b. Apply air seal to substrates by spray method indicated, complying with manufacturer's written instructions.
c. Fill and seal voids to prevent air infiltration.

3.7 PROTECTION

Protect installed insulation, air seal, and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.8 INSULATION SCHEDULE

Drawing Designation	**R-Value Or Thickness**	**Insulation**
Type 1	As indicated	Extruded-Polystyrene Board Insulation
Type 2	As indicated	Exposed or Concealed Building Insulation - Unfaced Mineral-Fiber Blanket Insulation
Type 3	As indicated	Exposed or Concealed Building Insulation: Foil-Faced Mineral-Fiber Blanket Insulation
Type 4	R = 30.6	Refer to Division 7 Section “Thermoplastic Membrane Roofing”
Type 5	As indicated	Refer to Division 4 Section “Unit Masonry Assemblies”
Type 6	As indicated	Refer to Division 9 Section “Gypsum Board Assemblies”
Type 7	As indicated	Foamed-in-place plastic-foam insulation
Type 8	As indicated	Refer to Division 7 Section “Exterior Insulation and Finish System”

END OF SECTION

CONSTRUCTION ISSUE

SECTION 07241

EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Walls: Water-drainage exterior insulation and finish system (EIFS) applied over water-resistive coating over glass-mat gypsum sheathing and masonry.
b. Soffits: Direct-applied exterior finish system (DEFS) applied over glass-mat gypsum sheathing.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.

b. Division 6 Section "Sheathing" for glass-mat gypsum sheathing.

1.2 SYSTEM DESCRIPTION

1.2.1. Class PB EIFS

a. A non-load-bearing, exterior cladding system that consists of an insulation board attached adhesively to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

1.2.2. Water-Drainage EIFS

a. EIFS with a means that allows water entering into an EIFS assembly to drain to the exterior.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. Class PB EIFS

a. Physical properties and structural performance that comply with the acceptance criteria of ICC-ES AC235.

(1) Drainage: According to ICC-ES AC235.

1.4 SUBMITTALS

1.4.1. Product Data

a. For each type and component of EIFS and DEFS indicated.

1.4.2. Samples for Verification

a. 24-inch- square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including a typical control joint filled with sealant of color selected.

b. Include sealant samples to verify color selected.

1.4.3. Manufacturer Certificates

a. Signed by manufacturers certifying that EIFS and joint sealants comply with requirements.

1.4.4. Compatibility and Adhesion Test Reports

a. For joint sealants from sealant manufacturer indicating the following:

(1) Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.

(2) Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.4.5. Evaluation Reports: For water-resistive coating, code compliance, and EIFS systems (including insulation), from ICC Evaluation Services, LLC.

1.4.6. Sustainable Design Submittal:

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.

d. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

(2) Paint and coating MSDS for each product applied on-site in the interior.

1.4.7. Field quality-control special inspection reports.

1.4.8. Submittal List:

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Samples for Verification	X	R
1.4.3	Manufacturer Certificates	X	I
1.4.4	Compatibility and Adhesion Test Reports	X	I
1.4.5	Evaluation Reports	X	I

1.4.6	Sustainable Design Submittal	S	I
1.4.7	Field quality-control special inspection reports	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications

a. An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.

1.5.2. Source Limitations

a. Obtain EIFS through one source from a single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with system components.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1. Delivery and Handling

a. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.

1.6.2. Storage

a. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

(1) Stack insulation board flat and off the ground.
(2) Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
(3) Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.7 PROJECT CONDITIONS

Weather Limitations: Maintain ambient temperatures above 40 deg F for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

Coordinate installation of EIFS with related Work specified in other Sections to ensure that assemblies, including sheathing, flashing, trim, joint sealants, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes. Do not allow water to penetrate behind flashing and drainage plane that is behind water-drainage EIFS.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Water-Resistive Coatings

a. Clear wood finishes, floor coatings, stains, primers, sealers & shellacs – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1113, Architectural Coatings, January 1, 2004.

2.1.3. Flexible-Membrane Flashing

a. Product to contain recycled content.

2.1.4. Insulation Adhesive

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

b. Aerosol Adhesives – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the Green Seal Standard for Commercial Adhesives GS-36, October 19, 2000.

2.1.5. Primer

a. Clear wood finishes, floor coatings, stains, primers, sealers & shellacs – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1113, Architectural Coatings, January 1, 2004.

2.1.6. Finish-Coat Materials

a. Clear wood finishes, floor coatings, stains, primers, sealers & shellacs – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1113, Architectural Coatings, January 1, 2004.

2.1.7. Elastomeric Sealant Products

2.1.8. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

b. Aerosol Adhesives – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the Green Seal Standard for Commercial Adhesives GS-36, October 19, 2000.

2.2 MANUFACTURERS

2.2.1. Basis-of-Design Products

a. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2.2. Basis-of-Design EIFS Systems

a. Subject to compliance with requirements, provide one of the following wall systems.

(1) Water-Drainage Channeled Insulation System

(a) Senergy; Degussa Wall Systems, Inc.; Senerflex Channeled Insulation Design.
(b) Dryvit Systems, Inc.; Dryvit Outsulation MD System.

(2) Water-Drainage Channeled Adhesive System

(a) Senergy; Degussa Wall Systems, Inc.; Senerflex Channeled Adhesive Design.
(b) Sto Corp.; Sto Therm Essence NExT

2.2.3. Basis-of-Design DEFS Systems

a. Subject to compliance with requirements, provide one of the following wall systems.

(1) Dryvit Finish System for Exterior Soffits.
(2) Sto Corp.; Sto Quick Gold Finish System for Soffits.

2.3 MATERIALS

2.3.1. Compatibility

a. Provide water-resistive coating, adhesive, fasteners, board insulation, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by EIFS manufacturer for Project.

2.3.2. Water-Resistive Coatings

a. EIFS manufacturer's standard formulation and accessories for use as water/weather-resistive barriers, compatible with substrate, and complying with physical and performance criteria of ICC-ES AC212..

(1) Sheathing Joint Tape: Type recommended by EIFS manufacturer for sealing joints between and penetrations through sheathing.

2.3.3. Flexible-Membrane Flashing

a. Cold-applied, fully self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer and complying with ICC-ES AC148.

2.3.4. Insulation Adhesive

a. EIFS manufacturer's standard formulation designed for indicated use, compatible with substrate, and complying with one of the following:

(1) Job-mixed formulation of portland cement complying with ASTM C 150, Type I, and polymer-based adhesive specified for base coat.
(2) Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.

2.3.5. Molded, Rigid Cellular Polystyrene Board Insulation

a. Comply with ASTM C 578, Type I; EIFS manufacturer's requirements; and EIMA's "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:

(1) Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
(2) Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, per ASTM E 84.
(3) Dimensions: Provide insulation boards not more than 24 by 48 inches and in thickness indicated but not more than 4 inches thick.
(4) Channeled Board Insulation: EIFS manufacturer's standard factory-fabricated profile with linear, vertical drainage channels, slots, or waves on the back side of board.
(5) Foam Shapes: Provide with profiles and dimensions indicated on Drawings.

2.3.6. Reinforcing Mesh

a. Balanced, alkali-resistant, open-weave glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. per EIMA 105.01, complying with ASTM D 578 and the following requirements for minimum weight:

(1) Standard-Impact Reinforcing Mesh: Not less than 4.0 oz./sq. Yd.

2.3.7. Base-Coat Materials

a. Standard mixture.

b. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.

2.3.8. Primer

a. EIFS manufacturer's standard factory-mixed elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

2.3.9. Finish-Coat Materials

a. EIFS manufacturer's standard acrylic-based coating complying with the following requirements for material composition and method of combining materials:

(1) Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
(2) Colors: As indicated.

2.3.10. Water: Potable.

2.3.11. Trim Accessories

a. Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written requirements; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard Cell Class for use intended, and ASTM C 1063.

(1) Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
(2) Weep Screed/Track: Prefabricated, one-piece type for attachment behind insulation with perforated face leg extended to form a drip and weep holes in track bottom, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg; designed to drain incidental moisture that gets into wall construction to the exterior at terminations of EIFS with drainage.
(3) Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
(4) Parapet Cap/Roof Edge Flashing: Type for covering parapet top/roof edge with design complying with Division 7 Section “Manufactured Roof Specialties” for copings and roof-edge flashings.

b. Soffit Trim Reveal Molding

(1) Vented Reveal Basis-of-Design Product: Fry Reglet Corporation, Aluminum Vent DCS-625-V-300, 5/8 inch deep by 3-inch wide reveals, clear anodized finish.

(2) Vented F Reveal Basis-of-Design Product: Fry Reglet Corporation; Aluminum Vent FDM-625-V-300, 5/8 inch deep by 3-inch wide reveals; clear anodized finish.

2.4 ELASTOMERIC SEALANTS

2.4.1. Elastomeric Sealant Products

a. Provide EIFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with ASTM C 920 Type S or M, minimum Grade NS, minimum Class 25 and Use O. Under the Use O classification, the

sealant shall be qualified for each material to which sealant is applied. The details for sealant installation, including the width and thickness of the sealant, shall be designed by the EIFS manufacturer.

2.4.2. Sealant Color

a. Match EIFS color.

2.5 MIXING

2.5.1. General

a. Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of EIFS.
b. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.
c. Proceed with installation only after unsatisfactory conditions have been corrected.

(1) Begin coating application only after surfaces are dry.
(2) Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

3.2.1. General

a. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
b. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind drainage plane of EIFS and deterioration of substrates.
c. Prepare and clean substrates to comply with EIFS manufacturer's written requirements to obtain optimum bond between substrate and adhesive for insulation.

3.3 EIFS INSTALLATION, GENERAL

Comply with EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

3.4 SUBSTRATE PROTECTION APPLICATION

3.4.1. Primer/Sealer

a. Apply over substrates where required by EIFS manufacturer to protect substrates from degradation and where required by EIFS manufacturer for improving adhesion of insulation to substrate.

3.4.2. Water-Resistive Coatings

a. Apply over substrates of wall systems to protect substrates from degradation and to provide water-/weather-resistive barrier.

(1) Tape and seal joints, exposed edges, terminations, and inside and outside corners of sheathing unless otherwise indicated by EIFS manufacturer's written instructions.

3.4.3. Flexible-Membrane Flashing

a. Install over weather-resistive barrier, applied and lapped to shed water; seal at openings, penetrations, terminations, and where indicated by EIFS manufacturer's written instructions to protect wall assembly from degradation. Prime substrates, if required, and install flashing to comply with EIFS manufacturer's written instructions and details.

3.5 TRIM INSTALLATION

3.5.1. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, and elsewhere as indicated, according to EIFS manufacturer's written instructions. Coordinate with installation of insulation.

a. Weep Screed/Track: Use at bottom termination edges, at window and door heads of water-drainage EIFS unless otherwise indicated.
b. Expansion Joint: Use where indicated on Drawings.
c. Casing Bead: Use at other locations.
d. Parapet Cap Flashing: Use where indicated on Drawings.

3.5.2. Soffit Trim Reveal Molding:

a. Use where indicated on Drawings.

3.6 INSULATION INSTALLATION

3.6.1. Board Insulation

a. Adhesively attach insulation to substrate in compliance with EIFS manufacturer's written instructions, and the following:

(1) Wall System

(a) Install insulation boards over sheathing with long dimension at right angles to stud faming.
(b) Place channeled insulation with channels aligned in the vertical position for drainage; align drainage channels with channels in insulation boards above and below.

(c) Apply adhesive to insulation by notched-trowel method resulting in approximately ½- by ½-inch ribbons 2 inches apart.
(d) Apply adhesive ribbons parallel to the short dimension of the insulation board so that when the board is applied to the sheathing the adhesive ribbons run vertically creating vertical drainage channels between the water/weather-resistive barrier and the insulation boards to provide water drainage from behind the insulation board.
(e) Apply adhesive ribbons between the channels on channeled insulation boards.
(f) Where trim is not indicated begin first course of insulation from a level base line and work upward.
(g) Where trim is indicated begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
(h) Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings and not less than 4 inches from aesthetic reveals.
(i) Interlock ends at internal and external corners.
(j) Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and water-/weather-resistive barrier.

(2) Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
(3) Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
(4) Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/16 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch.
(5) Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch.
(6) Install foam shapes and attach to supporting substrate.
(7) Interrupt insulation for expansion joints where indicated.
(8) Joint-sealant application to base coat: Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
(9) Joint-sealant application to casing beads: Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
(10) After installing insulation and before applying field-applied reinforcing mesh, fully wrap board edges. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches over front and back face, unless otherwise indicated on Drawings or EIFS manufacturer recommends extending mesh onto the substrate.
(11) Treat exposed edges of insulation as follows:

(a) Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
(b) Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
(c) At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.

3.6.2. Expansion Joints

a. Install at locations indicated, where required by EIFS manufacturer, and as follows:

(1) At expansion joints in substrates behind EIFS..
(2) Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
(3) Where wall height or building shape changes.
(4) Where EIFS manufacturer requires joints in long continuous elevations.

3.7 WALL SYSTEM BASE-COAT INSTALLATION

3.7.1. General

a. Apply to exposed surfaces of insulation in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16-inch dry-coat thickness.

3.7.2. Reinforcing Mesh

a. Embed type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible

(1) Standard-impact reinforcing mesh.
(2) High-impact reinforcing mesh on wall surfaces below 8 feet above finished ground floor slab.

3.7.3. Additional Reinforcing Mesh

a. Apply strip reinforcing mesh around openings extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch-wide strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.

(1) At aesthetic reveals, apply strip reinforcing mesh not less than 8 inches wide.
(2) Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.

3.7.4. Shapes

a. Fully embed reinforcing mesh in base coat.

3.7.5. Double Base-Coat Application

a. Where indicated, apply second base coat in same manner and thickness as first application except without reinforcing mesh. Do not apply until first base coat has cured.

3.8 SOFFIT SYSTEM BASE-COAT INSTALLATION

3.8.1. Apply over sheathing according to DEFS manufacturer's written instructions. Embed mesh so that no mesh color shows through base coat when it is dry. Avoid wrinkles in the mesh

3.9 FINISH-COAT INSTALLATION

3.9.1. Primer

a. Apply over dry base coat according to EIFS/DEFS manufacturer's written instructions.

3.9.2. Finish Coat

a. Apply over dry primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS/DEFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations

3.10 INSTALLATION OF JOINT SEALANTS

3.10.1. General

a. Prepare joints and apply sealants, of kind and at locations indicated, to comply with applicable requirements in Division 7 Section "Joint Sealants" and in ASTM C 1481

(1) Unless otherwise required by EIFS manufacturer, apply joint sealants after base coat has cured but before applying finish coat. Unless otherwise required by EIFS manufacturer, provide recessed joint configuration per Figure 3 in ASTM C 1481. If casing beads are used to form joints install sealant after applying finish coat.
(2) Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.
(3) Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
(4) Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
(5) Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
(6) Recess sealant sufficiently from surface of EIFS so an additional sealant application, including cylindrical sealant backing, can be installed without protruding beyond EIFS surface.

3.11 FIELD QUALITY CONTROL

3.11.1. General
a. Field quality control shall be in accordance with the Quality Control Plan.
b. Special Inspections: Engage a qualified special inspector to perform special inspections of the water-resistive barrier coating.

3.11.2. Statement of Special Inspections
a. Perform special inspections of the water-resistive barrier coating to ensure that ambient conditions at time of installation of water-resistive barrier coating were within acceptable range, installation sequences were followed, and coating meets requirements.

3.11.3. Remove and replace water-resistive barrier coating where inspection results indicate that the water-resistive barrier coating does not comply with specified requirements

3.12 CLEANING AND PROTECTION

CONSTRUCTION ISSUE

Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION

SECTION 07410

METAL PANELS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Factory-formed and field-assembled, standing-seam metal roof panels.
b. Factory-formed and field-assembled, concealed-fastener, metal soffit panels.
c. Underlayment materials.
d. Substrate boards.
e. Miscellaneous metal framing.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”
b. Division 5 Section "Steel Deck" for steel roof deck supporting metal roof panels.
c. Division 5 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal panels.
d. Division 7 Section "Sheet Metal Flashing and Trim" for field-formed roof drainage systems, and other sheet metal work not part of metal roof panel assemblies.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. General

a. Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

1.2.2. Water Penetration

a. No water penetration of standing seam metal roof panels when tested according to ASTM E 1646 at the following test-pressure difference:

(1) Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. Ft. and not more than 12.0 lbf/sq. Ft..
(2) Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. Ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
(3) Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

1.2.3. Wind-Uplift Resistance

a. Provide metal roof panel assemblies that comply with UL 580 for wind-uplift resistance class indicated.

1.2.4. FMG Listing

a. Provide metal roof panels and component materials that comply with requirements in FMG 4471 as part of a panel roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

(1) Fire/Windstorm Classification: Class 1A- 90.
(2) Hail Resistance: MH.

1.2.5. Structural Performance

a. Provide metal roof panel assemblies (including sheathing) capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592

(1) Wind Loads: Refer to Division 1 Section "Description of Work" for wind loading design criteria.

1.2.6. Seismic Performance

a. Provide metal panel assemblies capable of resisting the effects of earthquake motions.
b. Refer to Division 1 Section "Description of Work" for seismic-load design criteria.
c. Determine seismic loads using the appropriate exposure coefficient for the metal panel assemblies.

1.2.7. Thermal Movements

a. Provide metal panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of metal panel and accessory indicated.

1.3.2. Shop Drawings

a. Show layouts of metal panels, including plans, elevations, sections, details, and attachments to other work.
b. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories.

1.3.3. Samples

a. For each exposed finish.

1.3.4. Sustainable Design Submittal:

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.3.5. Submittal List:

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Samples	X	R
1.3.4	Sustainable Design Submittal	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

Installer Qualifications: An employer of workers trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Metal Panels

a. Steel to contain post-consumer recycled content and pre-consumer recycled content.

2.1.3. Panel Sealants

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 PANEL MATERIALS

2.3.1. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

a. Surface: Smooth, flat finish.
b. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.

(1) High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
(2) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified below:

(a) Humidity Resistance: 2000 hours.
(b) Salt-Spray Resistance: 2000 hours.

c. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.3.2. Panel Sealants

a. Joint Sealant: ASTM C 920; elastomeric silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.

2.4 UNDERLAYMENT MATERIALS

2.4.1. Felts: ASTM D 226

a. Type II (No. 30), asphalt-saturated organic felts.

2.5 SUBSTRATE BOARDS

2.5.1. Glass-Mat Gypsum Roof Board

a. ASTM C 1177/C 1177M.
b. Type and Thickness: Regular, ½ inch.

c. Product: Subject to compliance with requirements, provide DensDeck Roof Board by Georgia-Pacific Corporation.

2.5.2. Substrate-Board Fasteners

a. Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FMG 4470, designed for fastening substrate board to substrate.

2.6 MISCELLANEOUS METAL FRAMING

2.6.1. General

a. Comply with ASTM C 754 for conditions indicated.

2.6.2. Steel Sheet Components

a. Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.

2.6.3. Hat-Shaped, Rigid Furring Channels

a. ASTM C 645.
b. Minimum Base Metal Thickness: 0.0312 inch.
c. Depth: 7/8 inch.

2.6.4. Fasteners for Metal Framing

a. Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.7 MISCELLANEOUS MATERIALS

2.7.1. Fasteners for Metal Panels

a. Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating.

(1) Fasteners for Panels: Self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal panels.
(2) Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
(3) Blind Fasteners: High-strength aluminum or stainless-steel rivets.

2.7.2. Bituminous Coating

a. Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.8 METAL ROOF PANELS

2.8.1. Standing-Seam Metal Roof Panels

a. Factory-formed, designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
b. Basis-of-Design Product: Peterson Aluminum Corporation, "Snap-Clad."
c. Type: Vertical rib, snap joint, flat pan between ribs.
d. Material: Aluminum sheet, 0.032 inch (0.81 mm) thick.

(1) Exterior Finish: Fluoropolymer.
(2) Color: As indicated on drawing.

e. Panel Coverage: 12 inches.
f. Panel Height: 1-3/4 inches.
g. Uplift Rating: UL 90.

2.8.2. Roof Panel Accessories

a. Provide components required for a complete metal roof panel assembly including trim, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.
b. Closures: Provide closures at eaves fabricated of same metal as metal roof panels.
c. Clips: Floating to accommodate thermal movement. Manufacturer's standard panel clips designed to withstand negative-load requirements.
d. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch- thick, stainless-steel or nylon-coated aluminum sheet.

2.9 METAL SOFFIT PANELS

2.9.1. Concealed-Fastener, Metal Soffit Panels

a. Factory-formed, designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

2.9.2. V-Groove-Profile Metal Soffit Panels

a. Perforated panels formed with vertical panel edges and flat pan between panel edges; with V-groove joint between panels.
b. Basis-of-Design Product: Peterson Aluminum Corporation, "PAC-850."
c. Material: Aluminum sheet, 0.032 inch thick.

(1) Half vent panels.
(2) Exterior Finish: Fluoropolymer.
(3) Color: As indicated on drawing.
(4) Texture: Smooth.

d. Panel Coverage: 12 inches.

e. Panel Height: 1/2 inch.

2.10 FABRICATION

2.10.1. Fabrication and Finishing

a. Fabricate and finish metal panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
b. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
c. Where indicated, fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.
d. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
e. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.
b. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Clean roof deck of substances harmful to substrate boards, including removing projections capable of interfering with substrate board attachment.
b. Substrate Board: Install substrate boards over roof deck on entire roof surface. Attach with substrate-board fasteners.

(a) Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

c. Miscellaneous Framing: Install eave angles, furring, and other miscellaneous panel support members and anchorage according to manufacturer's written instructions.

(a) Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 METAL ROOF PANEL UNDERLAYMENT INSTALLATION

3.3.1. Felt Underlayment

a. Install felt underlayment on substrate boards. Use adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.3.2. Install flashings to cover underlayment to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION

3.4.1. Standing-Seam Metal Roof Panels

a. Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
b. Install clips to supports with self-tapping fasteners.
c. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
d. Provide metal roof panels of full length from eave to wall. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.

(1) Field cutting of metal roof panels by torch is not permitted.
(2) Rigidly fasten eave end of metal roof panels and allow wall end free movement due to thermal expansion and contraction. Predrill panels.
(3) Provide metal closures at rake walls.
(4) Flash and seal metal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
(5) Lap metal flashing over metal roof panels to allow moisture to run over and off the material.

3.4.2. Metal Soffit Panels

a. Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
b. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

3.4.3. Fasteners

a. Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

3.4.4. Metal Protection

a. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

3.4.5. Joint Sealers

a. Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies.
b. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

3.5 ACCESSORY INSTALLATION

a. Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
b. Install components required for a complete metal panel assembly including trim, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
c. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.6 CLEANING AND PROTECTION

Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION

SECTION 07420

INSULATED CORE METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Foamed-insulation-core horizontal and vertical metal wall panel assembly with integral reveals and profiled panels, with related metal trim and accessories.
b. Miscellaneous metal framing.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”
b. Division 5 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal panels.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. General

a. Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

1.2.2. Water Penetration

a. Static Pressure: No uncontrolled water penetration per ASTM E 331 at a minimum static differential pressure of 15 lbf/sq. ft., using minimum 10-by-10 foot test panel that includes horizontal and vertical joints.
b. Dynamic Pressure: No uncontrolled water penetration per AAMA 501.1 at a minimum static differential pressure of 15 lbf/sq. ft., using minimum 10-by-10 foot test panel that includes horizontal and vertical joints.

1.2.3. Air Infiltration

a. Maximum 0.06 cfm/sq. ft. per ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft., using minimum 10-by-10 foot test panel that includes horizontal and vertical joints.

1.2.4. Structural Performance

a. Provide metal wall panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, per ASTM E 72:

(1) Wind Loads: Refer to Division 1 Section "Description of Work" for wind loading design criteria.

1.2.5. Seismic Performance

a. Provide metal panel assemblies capable of resisting the effects of earthquake motions.
b. Refer to Division 1 Section "Description of Work" for seismic-load design criteria.
c. Determine seismic loads using the appropriate exposure coefficient for the metal panel assemblies.

1.2.6. Thermal Movements

a. Provide metal panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of metal panel and accessory indicated.

1.3.2. Shop Drawings

a. Show layouts of metal panels, including plans, elevations, sections, details, and attachments to other work.
b. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories.

1.3.3. Samples

a. For each exposed finish.

1.3.4. Sustainable Design Submittal:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.3.5. Submittal List:

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R

1.3.3	Samples	X	R
1.3.4	Sustainable Design Submittal	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

Installer Qualifications: An employer of workers trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Metal Panels

a. Steel to contain Post-consumer recycled content and pre-consumer recycled content.

2.1.3. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 SYSTEM DESCRIPTION

2.3.1. Insulated Core Metal Wall Panel System:

a. Factory-foamed-in-place horizontal and vertical wall panel system consisting of exterior metal face sheet with interior metal liner panel, bonded to factory foamed-in-place core in thermally-separated profile, utilizing no glues or adhesives, with factory sealed tongue-and-groove and pressure-equalized rainscreen-designed horizontal joint, attached to supports using concealed fasteners.

(1) System is provided complete with secondary metal framing.

b. Basis of Design: CENTRIA, Formawall Dimension Series Insulated Core Metal Wall Panels.

(1) CENTRIA Architectural Systems; Moon Township, PA 15108-2944. Tel: (800)759-7474. Tel: (412)299-8000. Fax: (412)299-8317. Email: info@CENTRIA.com. Web: www.CENTRIA.com.

2.4 PANEL MATERIALS

2.4.1. Metallic-Coated Steel Face Sheet: Coil-coated, ASTM A 755.

a. Metallic-Coated Steel Face Sheet: Coil-coated, ASTM A 755.
b. Face Sheet Thickness: Minimum 0.030 inch/22 gage thick.
c. Surface: Smooth.

2.4.2. Exposed Coil-Coated Finish.

a. Fluoropolymer Two-Coat System: 0.2-mil primer with 0.8-mil 70 percent PVDF fluoropolymer color coat, AAMA 620.
(1) Basis of Design: CENTRIA Fluorofinish.

2.4.3. Metallic-Coated Steel Liner Sheet: Coil-coated, ASTM A 755, 0.024 inch/24 gage thick.

a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90, structural quality.
b. Surface: Embossed planked.
c. Interior Liner Panel Finish: 0.2 mil primer with 0.6 mil acrylic color coat.

2.4.4. Exposed Trim and Fasteners: Match panel finish.

2.5 INSULATION FOR PANEL CORES

2.5.1. Metal Panel Foamed-Insulation-Core.

a. Foamed-in-place urethane-modified isocyanurate, density minimum 2.7 lb/cu. ft., minimum compressive strength 20 lb/sq. in., and containing no CFC or HCFC compounds.

2.6 FOAMED INSULATION-CORE METAL WALL PANELS

2.6.1. Foamed-Insulation-Core Metal Wall Panels.

a. Factory-foamed-in-place horizontal and vertical wall panel system consisting of an exterior metal face sheet with interior metal liner panel, bonded to factory foamed-in-place core in thermally-separated profile, with no glues or adhesives, and with factory-sealed tongue-and-groove and rainscreen-designed pressure-equalized horizontal joint, configured with weep-hole-vented chamber to maintain equalized atmospheric pressure reducing potential for moisture drive into wall assembly, attached to supports using concealed fasteners.
b. Horizontal Joints: Horizontal joints with positive drip edge, sloped drain shelf and integral venting to the exterior along the panel length to permit moisture drainage and to allow air to enter the pressure equalization chamber. Joint shall have a 2-3/8-inch baffle interlock to provide effective rain screen and pressure equalized performance.

c. Vertical Joint: Vertical joints for insulated metal panels shall be gasketed, exposed wet seals are not permitted. Outer wings of gasket shall compress against the metal return flange (trimless end) of the panel face. The vertical joint shall be designed to allow moisture to be drained from the panel's horizontal joint. No end dam sealant is to be applied to the ends of the horizontal joint at the vertical joint location. A continuous back-up flash behind the vertical joint is required with two beads of field applied non-curing butyl sealant between the panel and back up flashing for each panel.
d. Panel Ends: Factory formed trimless ends, tabbed under panel horizontal shelf.
e. Panel Width: As Indicated.
f. Panel Profile: Flat in locations and sizes indicated.

(a) Profile-faced Panels: As indicated.
(b) Segmented-faced Panels: With intermediate formed joints, as indicated on Drawings.

g. Panel Thickness: As Indicated.

2.7 METAL WALL PANEL ACCESSORIES

a. Metal Wall Panel Accessories, General: Provide complete metal wall panel assembly incorporating trim, copings, fasciae, parapet caps, soffits, sills, inside and outside corners, and miscellaneous flashings. Provide manufacturer's factory-formed clips, shims, flashings, gaskets, lap tapes, closure strips, and caps for a complete installation. Fabricate accessories in accordance with SMACNA Manual.
b. Formed Flashing and Trim: Match material, thickness, and color of metal wall panel face sheets.
c. Extrusion Trim: Provide manufacturer-provided extruded trim for the following locations and as indicated on Drawings:

(1) Base trim.
(2) Coping.
(3) Panel installation perimeter.
(4) Opening perimeters.

d. Vertical Joint Seal Plate: Extruded aluminum seal plate with combination neoprene gasket and non-curing butyl dual seal forming pressure-equalized vented chamber permitting moisture to drain to exterior. Seal plate capable of transferring panel loads to vertical supports. Resultant vertical panel joint shall meet performance requirements.

(1) Performance: Vertical joint design shall effectively demonstrate pressure equalization and be evaluated in accordance with ASTM E 283-04 and ASTM E 331-00. A third party test indicating the successful passing of these tests and noting effective pressure equalization must be submitted prior to bid

e. Sealants: Type recommended by metal wall panel system manufacturer for application, meeting requirements of Division 07 Section "Joint Sealants."
f. Flashing Tape: 4-inch wide self-adhering butyl flashing tape.
g. Panel Attachment Clips: Concealed G-90 galvanized steel clip configured to prevent overdriving of fastener and crushing of foam core, with panel fasteners engaging both face and liner elements and mechanically attaching to panel supports.
h. Fasteners: Self-tapping screws, bolts, nuts, and other acceptable fasteners recommended by panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal wall panels by means factory-applied coating.

2.8 SECONDARY METAL FRAMING

2.8.1. General

a. Cold-formed metallic-coated steel sheet, ASTM C 645, Grade 50, with ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating.

2.8.2. Subgirts: C- or Z- shaped sections, 0.064-inch minimum.

2.8.3. Sill Channels: 0.064-inch minimum.

2.8.4. Hat Channels: 0.040 inch minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.
b. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Secondary Metal Framing: Install secondary metal framing components as indicated. Install secondary metal framing and other metal panel supports per ASTM C 754 and metal wall panel manufacturer's recommendations.

3.3 METAL WALL PANEL SYSTEM INSTALLATION

3.3.1. Install metal wall panel system in accordance with approved shop drawings and manufacturer's recommendations. Install metal wall panels in orientation, sizes, and locations indicated. Anchor metal wall panels and other components securely in place. Provide for thermal and structural movement

3.3.2. Attach panels to metal framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.

a. Fasteners for Steel Wall Panels: Stainless-steel for exterior locations and locations exposed to moisture; carbon steel for interior use only.
b. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as approved by manufacturer.
c. Fasten metal wall panels to supports with concealed clips at each joint at location, spacing, and with fasteners recommended by manufacturer. Install clips to supports with self-tapping fasteners.
d. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

e. Horizontal Joinery: Working from base of installation to top connect upper panel to lower panel at dry seal joinery.
f. Vertical Joinery: Provide reveal between vertical ends of panels as shown on shop drawings using hardware and gaskets furnished by manufacturer to form a weather tight seal between panels.
g. Dissimilar Materials: Where elements of metal wall panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

3.3.3. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies.

a. Seal panel end utilizing 2 beads of non-curing butyl aligning with factory-applied seal in adjacent panel pocket; apply continuously without gaps to complete panel system air barrier.
b. Seal metal wall panel end laps to supports or back-up flashing sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer. Do not install sealant in locations that will interfere with drainage of pressure-equalized panel chambers.
c. Prepare joints and apply sealants per Division 07 Section "Joint Sealants."

3.4 ACCESSORY INSTALLATION

3.4.1. General: Install metal wall panel accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

a. Install related flashings and sheet metal trim per requirements of Division 07 Section "Sheet Metal Flashing and Trim."
b. Install components required for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
c. Comply with performance requirements and manufacturer's written installation instructions.
d. Provide concealed fasteners except where noted on approved shop drawings.
e. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.5 CLEANING AND PROTECTION

3.5.1. Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.

3.5.2. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 07540

THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARYSection Includes

a. Adhered membrane roofing system.
b. Roof insulation.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.
a. Division 7 Section "Sheet Metal Flashing and Trim" for sheet metal flashing and trim integral with membrane roofing.
b. Division 7 Section "Manufactured Roof Specialties" for wind resistive metal flashing and trim integral with membrane roofing.

1.2 DEFINITIONS

1.2.1. Roofing Terminology

a. Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. General

a. Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

1.3.2. Material Compatibility

a. Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

1.3.3. Roofing System Design

a. Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7 or in accordance with membrane manufacture’s written fastening density instructions, whichever is more resistive to wind load indicated.

b. Wind Load:

(1) Provide roofing assemblies, including anchorage, capable of withstanding wind pressures acting inward and outward normal to the plane of the roof.
(2) Refer to Division 1 Section "Description of Work" for wind loading design criteria.
(3) Determine design loads using the appropriate coefficients for the roof configurations indicated.

1.3.4. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

1.4 SUBMITTALS

1.4.1. Product Data

a. For each type of product indicated.

1.4.2. Shop Drawings

a. For roofing system. Include plans, elevations, sections, details, and attachments to other Work.

(1) Base flashings and membrane terminations.
(2) Tapered insulation, including slopes.
(3) Insulation fastening patterns.

1.4.3. Installer Certificates

a. Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

1.4.4. Manufacturer Certificates

a. Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
b. Submit evidence of meeting performance requirements. Include the following roofing system design considerations:

(1) Corner Uplift Pressure.
(2) Perimeter Uplift Pressure.
(3) Field-of-Roof Uplift Pressure.

1.4.5. Product Test Reports

a. Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.

1.4.6. Maintenance Data

a. For roofing system to include in maintenance manuals.

1.4.7. Warranties

a. Special warranties specified in this Section.

1.4.8. Inspection Report

a. Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.4.9. Sustainable Design Documentation

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Product Data for roofing materials indicating Solar Reflectance Index (SRI) value.

1.4.10. Submittal List

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Shop Drawings	X	R
1.4.3	Installer Certificates	X	I
1.4.4	Manufacturer Certificates	X	I
1.4.5	Product Test Reports	X	I
1.4.6	Maintenance Data	X	I
1.4.7	Warranties	X	I
1.4.8	Inspection Report	X	I
1.4.9	Sustainable Design Documentation	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications

a. A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

1.5.2. Manufacturer Qualifications

a. A qualified manufacturer that has UL listing for membrane roofing system identical to that used for this Project.

1.5.3. Source Limitations

a. Obtain components for membrane roofing system from roofing membrane manufacturer.

1.5.4. Fire-Test-Response Characteristics

a. Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL or another testing and inspecting agency

acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

b. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

1.5.5. Preliminary Roofing Conference

a. Before starting roof deck construction, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 1 Section "Coordination". Review methods and procedures related to roof deck construction and roofing system including, but not limited to, the following:

(1) Meet with Contracting Officer, Government's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
(2) Review methods and procedures related to roofing installation, including manufacturer's written instructions.
(3) Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
(4) Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
(5) Review structural loading limitations of roof deck during and after roofing.
(6) Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
(7) Review governing regulations and requirements for insurance and certificates if applicable.
(8) Review temporary protection requirements for roofing system during and after installation.
(9) Review roof observation and repair procedures after roofing installation.

1.5.6. Preinstallation Conference

a. Conduct conference at Project site. Comply with requirements in Division 1 Section "Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

(1) Meet with Contracting Officer, Government's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
(2) Review methods and procedures related to roofing installation, including manufacturer's written instructions.
(3) Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
(4) Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
(5) Review structural loading limitations of roof deck during and after roofing.
(6) Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
(7) Review governing regulations and requirements for insurance and certificates if applicable.
(8) Review temporary protection requirements for roofing system during and after installation.
(9) Review roof observation and repair procedures after roofing installation.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1. Delivery

a. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

1.6.2. Storage

a. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

(1) Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

1.6.3. Protection

a. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

1.6.4. Handling

a. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.7 PROJECT CONDITIONS

1.7.1. Weather Limitations

a. Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

1.8.1. Special Warranty

a. Basis-of-Design manufacturer's Total Roofing System Warranty, without monetary limitation, non-prorated, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
(1) Special warranty includes roofing membrane, flashings, counterflashings, adhesives and sealants, insulation, membrane underlayment, fasteners, fastener plates, fastening bars, metal edging, metal termination bars, and other components of membrane roofing system.
(2) Warranty Period: 15 years from date of final acceptance.
(3) Warranty shall include roofing damage resulting from wind speeds up to and including 90 mph (3-second gust speed at 33 feet above ground for exposure category indicated).
(4) Evidence of manufacturer’s warranty reserve shall be in included as part of project submittals.

b. Upon completion of construction, ownership of the building will be transferred to the Installation upon which the facility is located, via DD Form 1354 “Transfer and Acceptance of Military Real Property”.

Warranty shall be issued to the Installation as identified in Division 1 “Phase Turnover and Contract Closeout”.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. TPO Roofing Membrane:

a. Product data indicating that roof materials comply with initial Solar Reflectance Index (SRI) not less than 78 for a minimum of 75 percent of the roof surface when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

2.2 MANUFACTURERS

2.2.1. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING MEMBRANE

2.3.1. Fabric-Reinforced Thermoplastic Polyolefin Sheet

a. Uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced, ASTM D 6878, and as follows:

(1) Basis-of-Design Product: Carlisle SynTec Incorporated. Sure-Weld Adhered Roofing System.
(2) Thickness: 60 mils, nominal.
(3) Exposed Face Color: White.
(4) Physical and Radiative Properties: In accordance with basis-of-design product for membrane thickness and color indicated.

2.4 AUXILIARY MATERIALS

2.4.1. General

a. Auxiliary materials approved by roofing system manufacturer for intended use in accordance with warranty requirements, including, but not necessarily limited to, the following:

(1) Insulation/ membrane underlayment.
(2) Insulation attachment materials and method.

(3) Membrane bonding adhesive.
(4) Membrane perimeter securement materials and method.
(5) Membrane splicing tape.
(6) Sheet flashing.
(7) Metal edging.

b. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
c. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
d. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.
e. Bonding Adhesive: Manufacturer's standard solvent-based low VOC bonding adhesive for membrane, and solvent-based low VOC bonding adhesive for base flashings.
f. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
g. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
h. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

2.5 ROOF INSULATION

a. General

(1) Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
(2) Provide insulation materials complying with a total minimum Long Term Thermac Resistance (LTTR) R-value of 30.6 minimum, per ASTM C 1289 and CAN/ULC.

2.5.2. Polyisocyanurate Board Insulation

a. ASTM C 1289, Type II, Class 1, Grade 2 or 3, felt or glass-fiber mat facer on both major surfaces approved by roofing system manufacturer for intended use in accordance with warranty requirements.
b. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches, unless otherwise indicated.
c. Other Insulation Shapes: Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

2.6.1. General

a. Roof insulation accessories recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

2.6.2. Fasteners

a. Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof membrane underlayment to substrate, and acceptable to roofing system manufacturer in accordance with warranty requirements.

2.7 MEMBRANE UNDERLAYMENT OTHER THAN INSULATION

2.7.1. Membrane Underlayment

a. Where membrane underlayment is required, in addition to insulation, to resist the wind speed specified in "Performance Requirements" Article, provide materials and fastenings in accordance with warranty requirements.

2.8 WALKWAYS

2.8.1. Heat Weldable Walkway Rolls

a. Factory-formed, non-porous, heavy-duty, slip-resisting, surface-textured walkway rolls, approximately 120 mils thick, 30 inches wide by 50 feet in length, and acceptable to membrane roofing system manufacturer.

(1) Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

(1) Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
(2) Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
(3) Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Division 5 Section "Steel Deck."
(4) Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

b. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
c. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 INSULATION INSTALLATION

3.3.1. General

a. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
b. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
c. Install tapered insulation under area of roofing to conform to slopes indicated or if not indicated, to provide positive sloping to drains.

(1) Install insulation so that all roof surfaces slope to drains, whether or not slope is explicitly indicated.

d. Install insulation so completed surface is flush with surface of contiguous wood nailers; adjust thickness of nailers to maintain surfaces flush.
e. Install insulation under area of roofing to achieve required thickness. Install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
f. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
g. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

(1) Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

3.3.2. Membrane Underlayment

a. When required by warranty requirements install membrane underlayment. Install over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt membrane underlayment together

3.3.3. Mechanically Fastened Insulation and Membrane Underlayment

a. Install and secure insulation membrane underlayment to deck in accordance with warranty requirements using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation and membrane underlayment to deck type.
b. Fasten insulation and membrane underlayment to resist uplift pressure at corners, perimeter, and field of roof in accordance with performance and warranty requirements.

3.4 ADHERED ROOFING MEMBRANE INSTALLATION

3.4.1. General

a. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
b. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.
c. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
d. Bonding Adhesive: Apply solvent-based low VOC bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
e. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
f. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
g. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.

(1) Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
(2) Verify field strength of seams a minimum of twice and repair seam sample areas.

(a) Conduct initial probe after membrane has had sufficient time to cool and set.
(b) Conduct a second probe after the membrane has experienced at least one complete thermal cycle (i.e., daily solar heating with nighttime cooling).

(3) Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

h. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

3.5 BASE FLASHING INSTALLATION

3.5.1. General

a. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
b. Apply solvent-based low VOC bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
c. Flash penetrations and field-formed inside and outside corners with sheet flashing.
d. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

3.6 WALKWAY INSTALLATION

3.6.1. Heat Weldable Walkway Rolls

3.6.2. Install walkway products in locations indicated or, if not indicated, from roof access indicated to and around roof-mounted mechanical equipment. Cut walkway rolls into maximum 10-foot lengths and position with a minimum 1 inch gap between adjacent pieces to allow for water drainage. Cut walkway so a 4-inch minimum gap is created over field splices. Heat weld to substrate according to roofing system manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

3.7.1. General

a. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Contracting Officer.

(1) Notify Contracting Officer 48 hours in advance of date and time of inspection.

b. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

c. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTING AND CLEANING

3.8.1. General

a. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Contracting Officer.

b. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of final acceptance and according to warranty requirements.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Formed roof drainage system.
b. Formed low-slope roof flashing and trim.
c. Precast concrete splashblocks
d. Metal downspout boots (shoes).

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”
b. Division 6 Section "Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
c. Division 7 Section "Manufactured Roof Specialties" for manufactured roof specialties not part of sheet metal flashing and trim.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. General

a. Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

1.2.2. Thermal Movements

a. Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.2.3. Water Infiltration

a. Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.3 SUBMITTALS

1.3.1. Sustainable Design Submittals

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.3.2. Shop Drawings

a. Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:

(1) Identify material, thickness, weight, and finish for each item and location in Project.
(2) Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
(3) Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
(4) Details of expansion-joint covers, including showing direction of expansion and contraction.

1.3.3. Samples for Verification

a. For each type of exposed finish required, prepared on Samples of size indicated below:

(1) Sheet Metal Flashing: 12 inches long. Include fasteners, cleats, closures, and other attachments.
(2) Trim: 12 inches long. Include fasteners and other exposed accessories.

1.3.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Sustainable Design Submittals	S	I
1.3.2	Shop Drawings	X	R
1.3.3	Samples for Verification	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual". Conform to dimensions and profiles shown unless more stringent requirements are indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. Delivery

a. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

1.5.2. Storage

a. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

1.5.3. Handling

a. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.6 COORDINATION

Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Sheet Metal Materials

a. Contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.

2.1.3. Elastomeric Sealant and Epoxy Seam Sealer

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

b. Aerosol Adhesives – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the Green Seal Standard for Commercial Adhesives GS-36, October 19, 2000.

2.2 MANUFACTURERS

Basis-of-Design Products: Subject to compliance with requirements, provide either the named products or equal products. Refer to Division 1 Section “Reference Standards and Definitions”.

2.3 SHEET METALS

2.3.1. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

2.3.2. Exposed Finishes

a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

(1) Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified below:

(a) Humidity Resistance: 2000 hours.
(b) Salt-Spray Resistance: 2000 hours.

(2) Color: As indicated on drawings.

2.3.3. Lead Sheet

a. ASTM B 749, Type L51121, copper-bearing lead sheet.

2.4 MISCELLANEOUS MATERIALS

2.4.1. General

a. Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

2.4.2. Fasteners

a. Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
b. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
c. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
d. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
e. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2.4.3. Solder for Lead

a. ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

2.4.4. Burning Rod for Lead

a. Same composition as lead sheet.

2.4.5. Elastomeric Sealant

a. ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.4.6. Epoxy Seam Sealer

a. Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

2.4.7. Bituminous Coating

a. Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 FABRICATION, GENERAL

a. Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
b. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
c. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

(1) Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

d. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
e. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.
f. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
g. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

(1) Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

2.6.1. Hanging Gutters

a. Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.

b. Expansion Joints: Butt type.
c. Gutters with Girth up to 15 Inches: Fabricate from the following material:

(1) Aluminum: 0.032 inch thick.

d. Gutters with Girth 16 to 20 Inches: Fabricate from the following material:

(1) Aluminum: 0.040 inch thick.

2.6.2. Downspouts

a. Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
b. Fabricate downspouts from the following materials:

(1) Aluminum: 0.024 inch thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

2.7.1. Counterflashing

a. Aluminum: 0.032 inch thick.

2.8 FINISHES

2.8.1. General

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
c. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 PRECAST CONCRETE SPLASHBLOCKS

Precast concrete type, of size and profile indicated on drawings; if not indicated, provide minimum 12-inch wide by 18-inch long with center depression.

2.10 METAL DOWNSPOUT BOOTS (SHOES)

a. Provide downspout boots made from cast gray iron in heights indicated with inlets of size and shape to suit downspouts.
b. Mark A: Vertical, to discharge into pipe, 48 inches long.

(1) Basis-of-Design Products

(a) Barry Pattern & Foundry Company, Inc., Catalog Number B25A. (800) 524-1809.
(b) McKinley Iron Works, Inc., Type DS4. (800) 433-2303.

c. Mark B: At 35 degrees from horizontal, to discharge onto pavement, 48 inches long.

(1) Basis-of-Design Product

(a) Barry Pattern & Foundry Company, Inc., Catalog Number B25D. (800) 524-1809.
(b) McKinley Iron Works, Inc., Type DS8. (800) 433-2303.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
b. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

a. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
b. Torch cutting of sheet metal flashing and trim is not permitted.
c. Do not use graphite pencils to mark aluminum surfaces
d. Metal Protection

(1) Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

(a) Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
(b) Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
(c) Coat back side of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.

e. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
f. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.
g. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

(1) Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

h. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

i. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

j. Seal joints with elastomeric sealant as required for watertight construction.

(1) Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

(2) Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

k. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished Work.

(1) Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

3.3.1. General

a. Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

3.3.2. Hanging Gutters

a. Join sections with riveted and soldered joints or with lapped joints sealed with elastomeric sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored straps spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.

(1) Fasten gutter spacers to front and back of gutter.
(2) Loosely lock straps to front gutter bead and anchor to roof deck.
(3) Anchor and loosely lock back edge of gutter to continuous cleat.
(4) Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.

3.3.3. Downspouts

a. Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

(1) Provide elbows at base of downspout to direct water away from building and, where indicated, onto splashblocks..

(2) Connect downspouts to underground drainage system where indicated.

3.3.4. Expansion-Joint Covers

a. Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.

3.3.5. Precast Concrete Splashblocks

a. Install where downspouts discharge on low-sloped roofs. Set in elastomeric sealant compatible with roofing membrane.

3.4 ROOF FLASHING INSTALLATION

3.4.1. General

a. Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

3.4.2. Counterflashing

a. Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.

3.4.3. Roof-Penetration Flashing

a. Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

(1) Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
(2) Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.5 CLEANING AND PROTECTION

3.5.1. Cleaning

a. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
b. Clean and neutralize flux materials. Clean off excess solder and sealants.
c. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

3.5.2. Protection and Repair

a. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

CONSTRUCTION ISSUE

END OF SECTION

CONSTRUCTION ISSUE

SECTION 07710

MANUFACTURED ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Roof-edge flashings.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”
b. Division 6 Section "Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
c. Division 7 Section "Sheet Metal Flashing and Trim" for site-fabricated sheet metal flashing and trim and for roof-edge drainage-system components.
d. Division 7 Section "Thermoplastic Membrane Roofing" for metal edging specified as part of roofing system special warranty.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. General Performance

a. Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
b. SPRI Wind Design Standard: Manufacture and install roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:

(1) Refer to Division 1 Section "Description of Work" for wind loading design criteria.

c. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

1.3.1. Product Data

(1) For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1.3.2. Shop Drawings

a. For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:

(1) Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
(2) Pattern of seams and layout of fasteners, cleats, clips, and other attachments.
(3) Details of termination points and assemblies, including fixed points.
(4) Details of special conditions.

1.3.3. Sustainable Design Submittal:

a. Materials shall comply with requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each product applied on-site in the interior.

1.3.4. Samples for Verification

a. For roof-edge flashings made from 12-inch lengths of full-size components including fasteners, cover joints, accessories, and attachments.

1.3.5. Product Test Reports

a. Based on evaluation of comprehensive tests performed by a qualified testing agency, for roof-edge flashings.

1.3.6. Warranty: Sample of special warranty.

1.3.7. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Sustainable Design Submittal	S	I
1.3.4	Samples for Verification	X	R
1.3.5	Product Test Reports	X	I
1.3.6	Warranties	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements".

R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Mockups

a. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

(1) Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups.
(2) Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. Storage

a. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

1.5.2. Protection

a. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

1.6 WARRANTY

1.6.1. Special Warranty on Painted Finishes

a. Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

(1) Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

(a) Color fading more than 5 Hunter units when tested according to ASTM D 2244.
(b) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
(c) Cracking, checking, peeling, or failure of paint to adhere to bare metal.

b. Finish Warranty Period: 20 years from date of Substantial Completion.

1.7 COORDINATION

Coordinate installation of roofing specialties with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Aluminum Sheet and Aluminum Extrusion Materials

a. Contain no less than 20% recycled content.

2.1.3. Elastometric Sealant

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

b. Aerosol Adhesives – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the Green Seal Standard for Commercial Adhesives GS-36, October 19, 2000.

2.2 EXPOSED METALS

2.2.1. Aluminum Sheet

a. ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

(1) Surface: Smooth, flat finish.
(2) Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

(a) Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
(b) Concealed Surface: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.3 CONCEALED METALS

2.3.1. Aluminum Extrusions

a. ASTM B 221, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

2.4 UNDERLAYMENT MATERIALS

Provide underlayment in accordance with roofing-specialty manufacture's recommendations.

2.5 MISCELLANEOUS MATERIALS

2.5.1. General

a. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
b. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

(1) Fasteners: Series 300 stainless steel screws electrolytically compatible with materials fastened.

c. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
d. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5.2. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.6 ROOF-EDGE FLASHINGS

2.6.1. Roof-Edge Fascia

a. Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous extruded-aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.

(1) Basis-of-Design Product: Subject to compliance with requirements, provide product by Carlisle SynTec Inc.

(2) SecurEdge 2000 Fascia.
(3) Fascia Cover: Formed aluminum, thickness as required to meet performance requirements, 0.063.inch minimum

(a) Finish: Two-coat fluoropolymer.
(b) Color: As indicated on drawings.

(4) Corners: Factory mitered and continuously welded or mechanically clinched and sealed watertight.
(5) Splice Plates: Injection molded TPO splices to allow thermal expansion of extruded aluminum anchor bar.
(6) Special Fabrications: Radiussed sections.

2.6.2. Edge Flashing

a. Manufactured roof drip edge consisting of coated metal fascia in section lengths not exceeding 12 feet and a continuous integral drip-edge cleat to engage fascia. Provide matching corner units.

(1) Basis-of-Design Product: Subject to compliance with requirements, provide product by Carlisle SynTec Inc.
(2) SecurWeld Heat-Weldable Coated Drip Edge Fascia.
(3) Fascia: Formed prefabricated TPO-coated aluminum, thickness as required to meet performance requirements.

(a) Color: White.

(4) Corners: Factory mitered and continuously welded or mechanically clinched and sealed watertight.

2.7 Splices: Heat welded TPO splices to allow thermal expansion of drip edge fasciaGENERAL FINISH REQUIREMENTS

2.7.1. General

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
c. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
b. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
c. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
d. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

3.2.1. General

a. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.

(1) Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
(2) Provide uniform, neat seams with minimum exposure of solder and sealant.
(3) Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.

(4) Torch cutting of roof specialties is not permitted.
(5) Do not use graphite pencils to mark metal surfaces.

3.2.2. Metal Protection

a. Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

(1) Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
(2) Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of underlayment and cover with a slip sheet.
(3) Bed flanges in thick coat of water cut-off mastic where required by manufacturers of roof specialties for waterproof performance.

3.2.3. Expansion Provisions

a. Allow for thermal expansion of exposed roof specialties.

(1) Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.
(2) When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

3.2.4. Fastener Sizes

a. Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

3.2.5. Joint Seal

a. Seal joints with elastomeric sealant as required by roofing-specialty manufacturer.
b. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.3 ROOF-EDGE FLASHING INSTALLATION

3.3.1. General

a. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
b. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.4 CLEANING AND PROTECTION

3.4.1. General

a. Clean off excess sealants.

b. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

c. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 07840

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Through-penetration firestopping systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
b. Fire-resistive joint systems for head-of-wall joints.

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements."

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Through-Penetration Firestop Systems

a. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
b. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:

(1) F-Rated Systems: Provide through-penetration firestop systems with F-ratings required but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
(2) T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings required, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

(a) Penetrations located outside wall cavities.
(b) Penetrations located outside fire-resistive shaft enclosures.

c. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

(1) For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
(2) For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.2.2. Fire-Resistive Joint Systems

a. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements for joints, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.

b. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction indicated as determined by UL 2079.

1.2.3. Firestop Systems Exposed To View

a. Where firestop systems are required to have same Class A finish rating as wall and ceiling finishes in which firestop systems are installed provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each product required.

1.3.2. Shop Drawings

a. For each firestop system:

(1) Submit documentation, including illustrations, from a qualified testing and inspecting agency, showing each type of construction condition, relationships to adjoining construction, and type of firestop item.

1.3.3. Field Quality-Control Test Reports

1.3.4. Sustainable Design Submittal

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Paint and coating MSDS for each product applied on-site in the interior.

1.3.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	I
1.3.2	Shop Drawings	X	I
1.3.3	Test Reports	X	I
1.3.4	Sustainable Design Submittal	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

1.5 Installation Responsibility

a. Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

1.5.2. Fire-Test-Response Characteristics

a. Provide firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article.

(1) Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
(2) Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.
(3) Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:

(a) Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
(b) Fire-resistive joint systems correspond to those required by referencing system designations of the qualified testing and inspecting agency.

1.5.3. Coordination

a. Coordinate construction of joints, openings and penetrating items to ensure that firestop systems are installed according to requirements specified by firestop system manufacturer.

1.5.4. Concealed Installations

a. Do not cover up firestop systems installations that will become concealed behind other construction until inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

2.1.2. Firestopping

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.2 FIRESTOPPING

2.2.1. Products

a. Subject to compliance with requirements, select and provide firestopping products for each fire-resistance-rated construction indicated on Drawings in accordance with "Part 1 Performance Requirements" Article.

2.2.2. Compatibility

a. Provide firestop systems that are compatible with one another; with joint substrates, with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

2.2.3. Accessories

a. Provide components for each firestop system, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems required.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Through-Penetration Firestop Systems

a. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications required.

b. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

(1) After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

c. Install fill materials for firestop systems by proven techniques to produce the following results:

(1) Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
(2) Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
(3) For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

d. Identification: Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so

that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. Include the following information on labels:

(1) The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
(2) Contractor's name, address, and phone number.
(3) Through-penetration firestop system designation of applicable testing and inspecting agency.
(4) Date of installation.
(5) Through-penetration firestop system manufacturer's name.
(6) Installer's name.

3.1.2. Fire-Resistive Joint Systems

a. Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications required.
b. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 FIELD QUALITY CONTROL

3.2.1. Inspecting Agency

a. Engage a qualified independent inspecting agency to inspect firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

3.2.2. Testing Services

a. Inspecting of completed installations of firestopping systems shall take place in successive stages as installation of firestopping systems proceeds. Do not proceed with installation of systems for the next area until inspecting agency determines completed work shows compliance with requirements.

(1) Inspecting agency shall state in each report whether inspected firestop systems comply with or deviate from requirements.

b. Remove and replace firestop systems where inspections indicate that they do not comply with specified requirements.
c. Proceed with enclosing firestop systems with other construction only after inspection reports are issued and firestop systems comply with requirements.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 07920

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Joint sealants for the following applications, including those specified by reference to this Section:

(1) Exterior joints in vertical surfaces and in horizontal surfaces, not including vehicle pavements or sidewalk (reference Division 2 Section "Pavement Joint Sealant" for pavement and sidewalk joint sealant).

(a) Control joints in cast-in-place concrete: Elastomeric joint sealant ES–S3 or ES-S4, match concrete color.
(b) Expansion joints in cast-in-place concrete: Elastomeric joint sealant ES–S3, match concrete color.
(c) Control joints in unit masonry: Elastomeric joint sealant ES–S3 or ES-S4, match mortar color.
(d) Expansion joints in unit masonry: Elastomeric joint sealant ES–S3, match mortar color.
(e) Perimeter joints between unit masonry and metal frames of doors and windows: Elastomeric joint sealant ES-S4, match mortar color.

(2) Interior joints in vertical surfaces and nontraffic horizontal surfaces:

(a) Control joints in unit masonry: Elastomeric joint sealant ES–S3 or ES-S4, match mortar color.
(b) Expansion joints in unit masonry: Elastomeric joint sealant ES–S3, match mortar color.
(c) Perimeter joints between unit masonry and metal frames of doors and windows: Elastomeric joint sealant ES-S4, match mortar color.
(d) Control joints in ceramic tile: Elastomeric joint sealant ES-S5, match grout color.
(e) Sealing around toilet fixtures: Elastomeric joint sealant ES-S5, match toilet fixture color.
(f) Fiberglass reinforced panel joints, general areas: Elastomeric joint sealant ES-S1, where sealant is exposed match panel color.
(g) Fiberglass reinforced panel joints, food processing areas: Elastomeric joint sealant ES-S5, where sealant is exposed match panel color.
(h) Joints in field-painted vertical and overhead surfaces in gypsum board: Latex joint sealant. Match color of paint topcoat.
(i) Joints between concrete curbs and cold storage room panels: Elastomeric joint sealant ES-S2 or ES-U1, match concrete curb color.
(j) Joints between stainless steel plumbing fixtures and adjoining floors and counters: Elastomeric joint sealant ES-S5, transparent (clear)

(3) Interior joints in horizontal traffic surfaces:

(a) Control joints in ceramic tile flooring: Elastomeric joint sealant ES-S3, match grout color.

(4) Interior perimeter joints between food equipment cases and between surfaces indicated and food equipment cases: Foam compression seals.

(5) Joint-sealant applications not indicated will be selected by the Contracting Officer from elastomeric products indicated in Part 2.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”
b. Division 2 Section "Pavement Joint Sealants" for sealing joints in exterior pavements, walkways, and curbing.
c. Division 3 Section "Cast-In-Place Concrete" for filling joints in interior floor slabs.
d. Division 4 Section "Unit Masonry Assemblies" for masonry control and expansion joint fillers and gaskets.
e. Division 7 Section "Exterior Insulation and Finish Systems" for sealing joints in EIFS with elastomeric joint sealants.
f. Division 8 Section "Glazing" for glazing sealants.
g. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.

1.2 PRECONSTRUCTION TESTING

1.2.1. Preconstruction Compatibility and Adhesion Testing

a. Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

(1) Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
(2) Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
(3) Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
(4) For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

1.2.2. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.2.3. Preconstruction Field-Adhesion Testing

a. Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:

(1) Locate test joints where indicated on Project or, if not indicated, as directed by Contracting Officer.
(2) Conduct field tests for each application indicated below:

(a) Each kind of elastomeric sealant and joint substrate indicated.

(3) Notify Contracting Officer seven days in advance of dates and times when test joints will be erected.
(4) Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

(a) Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.

(b) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

(5) Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

(6) Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each joint-sealant product indicated.

1.3.2. Samples for Verification

a. For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.3.3. Preconstruction Compatibility and Adhesion Test Reports

a. From sealant manufacturer, indicating the following:

(1) Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.

(2) Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.3.4. Product Test Reports

a. Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

1.3.5. Preconstruction Field-Adhesion Test Reports

a. Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

1.3.6. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate

a. For each sealant specified to be validated by SWRI's Sealant Validation Program. . www.SWRIONLINE.org

1.3.7. Sustainable Design Submittal:

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.3.8. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Samples for Verification	X	R
1.3.3	Preconstruction Compatibility and Adhesion Test Reports	X	I
1.3.4	Product Test Reports	X	I
1.3.5	Preconstruction Field-Adhesion Test Reports	X	I
1.3.6	SWRI Validation Certificate	X	I
1.3.7	Sustainable Design Submittal	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Source Limitations

a. Obtain each kind of joint sealant through one source from a single manufacturer.

1.4.2. Product Testing

a. Test joint sealants using a qualified testing agency.

(1) Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
(2) Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920, for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

1.5 PROJECT CONDITIONS

1.5.1. General

a. Do not proceed with installation of joint sealants under the following conditions:

(1) When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
(2) When joint substrates are wet.
(3) Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
(4) Where Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Joint Sealants

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.1.3. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements”.

2.1.4. Sealants and Adhesives, Interior on-site applied only.

a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design”, including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 MATERIALS, GENERAL

2.3.1. Compatibility

a. Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

2.4 ELASTOMERIC JOINT SEALANTS

2.4.1. Elastomeric Sealants

a. Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

2.4.2. Stain-Test-Response Characteristics

a. Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.4.3. Suitability for Contact with Food

a. Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.4.4. **ES-S1** Single-Component Nonsag Neutral-Curing Surface Modified Silicone Sealant (Low dirt pick-up).

a. Basis-of-Design Product: Dow Corning Corporation; 756 SMS..
b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 50.
d. Use Related to Exposure: NT (nontraffic).

2.4.5. **ES-S2** Single-Component Pourable Neutral-Curing Silicone Sealant:

a. Basis-of-Design Product: Dow Corning Corporation; 890-SL.
b. Type and Grade: S (single component) and P (pourable).
c. Class: 100/50.
d. Use Related to Exposure: T (traffic).

2.4.6. **ES-S3** Single-Component Neutral-Curing Silicone Sealant:

a. Basis-of-Design Product: Dow Corning Corporation; 790.
b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 100/50.
d. Use Related to Exposure: T (traffic).
e. Stain-Test-Response Characteristics: Nonstaining to porous substrates.

2.4.7. **ES-S4** Single-Component Neutral-Curing Silicone Sealant:

a. Basis-of-Design Product: Dow Corning Corporation; 795.
b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 50.
d. Use Related to Exposure: NT (nontraffic).
e. Stain-Test-Response Characteristics: Nonstaining to porous substrates.

2.4.8. **ES-S5** Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:

a. Basis-of-Design Product: Dow Corning Corporation; 786 Mildew Resistant.
b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 25.
d. Use Related to Exposure: NT (nontraffic).

2.4.9. **ES-U1** Single-Component, Self-Leveling, Urethane Joint Sealant:

a. Basis-of-Design Product: Tremco Incorporated; Vulkem 45.
b. Type and Grade: S (single component) and P (pourable).

c. Class: 25.
d. Use Related to Exposure: T (traffic).

2.5 LATEX JOINT SEALANTS

2.5.1. Acrylic Latex Or Siliconized Acrylic Latex Sealant

a. Comply with ASTM C 834, Type OP, Grade NF.

2.5.2. Basis-of-Design Products:

a. Bostik Findley; Chem-Calk 600.
b. Pecora Corporation; AC-20+.
c. Schnee-Morehead, Inc.; SM 8200.
d. BASF Building Systems; Sonolac.
e. Tremco; Tremflex 834.

2.6 JOINT-SEALANT BACKING

2.6.1. General

a. Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

2.6.2. Cylindrical Sealant Backings

a. ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

2.6.3. Bond-Breaker Tape

a. Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 FOAM COMPRESSION SEALS

a. Manufacturer's standard preformed continuous foam compression seals to fill voids between refrigerated display cases and adjacent wall surfaces.
b. Basis-of-design product: Armacell LLC, AP/Armaflex, 48-inch wide by 18-foot long by 2-inch thick rolls.

(1) Meets requirements for resistance to mold growth (UL181), fungi (ASTM G 21 / C 1338), and bacteria (ASTM G 22).
(2) Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.

(3) Flame spread and smoke developed index: 25/50, ASTM E 84.
(4) Density: 3.0 to 6.0 lb/cu. ft.

2.8 MISCELLANEOUS MATERIALS

2.8.1. Primer

a. Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

2.8.2. Cleaners for Nonporous Surfaces

a. Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

2.8.3. Masking Tape

a. Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. Surface Cleaning of Joints

a. Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

(1) Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
(2) Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

(a) Concrete.
(b) Masonry.
(c) Unglazed surfaces of ceramic tile.

(3) Remove laitance and form-release agents from concrete.
(4) Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

(a) Metal.
(b) Glass.
(c) Porcelain enamel.
(d) Glazed surfaces of ceramic tile.

b. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer-or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
c. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal

3.3 INSTALLATION OF JOINT SEALANTS

3.3.1. General

a. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

3.3.2. Sealant Installation Standard

a. Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

3.3.3. Sealant Backings

a. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

(1) Do not leave gaps between ends of sealant backings.
(2) Do not stretch, twist, puncture, or tear sealant backings.
(3) Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

3.3.4. Bond-Breakers

a. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

3.3.5. Sealant Installation

a. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

(1) Place sealants so they directly contact and fully wet joint substrates.
(2) Completely fill recesses in each joint configuration.
(3) Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

3.3.6. Tooling of Nonsag Sealants

a. Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

(1) Remove excess sealant from surfaces adjacent to joints.
(2) Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
(3) Provide concave joint configuration per Figure 8A in ASTM C 1193, unless otherwise indicated.
(4) Provide flush joint configuration where indicated per Figure 8B in ASTM C 1193.
(5) Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

(a) Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.3.7. Foam Compression Seals

a. Neatly cut 48-inch wide rolls of foam compression seal material into strips of appropriate width to insure force fit between refrigerated display cases and adjacent wall surfaces.

b. Secure foam compression seals in place with adhesive sealant as indicated on drawings.

3.4 CLEANING

Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 08111

STANDARD STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Standard hollow-metal steel doors.
b. Standard hollow-metal steel frames.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”

1.2 DEFINITIONS

a. Minimum Thickness: Minimum thickness of base metal without coatings.

1.3 SUBMITTALS

1.3.1. Product Data

a. Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and finishes for each type of steel door and frame specified.

1.3.2. Shop Drawings

a. In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:
b. Elevations of each door design.
c. Details of doors, including vertical and horizontal edge details.
d. Frame details for each frame type, including dimensioned profiles.
e. Details and locations of reinforcement and preparations for hardware.
f. Details of each different wall opening condition.
g. Details of anchorages, accessories, joints, and connections.
h. Details of glazing frames and stops showing glazing.
i. Details of conduit and preparations for electrified door hardware and controls.

1.3.3. Coordination Drawings

a. Drawings of each opening, including door and frame, drawn to scale and coordinating door hardware. Show elevations of each door design type, showing dimensions, locations of door hardware, and preparations for power, signal, and electrified control systems.

1.3.4. Sustainable Design Submittal:

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.3.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Coordination Drawings	X	R
1.3.4	Sustainable Design Submittal	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. An employer of workers trained and approved by manufacturer.

1.4.2. Source Limitations

a. Obtain standard steel doors and frames through one source from a single manufacturer.

1.4.3. Fire-Rated Door Assemblies

a. Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10C.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. Delivery

a. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
b. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

1.5.2. Storage

a. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.

(1) If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.6 PROJECT CONDITIONS

Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

Coordinate installation of anchorages for standard steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Steel Doors & Frames

a. Steel to contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.

2.2 MATERIALS

2.2.1. Cold-Rolled Steel Sheet

a. ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

2.2.2. Metallic-Coated Steel Sheet

a. ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 zinc-iron-alloy (galvannealed) coating designation.

2.2.3. Frame Anchors

a. Interior Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

(1) Exterior Frame Anchors: Steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M. After fabricating, hot-dip galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.

2.2.4. Inserts, Bolts, and Fasteners

a. Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.

2.2.5. Powder-Actuated Fasteners in Concrete

a. Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.

2.2.6. Grout

a. Comply with ASTM C 476, with a slump of 4 inches for standard steel door frames built into concrete or masonry, as measured according to ASTM C 143/C 143M.

2.2.7. Mineral-Fiber Insulation

a. ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.

2.2.8. Glazing

a. Comply with requirements in Division 8 Section "Glazing."

2.2.9. Bituminous Coating

a. Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD STEEL DOORS

2.3.1. General

a. Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
b. Design: Flush panel.
c. Core Construction: Manufacturer's standard core indicated that produces doors complying with ANSI/SDI A250.8.

(1) Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with rigid polyurethane core with thermal-resistance value (R-value) of not less than 10.0 (deg F x h x sq. ft./Btu) when tested according to ASTM C 1363.
(2) Fire Door Core: As required to provide fire-protection ratings indicated.
(3) Interior Security Door Core: Vertical steel stiffeners with mineral fiber fill.

d. Vertical Edges for Single-Acting Doors: Edge profile in accordance with manufacturer's standard for the Model specified.

(1) Beveled Edge: 1/8 inch in 2 inches.

e. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick end closures or channels of same material as face sheets.
f. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

2.3.2. Exterior Doors

a. Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical-endurance level:

(1) Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) MSG No. 16 gage, (0.053-inch-thick) uncoated steel faces.

2.3.3. Interior Doors

a. Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8for level and model and ANSI/SDI A250.4 for physical-endurance level:

(1) Unless Otherwise Indicated: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush), MSG No. 16, (0.053-inch-thick), uncoated steel faces.
(2) Security Doors Level 4 and Physical Performance Level A (Maximum Duty), Model 1 (Full Flush), MSG No. 14, (0.067-inch-thick) uncoated steel faces.

b. Metallic-coated steel sheet where indicated.
c. Metallic-coated steel sheet where interior steel doors are located in cold storage rooms.

2.3.4. Hardware Reinforcement

a. Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as door face sheets

2.3.5. Concealed Stiffeners and Hardware Reinforcement

a. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD STEEL FRAMES

2.4.1. General

a. Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
b. Fabricate frames with mitered or coped corners. Fabricate frames as full profile welded frames.
c. Fabricate from metallic-coated steel sheet.

2.4.2. Exterior Frames

a. Frames of MSG No. 14, (0.067-inch-thick) uncoated steel sheet.
b. Fabricated from metallic-coated steel sheet.

2.4.3. Interior Frames

a. Frames of MSG No.16, (0.053-inch-thick) uncoated steel sheet, unless otherwise indicated.
b. Security Frames: Frames of MSG No. 14, (0.067-inch-thick) uncoated steel sheet.
c. Frames for Borrowed Lights: Same as adjacent door frame.
d. Metallic-coated steel sheet where indicated.
e. Metallic-coated steel sheet where interior steel frames are located in cold storage rooms.

2.4.4. Hardware Reinforcement

a. Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames and to comply with the following:

(1) Impact Type Traffic Door Frames: As indicated.

2.4.5. Jamb Anchors

a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long. Do not use wire anchors.
b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
c. Postinstalled Expansion Type for In-Place Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

2.4.6. Floor Anchors

a. Formed from same material as frames, not less than 0.042 inch thick, and as follows:

(1) Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.4.7. Hardware Reinforcement

a. Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames..

2.4.8. Ceiling Struts

a. Minimum 1/4-inch-thick by 1-inch wide steel.

2.4.9. Grout Guards

a. Formed from same material as frames, not less than 0.016-inch thick.

2.4.10. Mullions: Join to adjacent members by welding or rigid mechanical anchors.

2.5 STOPS AND MOLDINGS

2.5.1. Moldings for Glazed Lites in Doors

a. Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

2.5.2. Fixed Frame Moldings

a. Formed integral with standard steel frames, minimum 5/8 inch high, unless otherwise indicated.

2.5.3. Loose Stops for Glazed Lites in Frames

a. Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.6 LOUVERS

2.6.1. Interior Doors

a. Provide louvers where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch thick, cold-rolled steel sheet set into 0.032-inch thick steel frame.

(1) Sight-proof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.

2.7 FABRICATION

2.7.1. General

a. Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

2.7.2. Tolerances

a. Fabricate hollow metal work to tolerances indicated in SDI 117.

2.7.3. Standard Steel Doors

a. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
b. Glazed Lites: Factory cut openings in doors.
c. Astragals: Provide overlapping astragal on one leaf of pairs of doors as specified in Division 8 Section “Door Hardware” where required by NFPA 80 for fire-performance rating or where indicated.

2.7.4. Standard Steel Frames

a. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames. This does not permit knockdown frames or slip-on drywall frames to be substituted for full profile welded frames.
b. Full Profile Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
c. Sidelight Frames: Provide closed tubular members with no visible face seams or joints; fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
d. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
e. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
f. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
g. Jamb Anchors: Provide number and spacing of anchors as follows:

(1) Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

(a) Two anchors per jamb up to 60 inches in height.
(b) Three anchors per jamb from 60 to 90 inches in height.
(c) Four anchors per jamb from 90 to 120 inches in height.
(d) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 120 inches in height.

(2) Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

(a) Three anchors per jamb up to 60 inches in height.
(b) Four anchors per jamb from 60 to 90 inches in height.
(c) Five anchors per jamb from 90 to 96 inches in height.
(d) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
(e) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

(3) Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

h. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

(1) Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
(2) Double-Door Frames: Drill stop in head jamb to receive two door silencers.

2.7.5. Hardware Preparation

a. Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
b. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
c. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI/SDI A250.8.

2.7.6. Stops and Moldings

a. Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
b. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
c. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.
d. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
e. Provide loose stops and moldings on inside of doors and frames.
f. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.8 STEEL FINISHES

2.8.1. Factory Priming for Field-Painted Finish

a. Apply shop primer specified below immediately after surface preparation and pretreatment

(1) Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

a. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.
b. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. Remove Spreaders

a. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

3.2.2. Adjust and Brace

a. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb:

3.2.3. Drill and Tap

a. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.3 INSTALLATION

3.3.1. General

a. Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

3.3.2. Standard Steel Frames

a. Install standard steel frames for doors, sidelights, transoms, borrowed lights, and other openings, of size and profile indicated. Comply with ANSI/SDI A250.11.
b. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

(1) Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
(2) At fire-protection-rated openings, install frames according to NFPA 80.
(3) Install frames with removable glazing stops located on secure side of opening.
(4) Install door silencers in frames before grouting.
(5) Remove temporary braces necessary for installation only after frames have been properly set and secured.
(6) Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
(7) Field Apply bituminous coating to backs of frames that are filled with containing antifreezing agents.

c. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.

(1) Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

d. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
e. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
f. In-Place Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
g. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
h. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
i. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

(1) Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
(2) Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
(3) Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

(4) Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.3.3. Standard Steel Doors

a. Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
b. Non-Fire-Rated Standard Steel Doors:

(1) Jambs and Head: 1/8 inch plus or minus 1/16 inch.
(2) Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
(3) Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
(4) Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

c. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3.3.4. Glazing

a. Comply with installation requirements in Division 8 Section "Glazing" and with standard steel door and frame manufacturer's written instructions.
b. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

3.4.1. Final Adjustments

a. Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.

3.4.2. Clean

a. Remove grout and other bonding material off standard steel doors and frames immediately after installation.

3.4.3. Prime-Coat Touchup

a. Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

3.4.4. Metallic-Coated Surfaces

a. Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08211

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Solid-core doors with wood-veneer faces.
b. Factory finishing flush wood doors.
c. Factory fitting flush wood doors to frames and factory machining for hardware.
d. Louvers for flush wood doors.
e. Light frames for flush wood doors.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

1.2.2. Shop Drawings

a. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1.2.3. Samples for Verification

a. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
b. Corner sections of doors, approximately 8 by 10 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.
c. Louver blade and frame sections, 6 inches long, for each material and finish specified.
d. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.2.4. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit product data indicating percentages by weight of post-consumer and pre-consumer (post-industrial) recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

c. Submit Vendor's invoice for all wood materials and all wood-containing materials.

(1) Materials to be identified on a line-item basis with individual cost and FSC content amount indicated on each line.

(2) Vendor's FSC COC certificate number to be included on the invoice.

d. Submit a letter from the wood material Vendors stating the products provided are FSC Pure, FSC Mixed, or FSC Mixed [NN]%.

e. Submit manufacturer's product data indicating that all composite wood materials and laminating adhesives contain no added urea-formaldehyde resins.

f. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

(2) Paint and coating MSDS for each material applied on-site in the interior

(3) Confirm that materials contain no added urea-formaldehyde resins.

1.2.5. Submittal List:

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Shop Drawings	X	R
1.2.3	Samples for Verification	X	R
1.2.4	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Source Limitations

a. Obtain flush wood doors through one source from a single manufacturer.

1.3.2. Quality Standard

a. In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards.

1.3.3. Manufacturer Qualifications

a. A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1. Requirements

a. Comply with requirements of referenced standard and manufacturer's written instructions.
b. Package doors individually in plastic bags or cardboard cartons.
c. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.5 WARRANTY

1.5.1. Special Warranty

a. Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
b. Warranty shall be in effect during the following period of time from date of Substantial Completion:

(1) Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Wood Doors

a. All wood materials or wood containing materials permanently installed in the building will be Forest Stewardship Council (FSC) Certified and purchased from an FSC Certified Vendor.
b. Use composite wood and agrifiber building products on the interior of the building that contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.3. Wood Louvers & Beads

a. All wood materials or wood containing materials permanently installed in the building will be Forest Stewardship Council (FSC) Certified and purchased from an FSC Certified Vendor.
b. Use composite wood and agrifiber building products on the interior of the building that contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.4. Sealants and Adhesives, Interior on-site applied only.
a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 DOOR CONSTRUCTION, GENERAL

2.2.1. Doors for Transparent Finish

a. Grade: Custom, with Grade A faces.
b. Species and Cut: Red oak, rift cut.
c. Match between Veneer Leaves: Book match.
d. Assembly of Veneer Leaves on Door Faces: Running match.
e. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
f. Stiles: Same species as faces – edge Type A.

2.3 SOLID-CORE DOORS

2.3.1. Interior Veneer-Faced Doors

a. Core: Structural composite lumber.
b. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
c. Adhesive: Type I per WDMA T.M.–6.

2.4 LOUVERS AND LIGHT FRAMES

2.4.1. Wood Louvers

a. Door manufacturer's standard solid-wood louvers of same species as door faces.

2.4.2. Beads

a. Wood Beads for Light Openings in Wood Doors:

(1) Wood Species: Same species as door faces.
(2) Profile: Manufacturer's standard shape.

2.5 FABRICATION

2.5.1. Factory Fabrication

a. Factory fit doors to suit frame-opening sizes indicated:
b. Comply with clearance requirements of referenced quality standard for fitting.

2.5.2. Factory Machining

a. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
b. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.5.3. Openings

a. Factory cut and trim openings through doors.

(1) Light Openings: Trim openings with moldings of material and profile indicated.
(2) Louvers: Factory install louvers in prepared openings.

2.6 FACTORY FINISHING

2.6.1. General

a. Comply with referenced quality standard for factory finishing.
b. Finish doors at factory.

2.6.2. Transparent Finish

a. Grade: Premium.
b. Finish: System-11, catalyzed polyurethane.
c. Staining: As indicated on drawings.
d. Effect: Open-grain finish.
e. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine Doors and Installed Door Frames, with Installer Present, Before Hanging Doors

a. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
b. Reject doors with defects.
c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. Hardware

a. For installation, see Division 8 Section "Door Hardware."

3.2.2. Installation Instructions

a. Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

3.2.3. Factory-Fitted Doors

a. Align in frames for uniform clearance at each edge.

3.2.4. Factory-Finished Doors

a. Restore finish before installation if fitting or machining is required at Project site

3.2.5. Field Sealing

a. When tops or bottoms of doors are field cut, seal cut surfaces with a heavy coat of varnish or sealer that is compatible with finish of door.

3.3 ADJUSTING

3.3.1. Operation

a. Rehang or replace doors that do not swing or operate freely.

3.3.2. Finished Doors

a. Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08311

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Wall access doors.
b. Ceiling access doors.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of access door assembly specified, including details of construction relative to materials, individual components, profiles, and finishes.

1.2.2. Sustainable Design Submittals:
a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer’s product data or certification information for each of the following materials per Di-vision 1 Section “Sustainable Design Requirements.”
(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each product applied on-site in the interior.

1.2.3. Submittal List:

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”

S Submit quantity specified in Division 1 Section “Sustainable Design Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Single-Source Responsibility

a. Obtain access doors for entire Project from one source and by a single manufacturer.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General
a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Access Doors & Frames
a. Steel to contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.

2.2 MATERIALS

2.2.1. Steel Sheet

a. ASTM A 366/A 366M commercial-quality, cold-rolled steel sheet with baked-on, rust-inhibitive primer.

2.3 ACCESS DOORS

2.3.1. Flush Access Doors and Frames with Exposed Trim

a. Fabricated from steel sheet
b. Door: Minimum 0.060-inch- thick sheet metal, set flush with exposed face flange of frame.
c. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
d. Hinges: Concealed spring pin or continuous type.
e. Latch: Screwdriver- operated cam latch unless otherwise indicated.

(1) Where indicated provide self-latching bolt operated by an integral knurled knob turn.

2.4 FABRICATION

2.4.1. General

a. Manufacture each access door assembly as an integral unit ready for installation.

2.4.2. Steel Access Doors and Frames

a. Continuous welded construction. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

2.4.3. Locking Devices

a. Furnish number required to hold door in flush, smooth plane when closed.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1. Coordination

a. Advise Installers of other work about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices. Furnish inserts and anchoring devices for access doors that must be built into other construction. Coordinate delivery with other work to avoid delay.

3.2 INSTALLATION

3.2.1. General

a. Comply with manufacturer's instructions for installing access doors.
b. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finished surfaces.
c. Install concealed-frame access doors flush with adjacent finish surfaces.

3.3 ADJUST AND CLEAN

Adjust hardware and panels after installation for proper operation. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08331

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Type OCD 1: Manual operated insulated exterior coiling service doors in combination with manual operated coiling ventilation doors.
b. Type OCD 2: Manual operated insulated exterior coiling service doors.
c. Type OCD 3: Manual operated non-insulated interior coiling counter doors.

1.1.2. Related Sections
a. Division 1 Section “Sustainable Design Requirements.”

1.2 DEFINITIONS

Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. General Performance

a. Exterior overhead coiling doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

1.3.2. Delegated Design

1.3.3. Design exterior overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.3.4. Structural Performance

a. Provide overhead coiling doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:

(1) Wind Load:

(a) Provide exterior overhead coiling door assemblies, including anchorage, capable of withstanding wind pressures acting inward and outward normal to the plane of the wall.
(b) Refer to Division 1 Section "Description of Work" for wind loading design criteria.

(c) Determine design loads using the appropriate coefficients for the exterior overhead coiling door assembly configurations indicated.

(2) Seismic Loads:

(a) Provide overhead coiling doors assemblies capable of resisting the effects of earthquake motions.
(b) Refer to Division 1 Section "Description of Work" for seismic-load design criteria.
(c) Determine seismic loads using the appropriate exposure coefficient for the overhead coiling door assemblies.

1.3.5. Operation-Cycle Requirements

a. Design overhead coiling exterior service and ventilation door components and operator to operate for not less than 100,000 cycles.
b. Provide interior service door components and operators capable of operating for not less than 20,000 cycles.

1.4 SUBMITTALS

1.4.1. Product Data

a. For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:

(1) Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
(2) Summary of forces and loads on walls and jambs.

1.4.2. Delegated-Design Submittal

a. For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

(1) Detail fabrication and assembly of seismic restraints.

1.4.3. Sustainable Design Submittal:
a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”
(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.4.4. Submittal List:

Reference	Submittal Item	Quantity	Action

1.4.1	Product Data	X	R
1.4.2	Delegated-Design Submittal	X	I
1.4.3	Sustainable Design Submittal	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications

a. Engage an experienced installer who is an authorized representative of the overhead coiling door manufacturer for both installation and maintenance of units required for this Project.

1.5.2. Source Limitations

a. Obtain overhead coiling doors through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Overhead Coiling Doors

a. Steel to contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.

2.2 MANUFACTURERS

2.2.1. Basis-of-Design Products, General

a. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

b. Basis-of-Design Products: Overhead Door Corporation

(1) Coiling Service Doors:

(a) Exterior: 625 Series Stormtite Insulated Service Doors.

(2) Ventilation Doors: 610 Series Ventilated Service Doors.

(3) Counter Doors: 652 Series Counter Doors.

2.3 COILING DOORS DOOR CURTAIN MATERIALS AND CONSTRUCTION

2.3.1. Door Curtain

a. Fabricate overhead coiling-door curtain of interlocking slats, designed to meet performance requirements indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of material thickness recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

(1) Exterior Service Door Steel Door Curtain Exterior (Front) Slats: Structural-quality, cold-rolled galvanized steel sheets complying with ASTM A 653, with G90 zinc coating. Provide manufacturer's standard flat-profile slats. 0.033 inch (20 gage) minimum base-metal (uncoated) thickness.
(2) Counter Door Aluminum Door Curtain Slats. ASTM B 209 or ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated. Provide manufacturer's standard flat-profile slats.
(3) Insulation for Exterior Doors: Fill slat with manufacturer's standard CFC-free foamed-in-place polyurethane thermal insulation complying with maximum flame-spread and smoke-developed indices of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within metal slat faces. R-value of 6.7 minimum~~.~~
(4) Inside (Back) Curtain Slat Face for Insulated Door: Galvanized steel sheet not less than 0.021 inch (24 gage) minimum base-metal (uncoated) thickness~~.~~ Fabricate inside and exterior slat faces interlocked with each other.

2.3.2. Service Door Endlocks

a. Malleable-iron castings galvanized after fabrication, secured to curtain slats with galvanized rivets, or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

2.3.3. Counter Door Endlocks

a. Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

2.3.4. Exterior Service Door Windlocks

a. Malleable-iron castings secured to curtain slats with galvanized rivets or high-strength nylon, as required to comply with wind load.

2.3.5. Service Door Bottom Bar

a. Consisting of 2 angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick, either galvanized or stainless-steel or aluminum extrusions to suit type of curtain slats.

2.3.6. Counter Door Bottom Bar

a. Manufacturer's standard continuous channel or tubular shape, either stainless-steel or aluminum extrusions to suit type of curtain slats.

2.3.7. Service Door Curtain Jamb Guides

a. Fabricate curtain jamb guides of steel angles, or channels and angles, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Build up units with not less than 3/16-inch- thick, galvanized steel sections complying with ASTM A 36, and ASTM A 123. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain and a continuous bar for holding windlocks.

2.3.8. Counter Door Curtain Jamb Guides

a. Fabricate curtain jamb guides of angles, or channels and angles of material and finish to match curtain slats, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Provide continuous integral wear strips to prevent metal-to-metal contact and minimize noise of travel and removable stops on guides to prevent overtravel of curtain.

2.4 VENTILATION DOORS

2.4.1. Door Curtains

a. Fabricate overhead ventilation coiling-door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

(1) Perforated Aluminum Door Curtain Slats: ASTM B 209 sheet or ASTM B 221 extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of 0.050 inch and as required to meet requirements.

2.4.2. Endlocks

a. Malleable-iron castings galvanized after fabrication, secured to curtain slats with galvanized rivets, or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

2.4.3. Bottom Bar

a. Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from aluminum extrusions to match curtain slats and finish.

2.4.4. Astragal

a. Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

2.4.5. Curtain Jamb Guides

a. Fabricate curtain jamb guides of steel angles, or channels and angles, with sufficient depth and strength to retain curtain and to allow curtain to operate smoothly. Build up units with not less than 3/16-inch- thick, galvanized steel sections complying with ASTM A 36, and ASTM A 123.

Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.4.6. Mounting Hardware and Accessories

a. Provide a separate duel track mounted behind the exterior coiling service door to allow independent door operation.
b. Separate hood from that of service door.
c. Fabricate and install ventilation door separate from service door so that each door may be removed and serviced independent of the other.

2.5 HOODS AND ACCESSORIES

2.5.1. Hood

a. Form to entirely enclose coiled curtain and operating mechanism at opening head and act as weatherseal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.
b. Service and Ventilation Doors: Fabricate steel hoods of not less than 0.021 inch (24 gage) base-metal (uncoated) thickness, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653.
c. Counter Doors: Fabricate aluminum hoods, complying with ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and not less than 0.032 inch thick, for aluminum doors.
d. Service and Ventilation Door Shape: Round.
e. Counter Door Shape: Square.

2.5.2. Weatherseals

a. Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets fitted to bottom and at top of exterior doors. At door head, use 1/8-inch- thick, replaceable, continuous sheet secured to inside of curtain coil hood.
b. In addition, provide replaceable, adjustable, continuous, flexible, 1/8-inch- thick seals of flexible vinyl, rubber, or neoprene at door jambs for a weathertight installation.

2.5.3. Vision-Panel Glazing

a. Manufacturer's standard clear glazing, fabricated from transparent acrylic sheet; set in glazing channel secured to curtain slats.

2.5.4. Push/Pull Handles for Non-Insulated Service Doors and Ventilation Doors

a. Provide galvanized steel lifting handles on each side of door. Provide pull-down straps for doors more than 84 inches high.

2.5.5. Slide Bolt for Service and Ventilation Doors

a. Fabricate with side locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

2.5.6. Slide Bolt for Counter Door

a. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
b. Locking Bars: Full-disc Cremone type, both jamb sides, operable from inside only.
c. Lock cylinder is specified in Division 8 Section "Door Hardware."

2.6 COUNTERBALANCING MECHANISM

2.6.1. General

a. Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel connected to door curtain with required barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

2.6.2. Counterbalance Barrel

a. Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

2.6.3. Spring Balance

a. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.

2.6.4. Torsion Rod Fabrication

a. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

2.6.5. Brackets

a. Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate with bell-mouth guide groove for curtain. Support and attach guides to opening jambs with continuous angle welded to tracks and attached to wall.

2.7 MANUAL DOOR OPERATORS

2.7.1. Chain-Hoist Operator for Insulated Service Doors

a. Provide manual chain-hoist operator consisting of endless steel hand chain, chain pocket wheel and guard, and gear-reduction unit with a maximum 35-lbf force for door operation. Provide alloy steel hand chain with chain holder secured to operator guide.

2.7.2. Push-up Operation for Non-Insulated Service Doors, Ventilation Doors, and Counter Doors

a. Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lbf.

2.8 FINISHES, GENERAL

2.8.1. General

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.8.2. Appearance of Finished Work

a. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

2.9.1. Finish Designation

a. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

2.9.2. Class II, Clear Anodic Finish

a. AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

2.10 STEEL AND GALVANIZED STEEL FINISHES

2.10.1. General

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.10.2. Contractor’s Option

a. At Contractor’s option provide factory primer for field finish specified in Division 9 Section “Painting,” baked finish, or powder-coat finish.

(1) Factory Primer for Field Finish: Manufacturer's standard primer, compatible with field-applied finish according to coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
(2) Baked Finish: Baked finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.
(3) Powder-Coat Finish: Powder-coat finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.

2.10.3. Color

a. Custom color topcoats as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
b. Do not install overhead coiling door components with through-bolts to wall.

3.2 ADJUSTING

3.2.1. Lubricate and Adjust

a. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.3 DEMONSTRATION

3.3.1. Startup Services

a. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain doors.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08334

OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 SUMMARYSection Includes

a. Electric-motor-operated overhead coiling grilles.

1.1.2. Related Sections

a. Division 8 Section "Door Hardware" for lock cylinders and keying.
b. Division 16 Sections for electrical service and connections for powered operators, and accessories.

1.2 DEFINITIONS

1.2.1. Operation Cycle

a. One cycle of a door is complete when it is moved from the closed position to the fully open position and returned to the closed position.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. Operation-Cycle Requirements

a. Provide overhead coiling grille components and operators capable of operating for not less than 10,000 cycles and for 10 cycles per day.

1.4 SUBMITTALS

1.4.1. Product Data

a. For each type and size of overhead coiling grille and accessory.

1.4.2. Samples for Verification

a. Of each type of exposed finish required, prepared on Samples of size indicated below.

(1) Grille Curtain: 12-inch- square assembly with rods, spacers, and vertical links.

1.4.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Samples for Verification	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
R Review each submittal, mark to indicate action taken, and return.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications

a. Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

1.5.2. Source Limitations

a. Obtain overhead coiling grilles through one source from a single manufacturer.
b. Obtain operators and controls from overhead coiling grille manufacturer.

1.5.3. Electrical Components, Devices, and Accessories

a. Listed and labeled as defined in NFPA 70, Article 100.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Basis-of-Design Products

a. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.
b. Basis-of-Design Products: Cookson Company, Rolling Grilles, Standard Pattern 5014 M92.

2.2 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

2.2.1. General

a. Fabricate overhead coiling grille curtain consisting of a network of 5/16-inch- minimum diameter horizontal solid rods, spaced as indicated. Interconnect rods by vertical links approximately 5/8 inch wide, spaced as indicated and rotating on rods.

(1) Space rods at approximately 2 inches o.c.
(2) Space links approximately 9 inches apart in a straight in-line pattern.

(3) Aluminum Grille Curtain: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

2.2.2. Endlocks

a. Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.

2.2.3. Bottom Bar

a. Manufacturer's standard continuous channel, tubular shape, or two angles, finished to match grille.

(1) Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for grille.
(2) Provide motor-operated grilles with combination bottom astragal and sensor edge.

2.2.4. Grille Curtain Jamb Guides

a. Manufacturer's standard extruded-aluminum shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

2.3 ACCESSORIES

2.3.1. Push/Pull Handles

a. For emergency-operated grilles, provide manufacturer's standard lifting handles on each side of grille.

(1) Provide pull-down straps or pole hooks for grilles more than 84 inches high.

2.3.2. Locking Device

a. Fabricate locking device assembly with lock in the bottom bar to secure grille to floor.

(1) Locks: Both jamb sides and at mid point of grille, operable from inside and outside.
(2) Provide floor sockets with stainless steel tops that prevent debris from clogging sockets.
(3) Lock cylinders are specified in Division 8 Section "Door Hardware”.

b. If grille curtain is power operated, provide safety interlock switch to disengage power supply when grille is locked.

2.3.3. Mounting Tube Frame

a. Provide manufacturer's standard mounting tube frame designed to support grille; factory fabricated from structural-steel tubes; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.

2.4 COUNTERBALANCING MECHANISM

2.4.1. General

a. Counterbalance grille curtain by means of adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to grille curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
b. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up grille curtain without distortion of curtain and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
c. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of grille curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
d. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
e. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate.

2.5 ELECTRIC GRILLE OPERATORS

2.5.1. Genera

a. Provide electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille and operation-cycle requirements specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking grille, and accessories required for proper operation.
b. Comply with NFPA 70.
c. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging chain and sprocket operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
d. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
e. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.
f. Grille-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head hoist-type grille operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, and chain and sprocket secondary drive; with auxiliary chain hoist and floor-level disconnect.
g. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1; with overload protection; sized to start, accelerate, and operate grille in either direction from any position, at not less than 2/3 fps and not more than 1 fps, without exceeding nameplate ratings or service factor.

(1) Type: Polyphase, medium-induction type.
(2) Service Factor: According to NEMA MG 1, unless otherwise indicated.
(3) Coordinate wiring requirements and electric characteristics of motors with building electrical system.
(4) Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.

h. Remote-Control Station: Provide momentary-contact, three-button key operated control station with push-button controls labeled "Open," "Close," and "Stop”.

(1) Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

i. Obstruction Detection Device: Provide each motorized grille with indicated external automatic safety sensor capable of protecting full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.

(1) Sensor Edge: Provide each motorized grille with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward grille travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

(a) Provide electrically actuated automatic bottom bar.

j. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

2.6 FINISHES, GENERAL

2.6.1. General

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

2.7.1. General

a. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
b. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION

General: Install grilles and operating equipment, complete with necessary hardware, according to Shop Drawings, manufacturer's written instructions, and as specified.

3.2 ADJUSTING

Lubricate bearings and sliding parts; adjust grilles to operate easily, free of warp, twist, or distortion and with tight fit around entire perimeter.

3.3 DEMONSTRATION

3.3.1. Startup Services

a. Engage a factory-authorized service representative to perform startup services and to train maintenance personnel as specified below:

(1) Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
(2) Train maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices.
(3) Review data in the maintenance manuals.

3.3.2. Training

a. Schedule training with Contracting Officer with at least 7 days' advance notice.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08361

SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Electric operated insulated exterior sectional doors in combination with electric operated ventilation doors..

1.2 DEFINITIONS

Operation Cycle: One cycle of a door is complete when it is moved from the closed position to the fully open position and returned to the closed position.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. General Performance

a. Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

1.3.2. Delegated Design

a. Design sectional doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.3.3. Structural Performance

a. Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:

(1) Wind Loads:

(a) Provide exterior sectional overhead door assemblies, including anchorage, capable of withstanding wind pressures acting inward and outward normal to the plane of the wall.
(b) Refer to Division 1 Section "Description of Work" for wind loading design criteria.
(c) Determine design loads using the appropriate coefficients for the exterior sectional overh door assembly configurations indicated.

(2) Seismic Loads:

(a) Provide sectional overhead door assemblies capable of resisting the effects of earthquake motions.
(b) Refer to Division 1 Section "Description of Work" for seismic-load design criteria.
(c) Determine seismic loads using the appropriate exposure coefficient for the sectional overhead door assemblies.

1.3.4. Operation-Cycle Requirements

a. Provide sectional door components and operators capable of operating for not less than 100,000 cycles.
b. Provide ventilation door components and operators capable of operating for not less than 15,000 cycles.

1.4 SUBMITTALS

1.4.1. Product Data

a. For each type and size of sectional overhead door and accessory. Include the following:

(1) Summary of forces and loads on walls and jambs.
(2) Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

1.4.2. Delegated-Design Submittal

a. For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

(1) Detail fabrication and assembly of seismic restraints.

1.4.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Delegated-Design Submittal	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications

a. Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

1.5.2. Source Limitations

a. Obtain sectional overhead doors through one source from a single manufacturer.

1.5.3. Standard for Sectional Doors

a. Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.

1.5.4. Electrical Components, Devices, and Accessories

a. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Basis-of-Design Products, General

a. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

b. Basis-of-Design Products

(1) Sectional Doors: Wayne-Dalton Corp., Service Door, Thermospan 200-20.
(2) Ventilation Doors: Rasco Industries, Inc., The Bug Blocker Product Family, The Bug Blocker Overhead Screen Door Systems.

2.2 SECTIONAL DOORS (STEEL DOOR SECTIONS)

2.2.1. Materials

a. Construct door sections including face sheets and frames from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, G60 coating designation.
b. Minimum Base-Metal (Uncoated) Thickness for Exterior-Section Faces: 0.033 inch (20 gage).
c. Exterior-Section Face: Manufacturer's standard grooved, ribbed, or fluted.

2.2.2. Door Panels

a. Fabricate door panels from a single sheet to provide sections not more than 24 inches high and nominally 2 inches deep. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
b. For insulated doors, provide door sections with continuous thermal-break construction, separating faces of door.

2.2.3. Stiles

a. Enclose open sections with channel end stiles formed from not less than 0.064-inch- thick galvanized steel sheet and weld end stiles to door section in place. Provide intermediate stiles formed from not less than 0.064-inch- thick galvanized steel sheet, cut to door section profile, and welded in place.

b. Stile Spacing: Not more than 48 inches apart.

2.2.4. Bottom Section Reinforcement

a. Reinforce bottom section with a continuous channel or angle complying with bottom-section profile and allowing installation of astragal.

2.2.5. Section Reinforcement

a. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place.

2.2.6. Hardware Reinforcement

a. Provide reinforcement for hardware attachment.

2.2.7. Thermal Insulation

a. Insulate inner core of steel sections with door manufacturer's standard CFC-free polyurethane insulation, foamed in place to completely fill inner core of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections that incorporate the following inside facing material, with no exposed insulation material evident:

(1) Inside Facing Material: Zinc-coated (galvanized) steel sheet with a minimum base (uncoated) metal thickness of 0.015 inch (26 gage).

b. R-Value: 17.5 deg F x h x sq. ft./Btu

2.2.8. Section Fabrication Finish

a. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.2.9. Finish

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

b. Surface Preparation: Clean galvanized surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants.

(1) Pretreat zinc-coated steel, after cleaning, with a conversion coating of type suited to organic coating applied over it.

c. Apply manufacturer's standard primer to both door faces after forming, according to coating manufacturer's written instructions for application and minimum dry film thickness.

d. At Contractor's option provide factory primer for field finish specified in Division 9 Section "Painting," baked finish, or powder-coat finish.

(1) Factory Primer for Field Finish: Manufacturer's standard primer, compatible with field-applied finish according to coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
(2) Baked Finish: Baked finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.
(3) Powder-Coat Finish: Powder-coat finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.

e. Color: Custom color topcoats as indicated.

2.3 VENTILATION DOORS (ALUMINUM SECTIONS WITH STAINLESS STEEL SCREENED PANELS)

2.3.1. Door Frame

a. Construct door sections with extruded-aluminum shapes, complying with ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, with wall thickness not less than 0.065 inch. Join stiles and rails by welding or with concealed, 1/4-inch- minimum-diameter, aluminum or nonmagnetic stainless-steel through bolts, full height of door section. Provide reinforcement for hardware attachment.

(1) Frame Finish: Clear anodized.

2.3.2. Screen

a. Fabricate screen of stainless steel woven wire cloth, complying with ASTM E 437.
b. Insect Screen Wire Cloth: B Medium, 30 by 30 mesh, 0.011-inch) wire diameter, 0.0223-inch-square) opening size, 44.8 percent free area.
c. Weave type: Manufacturer's standard for wire cloth indicated.
d. Metal composition: Type 304 stainless steel.

2.3.3. Mounting Hardware and Accessories

a. Lift Type: Vertical lift except where clearances limit type to high lift. Do not provide standard or low lift types unless specifically indicated.
b. Mounting hardware shall be standard commercial grade 2- or 3-inch ten ball rollers, track, galvanized steel 11 gage hinges.
c. Provide a separate duel track mounted behind the sectional door to allow independent door operation.
d. Provide manufacturer's standard torsion spring kit.
e. Provide pull brackets at the bottom of each side of the door.
f. Locking Device: Fabricate with hasps for locking by padlock, located on both-jambs, operable from inside only.
g. Separate hood from that of section door.
h. Fabricate and install ventilation door separate from service door so that each door may be removed and serviced independent of the other.

2.4 SECTIONAL DOOR TRACKS, SUPPORTS, AND ACCESSORIES

2.4.1. Tracks

a. Manufacturer's standard, galvanized steel track system, sized for door size and weight, designed for vertical lift except where clearances limit type to high lift., and complying with ASTM A 653/A 653M for minimum G60 zinc coating. Do not provide standard or low lift types unless specifically indicated. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced at 2 inches apart for door-drop safety device. Slope tracks at proper angle from vertical or design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.

2.4.2. Track Reinforcement and Supports

a. Galvanized steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.

b. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling) tracks with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks.

(1) Repair galvanized coating on tracks according to ASTM A 780.

2.4.3. Weatherseals

a. Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of overhead door.

2.4.4. Windows

a. Type and size indicated and in arrangement shown. Set glazing in vinyl, rubber, or neoprene glazing channel for metal-framed doors and elastic glazing compound for wood doors, as required. Provide removable stops of same material as door-section frames.

b. Size: Manufacturer's standard for type of glazing indicated, nominally 24 inches by 6 inches.

c. Sealed ½ inch insulated glass.

2.5 SECTIONAL DOOR HARDWARE

2.5.1. General

a. Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

2.5.2. Hinges

a. Heavy-duty galvanized steel hinges of not less than 0.0747-inch- thick, uncoated steel at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors exceeding 16 feet in width, unless otherwise recommended by door manufacturer.

2.5.3. Rollers

a. Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- diameter roller tires for 3-inch- wide track and 2-inch- diameter roller tires for 2-inch- wide track.

b. Tire Material: Case-hardened steel.

2.5.4. Push/Pull Handles

a. For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.

2.5.5. Locking Device

a. Fabricate with hasps for locking by padlock, located on both-jambs, operable from inside only.

2.5.6. Safety Interlock Switch

a. Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.6 SECTIONAL DOOR COUNTERBALANCE MECHANISM

2.6.1. Torsion Spring

a. Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from oil-tempered-steel wire complying with ASTM A 229/A 229M, Class II, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for a minimum of 100,000 cycles.

2.6.2. Cable Drums

a. Cast-aluminum or gray-iron casting cable drums grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft. Provide one additional midpoint bracket for shafts up to 16 feet long and two additional brackets at one-third points to support shafts more than 16 feet long unless closer spacing is recommended by door manufacturer.

2.6.3. Cable Safety Device

a. Include a spring-loaded, steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either cable breaks.

2.6.4. Bracket

a. Provide anchor support bracket as required to connect stationary end of spring to the wall and to level shaft and prevent sag.

2.6.5. Spring Bumper

a. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.7 ELECTRIC DOOR OPERATORS

2.7.1. General

a. Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

(1) Comply with NFPA 70.
(2) Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

2.7.2. Usage Classification

a. Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

2.7.3. Door-Operator Type

a. Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.

(1) Jackshaft, Side Mounted: Jackshaft operator mounted on the inside front wall on right or left side of door and connected to torsion shaft with an adjustable coupling or drive chain.

2.7.4. Electric Motors

2.7.5. High-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction from any position, at not less than 2/3 fps (0.2 m/s) and not more than 1 fps (0.3 m/s), without exceeding nameplate ratings or service factor.

a. Type: Polyphase, medium-induction type.
b. Service Factor: Comply with NEMA MG 1, unless otherwise indicated.
c. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
d. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
e. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.
f. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
g. Use adjustable motor-mounting bases for belt-driven operators.

2.7.6. Limit Switches

a. Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

2.7.7. Obstruction Detection Device

2.7.8. Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

a. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

2.7.9. Remote-Control Station

a. Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
b. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

2.7.10. Emergency Manual Operation

a. Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).

2.7.11. Emergency Operation Disconnect Device

a. Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

(1) Provide electrical interlock arrangement between door control panel and dock leveler control panel to prevent dock leveler from raising when door is in closed position.

2.7.12. Motor Removal

a. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Install door, track, and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
b. Do not through-bolt exterior door supports or operating equipment to wall.

3.1.2. Track Installation

a. Fasten vertical track assembly to framing, spaced not less than 24 inches apart. Hang horizontal track from structural overhead framing with angle or channel hangers fastened to framing by welding or bolting or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

3.2 ADJUSTING

3.2.1. General

a. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and with weathertight fit around entire perimeter.

3.2.2. Touch-up Painting

a. Immediately after welding galvanized track to track supports, clean field welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

3.3 DEMONSTRATION

3.3.1. Training

a. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain doors.

END OF SECTION

SECTION 08380

TRAFFIC DOORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Double action, self-closing, lightweight, impact resistant doors of the following types:

(1) Types F and FF, single and pair of doors, non-sealed.
(2) Types G and GG, single and pair of doors, sealed.

b. Flexible vertical strip barrier doors.

1.2 SUBMITTALS

1.2.1. Product data

a. Manufacturer's product description, installation and maintenance instructions for each type and size of traffic door.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

Protect doors during transit, storage and handling to prevent damage, soiling and deterioration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of

design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 DOOR TYPES AND ACCESSORIES

2.2.1. Traffic Doors Type: F and FF.

a. Basis-of-Design Product: Eliason Easy Swing Door Division, Model HCP-10.
b. Door Body: Fire retardant exterior surface of 0.125 thick high impact thermoplastic material, bonded to a high strength polymer cell core with a high strength structural PVC frame; 1-1/2 inch total door thickness.
c. Standard design clearances.
d. Windows: Clear acrylic; double glazed; set in black rubber molding; 14 inches by 16 inches unless otherwise indicated.
e. Spring Bumpers: Flexible, impact resistant thermoplastic material; 18 inches high; in manufacturer's standard black finish front and back.
f. Jamb Guards: Welded assembly of 1/4 inch stainless steel; 18 inches high by 5 inches deep. Provide with floor and wall anchors. Secure bottom pin assembly to top of jamb guard.
g. Color: As indicated on drawings.
h. Provide manufacturer's standard brackets on doors for application of padlocks.

2.2.2. Traffic Doors Type G and GG.

a. Basis-of-Design Product: Eliason Easy Swing Door Division; Model HCG-10.
b. Door body: Fire retardant exterior surface of 0.125 thick high impact thermoplastic material, bonded to a high strength urethane foam core with a high strength structural PVC frame; 1-1/2 inch total door thickness.
c. Standard design clearances.
d. Windows: Clear acrylic; double glazed; set in black rubber molding; 14 inches by 16 inches unless otherwise indicated.
e. Provide the following as indicated on drawings:

(1) Spring Bumpers: Flexible, impact resistant ¼ inch thick thermoplastic material; 18 inches high; in manufacturer's standard black finish front and back.
(2) Scuff Plates: 0.090 inch thick thermoplastic, 48 inches high; in manufacturer's standard black finish.

f. Jamb Guards: Welded assembly of 1/4 inch stainless steel; 18 inches high by 5 inches deep. Provide with floor and wall anchors. Secure bottom pin assembly to top of jamb guard.
g. Color: As indicated on drawings.
h. Provide manufacturer's standard brackets on doors for application of padlocks.
i. Full perimeter gasket seal, adjustable at bottom.

2.3 TRANSPARENT-STRIP DOOR CURTAINS

2.3.1. General

a. Door curtains consisting of overlapping strips to form a sealed door curtain. Provide strips of length required to suit opening height and with sufficient number in unit to close opening width with 4 to 6 inches overlap on each jamb.
b. Basis-of-Design Product: American Floor Products Company, Inc., Vista-Curtain Flexible, Transparent Strip Doors (VC-5050), Style PF-808.

2.3.2. Strip Material: Curved, clear, transparent, extruded PVC. Fabricate strips for manufacturer's standard method of attachment to overhead mounting system indicated.

a. Low-Temperature Grade: USDA accepted, designed to withstand temperature range of minus 30 to plus 150 deg F.

2.3.3. Strip Size and Overlap:

a. Strip width and thickness: Minimum 8 inches wide and 0.08 inch thick.
b. Strip overlap: Overlap strips 2/3 width of strips.

PART 3 - EXECUTION

3.1 INSPECTION

Verify openings are prepared with headers level, jambs plumb, floor level, without projections, and are correctly dimensioned to receive traffic doors. Begin installation of doors only when conditions are satisfactory.

3.2 INSTALLATION

3.2.1. General

a. Install doors, complete with accessories and hardware, in strict accordance with shop drawings and manufacturer's installation instructions.

3.2.2. Transparent-Strip Door Mounting

a. Mount strip doors so operation of doors or other apparatus in same opening are not obstructed.

(1) Wall Surface Mounting: Consisting of a steel plate bolted to side of interior face of wall above door opening; equip plate with permanently attached, threaded, mounting pins and steel-angle or -plate retaining strip attached to plate with wing nuts.
(2) Wall Surface Mounting: Consisting of a rigid, vinyl wall-mounting unit bolted to interior face of wall above opening; equip unit with a similarly formed, rigid, vinyl retainer attached to unit with wing nuts.
(3) At Contractor’s option, mount strip doors using either of the above systems.

3.3 ADJUST AND CLEAN

3.3.1. General

a. Follow traffic door manufacturer’s instructions as required to:

(1) Clean and lubricate operating parts.
(2) Adjust to open and close smoothly and freely without binding.
(3) Check seals for proper fit.

3.3.2. Repair and Clean

a. Repair damage to doors to match manufacturer's original finish; if unable to repair damage, replace doors.
b. Clean surfaces soiled by work as recommended by manufacturer.
c. Leave work area clean and free of debris.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08411

ALUMINUM-FRAMED SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Exterior and interior aluminum-framed storefronts.
b. Exterior and interior manual-swing aluminum doors.
c. Exterior and interior aluminum door frames.

1.1.2. Related Section

a. Division 1 Section “Sustainable Design Requirements.”

1.2 PERFORMANCE REQUIREMENTS

1.2.1. General

a. Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

(1) Blast Loads.
(2) Structural loads.
(3) Deflection of Framing Members:
(4) Thermal movements.
(5) Movements of supporting structure indicated on Drawings including, but not limited to, deflection from uniformly distributed and concentrated live loads.
(6) Dimensional tolerances of building frame and other adjacent construction.
(7) Failure includes the following:

(a) Deflection exceeding specified limits.
(b) Thermal stresses transferring to building structure.
(c) Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
(d) Noise or vibration created by wind and thermal and structural movements.
(e) Loosening or weakening of fasteners, attachments, and other components.
(f) Failure of operating units.

b. Delegated Design: Design exterior aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.2.2. Blast Loads

a. Exterior Frame Member Design: Provide exterior aluminum-framed systems capable of resisting the effects of blast loads, including connections to their surroundings and supporting structural elements, in accordance with ASTM F 2248 based on an explosive weight of II (see United Facilities Criteria (UFC) 4-010-02, DoD Minimum Antiterrorism Standoff Distances for Buildings) and the standoff distance indicated.

(1) Once the contract is awarded, the successful contractor will be eligible to receive UFC 4-010-02 for use in the development of the the final exterior aluminum-framed design package under conditions dictated by the Government.
(2) Alternatives to the design approach above: :Any or all aluminum-framed systems, including connections and supporting structural elements:

(a) May be designed using dynamic analysis to substantiate the system will provide equivalent performance. The design loading for a dynamic analysis shall be the same pressure and impulse from the explosive weight indicated above. The design loading shall be applied over the areas tributary to the element being analyzed.
(b) May be dynamically tested in accordance with ASTM F 1642 to demonstrate equivalent performance. Testing shall include the entire aluminum-framed system.

1.2.3. Structural Loads

a. Wind Loads:

(1) Provide exterior aluminum-framed systems capable of withstanding wind pressures acting inward and outward normal to the plane of the wall.
(2) Refer to Division 1 Section "Description of Work" for design wind velocity and building exposure factor.
(3) Determine design loads using the appropriate coefficients for the aluminum-framed system configurations indicated.

b. Seismic Loads:

(1) Provide aluminum-framed systems capable of resisting the effects of earthquake motions.
(2) Refer to Division 1 Section "Description of Work" for seismic data, i.e., design category, use group, and occupancy importance factor.
(3) Determine seismic loads using the appropriate exposure coefficient for the aluminum-framed systems.

c. Security Protection:

(1) Provide exterior aluminum-framed systems capable of resisting blast loads in accordance with performance requirements.

1.2.4. Deflection of Framing Members:

a. Deflection Normal to Wall Plane At Design Wind Pressure: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
b. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below them to less than 1/8 inch and clearance between members and operable units directly below them to less than 1/16 inch.

c. Deflection Normal to Wall Plane At Design Blast Pressure: Except where more stringent requirements are dictated by project conditions, restrict deflections of edges of blast resistant glazing the frames support to 1/160 of the length of the supported edge at allowable stress levels determined in accordance with ASTM F 2248.

(1) The supported edge length of punched windows shall be equal to the span of the glass, regardless of any intermediate support connections. For multi-panel glazing systems, the supported edge length shall be equal to the span of a single glass panel and the deflection shall be calculated based on simple support conditions for that length.

1.2.5. Structural-Test Performance

a. Preconstruction Testing Service: Provide aluminum framed systems that comply with test-performance requirements indicated, as evidenced by reports based on Project-specific preconstruction testing or of tests performed on manufacturer's standard assemblies by a qualified testing agency.

b. Provide exterior aluminum-framed systems tested according to ASTM E 330 as follows:

(1) When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.

(2) When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.

c. Test Durations: As required by design wind velocity but not less than 10 seconds.

1.2.6. Thermal Movements

a. Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.2.7. Air Infiltration

a. Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. Ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. Ft..

1.2.8. Water Penetration Under Static Pressure

a. Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. Ft..

(1) Maximum Water Leakage: No uncontrolled water penetrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.

1.3 SUBMITTALS

1.3.1. Product Data

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

1.3.2. Shop Drawings

a. For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
b. For aluminum-framed systems indicated to comply with performance requirements and design criteria, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

(1) Show minimum frame bite for glazing exterior window and door systems.

1.3.3. Product Test Reports

a. Based on evaluation of comprehensive tests performed by a qualified testing agency, for exterior aluminum-framed systems, indicating compliance with performance requirements.

1.3.4. Seismic Qualification Certificates: For aluminum-framed systems**,** accessories, and components, from manufacturer.

a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

1.3.5. Sustainable Design Submittals

a. Materials shall comply with requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.3.6. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Product Test Reports	X	I
1.3.4	Seismic Qualification Certificates	X	I
1.3.5	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.

I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
b. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.

1.4.2. Testing Agency Qualifications

a. An independent agency qualified according to ASTM E 699 for testing indicated.

1.4.3. Product Options

a. Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

(1) Do not modify door stile width. Do not modify other intended aesthetic effects, as judged solely by Contracting Officer, except with Contracting Officer's approval. If modifications are proposed, submit comprehensive explanatory data to Contracting Officer for review.

1.4.4. Accessible Entrances

a. Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Aluminum Framing Members

a. Contain no less than 20% of Post-consumer recycled content.

2.1.3. Joint Sealants

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.2 MANUFACTURERS

2.2.1. Basis-of-Design

a. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

(1) Basis-of-Design Products

(a) The design for exterior aluminum-framed systems is based on Kawneer 1600 Wall System.
(b) The design for interior aluminum-framed systems is based on Kawneer Trifab 450.

2.3 MATERIALS

2.3.1. Aluminum

a. Alloy and temper recommended by manufacturer for type of use and finish indicated.
b. Sheet and Plate: ASTM B 209.
c. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
d. Extruded Structural Pipe and Tubes: ASTM B 429.
e. Structural Profiles: ASTM B 308/B 308M.
f. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

2.3.2. Steel Reinforcement

a. With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
b. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
c. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
d. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 COMPONENTS

2.4.1. General

a. Exterior Assemblies: At the Contractor's option, exterior aluminum framed system glazing may be retained by structural sealant, or mechanically with gaskets, or a combination of both in compliance with performance requirements.
b. Exterior Assemblies: Thermally broken.
c. Interior Assemblies: Retain interior aluminum framed system glazing mechanically with gaskets.
d. Glazing Bite: Provide a minimum bite of 3/8 inch for structural-sealant-glazed components and 1 inch for components that are not structural-sealant-glazed.

2.5 FRAMING SYSTEMS

2.5.1. Framing Members

a. Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

2.5.2. Brackets and Reinforcements

a. Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.5.3. Fasteners and Accessories

a. Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
b. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
c. Reinforce members as required to receive fastener threads.

2.5.4. Concrete and Masonry Inserts

a. Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

2.5.5. Flashing

a. Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

2.5.6. Framing System Gaskets and Sealants

a. Manufacturer's standard recommended by manufacturer for joint type.

2.6 GLAZING SYSTEMS

2.6.1. Glazing

a. As specified in Division 8 Section "Glazing."

2.6.2. Glazing Gaskets

a. Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.

2.6.3. Spacers and Setting Blocks

a. Manufacturer's standard elastomeric types.

2.7 DOORS

2.7.1. General

a. Manufacturer's standard glazed doors, for manual swing operation.
b. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.
c. Door Design: Medium stile; 3-1/2-inch nominal width.
d. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
e. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
f. Provide nonremovable glazing stops on outside of door.

2.7.2. Door Hardware

a. As specified in Division 8 Section "Door Hardware."

2.8 ACCESSORY MATERIALS

2.8.1. Joint Sealants

a. For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."

2.8.2. Bituminous Paint

a. Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.9 FABRICATION

2.9.1. General

a. Form aluminum shapes before finishing.
b. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
c. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

(1) Profiles that are sharp, straight, and free of defects or deformations.
(2) Accurately fitted joints with ends coped or mitered.

(3) Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
(4) Physical and thermal isolation of glazing from framing members.
(5) Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
(6) Provisions for field replacement of glazing from exterior.
(7) Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

2.9.2. Mechanically Glazed Framing Members

a. Fabricate for flush glazing (without projecting stops).

2.9.3. Structural-Sealant-Glazed Framing Members

a. Include accommodations for using temporary support device (dutchman) to retain glazing in place while structural sealant cures.

2.9.4. Door Frames

a. Reinforce as required to support loads imposed by door operation and for installing hardware.
b. At exterior doors, provide compression weather stripping at fixed stops.
c. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

2.9.5. Doors

a. Reinforce doors as required for installing hardware.

2.9.6. After Fabrication

a. Clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

2.10.1. Clear Anodic Finish

a. AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Comply with manufacturer's written instructions.
b. Do not install damaged components.
c. Fit joints to produce hairline joints free of burrs and distortion.

(1) Rigidly secure nonmovement joints.
(2) Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
(3) Seal joints watertight, unless otherwise indicated.

d. Metal Protection

(1) Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
(2) Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

e. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
f. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.
g. Install components plumb and true in alignment with established lines and grades, without warp or rack.
h. Install glazing as specified in Division 8 Section "Glazing."

3.2.2. Entrances

a. Install to produce smooth operation and tight fit at contact points.
b. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure.

3.2.3. Perimeter Joint Sealants

a. Install as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

3.2.4. Erection Tolerances

a. Install aluminum-framed systems to comply with the following maximum tolerances:

(1) Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
(2) Alignment:

(a) Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
(b) Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

(3) Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08461

SLIDING AUTOMATIC ENTRANCE DOORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Exterior and interior sliding, automatic entrance door assemblies.
b. This Section specifies non-blast resistant sliding automatic entrance door assemblies positioned in exterior walls in accordance with UFC 4-010-01, Appendix B, Standard 12, “Alternative Designs”. Sliding automatic entrance door system glazing shall comply with glass type and minimum frame bite provisions of UFC 4-010-01, Appendix B, Standard 10.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”

1.2 DEFINITIONS

1.2.1. Activation Device

a. Device that, when actuated, sends an electrical signal to the door operator to open the door.

1.2.2. Safety Device

a. Device that prevents a door from opening or closing.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. General

a. Provide automatic entrance door assemblies capable of withstanding structural loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.

b. Delegated Design: Design exterior sliding automatic door systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.3.2. Structural Loads

a. Wind Loads:

(1) Provide exterior automatic entrance door assemblies, including anchorage, capable of withstanding wind pressures acting inward and outward normal to the plane of the wall.
(2) Refer to Division 1 Section "Description of Work" for design wind velocity and building exposure factor.
(3) Determine design loads using the appropriate coefficients for the automatic entrance door assemblies configurations indicated.

b. Seismic Loads:

(1) Provide automatic entrance door assemblies capable of resisting the effects of earthquake motions.
(2) Refer to Division 1 Section "Description of Work" for seismic data, i.e., design category, use group, and occupancy importance factor.
(3) Determine seismic loads using the appropriate exposure coefficient for the automatic entrance door assemblies.

1.3.3. Thermal Movements

a. Provide automatic entrance doors that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 º F, ambient; 180 º F, material surfaces.

1.3.4. Operating Temperature Range

a. Provide automatic entrance door operators capable of operating between minus 20 º F and plus 130 º F.

1.3.5. Air Infiltration

a. Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. of fixed entrance system area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft.

1.3.6. Opening Force Requirements

a. Egress Doors: Not more than 50 lbf required to manually set door in motion if power fails, and not more than 15 lbf required to open door to minimum required width:
b. Accessible Interior Doors: Not more than 5 lbf.

1.3.7. Closing-Force Requirements

a. Not more than 30 lbf required to prevent door from closing.

1.4 SUBMITTALS

1.4.1. Product Data

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic entrance doors.

1.4.2. Shop Drawings

a. Include plans, elevations, sections, details, hardware mounting heights, and attachments to other Work.
b. For systems indicated to comply with performance requirements and design criteria, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

(1) Show minimum frame bite for glazing exterior door, sidelight, and transom systems.

c. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

1.4.3. Samples for Verification

a. For each type of exposed finish required, in manufacturer's standard sizes.

1.4.4. Product Test Reports

a. Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating current automatic entrance door systems comply with requirements.

1.4.5. Maintenance Data

a. For door operators and control systems to include in maintenance manuals.

1.4.6. Sustainable Design Submittals

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each product applied on-site in the interior.

1.4.7. Submittal List:

Reference	Submittal Item	Quantity	Action
1.4.1	Product Data	X	R
1.4.2	Shop Drawings	X	R
1.4.3	Samples for Verification	X	R
1.4.4	Product Test Reports	X	I
1.4.5	Maintenance Data	X	I
1.4.6	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications

a. An experienced installer who is an authorized representative of the automatic entrance door manufacturer for both installation and maintenance of units required for this Project.

b. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

1.5.2. Professional Engineer Qualifications

a. A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of automatic entrance door systems that are similar to those indicated for this Project in material, design, and extent.

1.5.3. Manufacturer Qualifications

a. A firm experienced in manufacturing systems similar to those indicated for this Project and with a record of successful in-service performance.

1.5.4. Testing Agency Qualifications

a. An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the automatic entrance door assembly testing indicated, as documented according to ASTM E 548.

1.5.5. Source Limitations

a. Obtain automatic entrance doors through one source from a single manufacturer.

1.5.6. Product Options

a. Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

(1) Do not modify door stile width. Do not modify other intended aesthetic effects, as judged solely by Contracting Officer, except with Contracting Officer’s approval. If modifications are proposed, submit comprehensive explanatory data to Contracting Officer for review.

1.5.7. Welding Standards

a. Comply with AWS D1.2, "Structural Welding Code--Aluminum."

1.5.8. ANSI/BHMA Standard

a. ANSI/BHMA A156.10 (rev. 05), "Power Operated Pedestrian Doors."

1.5.9. UL Standard

a. Provide power door operators that comply with UL 325.

1.5.10. Emergency Exit Door Requirements

a. Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.
b. Emergency Break Away: Provide in accordance with ANSI A156.10 and NFPA 101.

1.6 PROJECT CONDITIONS

1.6.1. Field Measurements

a. Verify automatic entrance door openings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Adhesives & Sealants

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2.1. Sliding Units:

a. Basis-of-Design Products: Subject to compliance with modification requirements, provide Stanley Access Technologies; Div. of The Stanley Works; Dura-Glide 3000 Automatic Sliding Entrance System, with transom.

2.3 MATERIALS

2.3.1. Aluminum

a. Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with standards indicated below:

(1) Extruded: ASTM B 221.
(2) Sheet and Plate: ASTM B 209.
(3) Welding Rods and Bare Electrodes: AWS A5.10.

2.3.2. Glazing and Glazing Sealants

a. As specified in Division 8 Section "Glazing."

2.3.3. Sealants and Joint Fillers

a. Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance framing system.

2.3.4. Nonmetallic, Shrinkage-Resistant Grout

a. Premixed, nonmetallic, noncorrosive, nonstaining grout; complying with ASTM C 1107; of consistency suitable for application.

2.3.5. Bituminous Paint

a. Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil thickness per coat.

2.4 AUTOMATIC ENTRANCE DOOR SYSTEMS

2.4.1. General

a. Provide manufacturer's standard automatic entrance door system, complete with doors, sidelite and transom framing, operators, controls, activation devices, safety devices, and accessories as indicated. Comply with the following:

(1) Configuration:

(a) Biparting sliding doors, with sidelite on each side of door.
(b) Single sliding doors.

(2) Traffic Pattern: As indicated on drawings.
(3) Emergency Breakaway Capability: Doors and sidelites.

2.4.2. Activation Device

a. Motion detectors mounted on each side of door header to detect pedestrians in activating zone and to open door.

2.4.3. Safety Devices

a. Presence detector mounted to underside of door header and two photoelectric beams mounted in sidelite jambs to detect pedestrians in presence zone and to prevent door from closing.

2.5 COMPONENTS

2.5.1. General

a. Exterior Assemblies: At the Contractor's option, exterior sliding automatic entrance door system glazing may be retained by structural sealant, or mechanically with gaskets, or a combination of both in compliance with performance requirements.

(1) Glazing Bite: Provide a minimum bite of 3/8 inch for structural-sealant-glazed components and 1 inch for components that are not structural-sealant-glazed or greater as required by UFC 4-010-01, Appendix B, Standard 10, based on calculations.

b. Interior Assemblies: Retain interior sliding automatic entrance door system glazing mechanically with gaskets.

2.5.2. Doors

a. Provide manufacturer's standard 1-3/4-inch- thick glazed doors with minimum 0.125-inch- thick, extruded tubular stile and rail members. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails.

b. Glazing Stops and Gaskets:

(1) Mechanically Glazed Framing Members: Provide manufacturer's standard snap-on, extruded-aluminum, square glazing stops and preformed resilient glazing gaskets.

(2) Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device (dutchman) to retain glazing in place while structural sealant cures.

c. Stile Design: Medium stile; 3-1/2-inch nominal width.

d. Bottom Rail Design: 10-inch nominal height, seamless.

e. Cart Protection Rails: Provide surface mounted cart protection rails horizontally across bottom section of automatic sliding entrance doors and sidelites as detailed on Drawings. Rails shall be fabricated of Type 304 stainless steel, No. 4 satin finish, 11 ga. thickness, 8 inches high by door width unless otherwise indicated. Provide two rails per door and sidelite leaf mounted on approach side only unless otherwise indicated. Secure rails to door stiles with countersunk stainless steel fasteners. Cut weatherstripping as required for passage of cart protection rails through sliding door opening.

2.5.3. Framing Members

a. Fabricate from extruded aluminum or formed-aluminum sheet or plate.

b. Main Extrusions: Minimum wall thickness of 0.125 inch.

c. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch.

d. Muntin Bars: Horizontal extruded tubular rail members, 4-1/4-inch nominal height.

2.5.4. Headers

a. Fabricated from minimum 0.125-inch- thick, extruded aluminum or formed-aluminum sheet or plate. Conceal operator and roller track in header, providing access by means of hinged or removable access panel to permit service and adjustment. Secure panel to prevent unauthorized access.

b. Concealed: Fabricate header to match depth of framing and to extend full width of door opening.

c. Capacity: Capable of supporting doors without intermediate supports.

2.5.5. Carrier Assembly and Overhead Roller Track

a. Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.
b. Rollers: Minimum two ball-bearing roller wheels and two antirise rollers for each active leaf.
c. Provide overhead and sill tracks and roller assembly with anti-riser feature to prevent derailing; locate overhead assembly within door head, provide access panel for servicing.

2.5.6. Sills

a. Manufacturer's standard sill members and bottom guide system, with stainless-steel ball-bearing-center roller wheels, and threshold and configuration indicated below:

(1) Provide recessed-mounted roller guide track system at sidelights and no threshold across the door opening. Basis-of-Design Manufacturer’s standard “Threshold Extrusion, 4-1/2-inch Frame.”

2.5.7. Brackets and Reinforcements

a. Manufacturer's standard; compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

2.5.8. Fasteners and Accessories

a. Manufacturer's standard corrosion resistant, nonstaining, nonbleeding; compatible with adjacent materials.
b. Reinforcement: Reinforce members as required to retain fastener threads.
c. Exposed Fasteners: Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

2.5.9. Signage

a. Comply with ANSI/BHMA A156.10, and as indicated on drawings and as specified in Division 10 Section "Signs."

2.6 DOOR OPERATORS

2.6.1. General

a. Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Comply with the following:

(1) Type: Power operated, complying with ANSI/BHMA A156.10.
(2) Connections: Provide connections for power and control wiring.
(3) Adjustment Features: Operators shall be fully adjustable without removing entrance doors, as follows:

(a) Adjustable speed, including opening, closing, back check, and latch check.
(b) Door speed (not the checking speed): Minimum two feet per second opening, one foot per second closing; adjustable speed control for opening and closing cycles.
(c) Adjustable time delay for length of time door remains open.

(d) Adjustable 0 to 30 seconds.
(e) Automatic door re-open if stopped while closing.

(4) Microprocessor Control: System that automatically defines and sets opening and closing parameters.
(5) On/Off Feature: Provide on/off/hold-open switch to control electric power to operator.

(a) Mount switch on jamb 66 inches above floor.

(6) Power for sliding door operation shall be automatically disconnected upon emergency release; provide door holders to retain swing out panels during normal operation.

2.6.2. Electromechanical Operators

a. Self-contained overhead units, with power opening and closing mechanism indicated below and with checking in both opening and closing cycles. Provide safety-release clutch for obstructed closing. Provide for manual sliding when power is off. Provide operator action as indicated.

(1) Closing Mechanism: Power operated.
(2) Mounting: Concealed.

2.7 ACTIVATION AND SAFETY DEVICES

2.7.1. Control Systems

a. Provide a motion-detecting control system, a presence -detecting control system, and photo-cell control system.
b. Mount motion-detecting control systems on door head in anti-vandalism unit case.

2.7.2. Microwave-Scanner Motion Detector
a. Self-contained, K-band-frequency, microwave-scanner units with metal or plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10; with relay hold time of not less than 2 to 10 seconds. .Provide housing with black finish.
(1) Approach side of door is indicated on drawings.
(2) For one-way-traffic doors, detector on egress side shall not be active when doors are fully closed.
(3) Provide capability for switching between uni-directional (one-way traffic)and bi-directional (two-way traffic) detection, adjustable in field.

2.7.3. Infrared-Scanner Presence Detector

a. Self-contained, infrared-scanner units with metal or plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10; with relay hold time of not less than 2 to 10 seconds. Detectors shall remain active at all times. Provide housing with black finish.

2.7.4. Photoelectric-Beams Control System

a. Manufacturer's standard horizontal photoelectric-beam system.
b. Pulsed infrared, sender-receiver assembly for recessed mounting. and shall prevent doors from closing when beam is interrupted. Beams shall not be active when doors are fully closed.

2.7.5. Electrical Interlocks

a. Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.8 HARDWARE

2.8.1. General

a. Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those indicated to be provided by automatic entrance door manufacturer.

2.8.2. Heavy-Duty Hardware

a. Provide units as indicated in size, number, and type recommended by manufacturer for entrances required. Finish exposed parts to match door finish, unless otherwise indicated.

2.8.3. Emergency Breakaway Hardware

a. Provide release hardware that allows panel to swing out in the direction of egress to a full 90 degrees from any position in the sliding mode. Maximum force to open panel shall be 50 lbf according to ANSI/BHMA A156.10. Interrupt operation of panel operator while in the breakaway mode.

2.8.4. Security Hooking Devices:

a. Provide security hooking devices at top and bottom of meeting stiles of sliding doors and sidelights. Hooks shall automatically secure sliding doors and sidelights together when sliding doors reach fully closed position and shall prevent break out when sliding door is locked.
b. Provide 2-point night locks at meeting stiles of sliding doors. 2-point locks shall consist of a hook bolt at meeting stiles of bi-parting leafs and a head bolt simultaneously thrown or retracted by cylinder operation.
c. Cylinders: On door exterior and interior, as specified in Division 8 Section "Door Hardware."

2.8.5. Compression Weather Stripping

a. Manufacturer's standard replaceable, compressible gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287. Include bumper-type gaskets at door stops and laps.

2.8.6. Sliding Weather Stripping

a. Manufacturer's standard replaceable weather stripping of wool, polypropylene, or nylon woven pile, with nylon-fabric or aluminum-strip backing, complying with AAMA 701. Sliding weather stripping includes stripping at jamb, head, and meeting rails where there is no stop or lap to receive compression weather stripping.

2.9 FABRICATION

2.9.1. General

a. Fabricate automatic entrance door system components to designs, sizes, and thicknesses specified and to comply with indicated standards.

2.9.2. Prefabrication

a. Provide automatic entrance doors as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
b. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.
c. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
d. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
e. Prepare components to receive concealed fasteners and anchor and connection devices.
f. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.

2.9.3. Welding

a. Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

2.9.4. Glazing Channels

a. Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."

2.9.5. Metal Protection

a. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

2.9.6. Hardware

a. Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.
b. Hardware Preparation:

(1) Prepare doors and frames to receive hardware.
(2) Hardware supplier shall furnish sliding door manufacturer approved hardware schedule, hardware templates, and samples of physical hardware where necessary to insure correct fitting and installation.
(3) Preparation includes sinkages and cut-outs for mortise and concealed hardware.
(4) Where cut-outs are required for cylinders on one face of door only, do not provide cut-out on opposite face; doors with unnecessary cut-outs, whether plugged, capped or otherwise filled, are not acceptable.
(5) Provide reinforcements for both concealed and surface applied hardware.
(6) Drill and tap mortise reinforcements at factory, using templates.
(7) Install reinforcements with concealed connections designed to develop full strength of reinforcements.

2.9.7. Doors

a. Fabricate doors in profiles indicated. Reinforce as required to support imposed loads and for installing hardware. Factory assemble door and frame units.
b. Exterior Doors: Provide compression weather stripping at fixed stops. At locations without fixed stops, provide sliding weather stripping retained in adjustable strip mortised into door edge.

2.9.8. Framing

a. Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide subframes and reinforcement of types indicated or, if not indicated, as needed for a complete system to support required loads.
b. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

2.10 ACCESS SECURITY SYSTEM

2.10.1. Performance

a. The access security system shall detect sliding condition and panic breakout condition of automatic sliding entrance doors when doors are locked and security system is activated.

2.10.2. Wiring

a. System shall be factory wired within the automatic sliding entrance door components; all equipment shall be concealed within door operator housing.

2.10.3. Operation

a. System shall electrically transmit a signal to a remote alarm when sliding condition and panic condition occur. Wiring from automatic sliding entrance doors and the alarm system are specified in Division 16. Provide disconnect switch and wire terminal connection points on terminal block for interface connections to remote alarm.

2.11 ALUMINUM FINISHES

Finish aluminum automatic entrance door system components to match finish of aluminum framed systems.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Existing Conditions

Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

3.3 INSTALLATION

3.3.1. General

a. Comply with automatic entrance door manufacturer's written installation instructions, unless more stringent requirements are indicated. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

3.3.2. Metal Protection

a. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.3.3. Entrances

a. Install entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place. Lubricate operating hardware and other moving parts.
b. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
c. Set tracks, header assemblies, operating brackets, and guides level and true to location with anchorage for permanent support.

(1) Set sill members in a bed of non-shrink, non-metallic, grout or mortar to completely support sill member from deflecting and bending; remove excess grout and mortar.
(2) Anchor thresholds with No. 10 or larger flat head, countersunk, machine screws (MS).
(3) Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

3.3.4. Door Operators

a. Install door operator system, including control wiring, as follows:

(1) Refer to Division 16 Sections for connection to electrical power distribution system.

3.3.5. Activation and Safety Devices

a. Install control devices and wiring, including connections to door operators, as follows:

(1) Factory install devices in doors and headers.
(2) Microwave-Scanner Motion Detectors: Install motion detectors on each side of door header of each automatic entrance door.
(3) Infrared-Scanner Presence Detectors: Install presence detectors at center of header on each automatic entrance door.

(4) Install photoelectric beams in vertical jambs of sidelites, with dimension above finished floor as follows:

(a) Top Beam: 48 inches.
(b) Bottom Beam: 24 inches.

3.3.6. Glazing

a. Comply with installation requirements in Division 8 Section "Glazing," unless otherwise indicated.

3.3.7. Sealants

a. Comply with requirements in Division 7 Section "Joint Sealants" for installing perimeter sealants, fillers, and gaskets.
b. Seal threshold perimeter between metal and concrete with sealant.
c. Seal frame perimeter with sealant to provide weathertight construction, unless otherwise indicated.

3.4 ADJUSTING

3.4.1. Components

a. Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure.

3.4.2. Operation

a. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.

3.5 CLEANING AND PROTECTION

3.5.1. Cleaning

a. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
b. Comply with requirements in Division 8 Section "Glazing" for cleaning and maintaining glass.

3.5.2. Protection

a. Provide final protection and maintain conditions, including limiting construction traffic, that ensure automatic entrance doors are without damage or deterioration at time of final acceptance.

3.6 DEMONSTRATION

3.6.1. Training

a. Engage manufacturer's inspector certified by the American Association of Automatic Door Manufacturers to train Government's maintenance personnel to adjust, operate, and maintain automatic entrance doors as specified below:

(1) Train Government's maintenance personnel on procedures and schedules for starting up and shutting down, troubleshooting, servicing, complying with safety requirements, and maintaining equipment and schedules.
(2) Review data in maintenance manuals.
(3) Schedule training with Contracting Officer with at least seven days' advance notice.

END OF SECTION

SECTION 08620
UNIT SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Unit skylights mounted on prefabricated curbs.

1.1.2. Related Section

a. Division 1 Section “Sustainable Design Requirements.”

1.2 REFERENCES

1.2.1. Aluminum Association (AA)

a. Specifications for Aluminum Structures.

1.2.2. American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

a. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.2.3. National Fenestration Rating Council (NFRC)

a. NFRC 100 – Procedure for Determining Fenestration Product U-Factors
b. NFRC 200–Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance of Normal Incidence.

1.2.4. North American Fenestration Standard (NAFS)

a. AAMA/WDMA/CSA/101/I.S.2/A440 – The Voluntary Performance Specification for Windows, Skylights, and Glass Doors.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. Unit Skylight Standard

a. Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

(1) Performance Class and Grade: Class CW-PG. The performance grade (PG) designation is approximately equal to the design load in pounds per square foot induced by wind and/or static snow loads acting in a downward direction. Refer to Division 1 Section "Description of Work" for design wind velocity and building exposure factor.

(2) Certification: AAMA, WDMA, or CSA certified unit skylights with label attached to each.

b. Skylights must be certified by the NFRC.

c. Skylights must be certified by the NAFS.

d. Skylights must conform with all federal, state and local code bodies having jurisdiction, and be designed to withstand all forces of nature deemed necessary by those code bodies for the specified project location.

e. Energy Requirements: Glazing material must have a maximum light distribution characteristic that maximizes the shading factor. Per Addendum D of ASHRAE 90.1-2007, the diffusing qualities of glazing must have a minimum haze factor of 90 percent or greater. The combined inner/outer lens target values shall be as follows:

(1) Light Transmittance: 60.0 percent minimum with white acrylic inner lens and clear polycarbonate outer lens.
(2) Diffusion/Haze Factor: 100 percent minimum.
(3) Solar Heat Gain Coefficient (SHGC): 0.52 maximum, NFRC 200.
(4) Thermal Transmittance ("U" Value): 0.82 or lower (glazing and framing) in accordance with NFRC 100.

f. Air Infiltration: ASTM E283 shall be less than 0.01 CFM/ Cu. Ft. @ 6.25-psf negative pressure.
g. Water Penetration: ASTM E331 shall pass at a negative pressure of 15-psf.
h. Skylight and frame assembly shall comply with OSHA 1910 and related requirements for completed construction, and OSHA 1926 for requirements during construction.

1.4 SUBMITTALS

1.4.1. Product Data

a. For each type of unit skylight indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for unit skylights

1.4.2. Shop Drawings

a. For unit skylight work. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work. Include all flashing, connection, and termination details necessary for a proper and complete installation.

1.4.3. Product Test Reports

a. Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency for each type, performance class, performance grade, and size of unit skylight. Test results based on testing of smaller unit skylights will not be accepted.

1.4.4. Sustainable Design Submittals

a. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each product applied on-site in the interior.

1.4.5. Submittal List

Reference	Submittal Item	Quantity	Action

1.4.1	Product Data	X	R
1.4.2	Shop Drawings	X	R
1.4.3	Product Test Reports	X	I
1.44.4	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

1.5.1. Manufacturer Qualifications: A manufacturer capable of fabricating unit skylights that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

1.5.2. Installer Qualifications: An installer acceptable to unit skylight manufacturer for installation of units required for this Project.

1.5.3. Source Limitations: Obtain unit skylights and prefabricated curbs from single manufacturer.

1.5.4. Surface-Burning Characteristics of Plastic Glazing:

a. Provide plastic glazing sheets identical to those tested for fire-exposure behavior per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

(1) Self-Ignition Temperature: 650 deg F or more for plastic sheets in thickness indicated when tested per ASTM D 1929.
(2) Smoke-Production Characteristics: Comply with either requirement below:

(a) Smoke-Developed Index: 450 or less when tested per ASTM E 84 on plastic sheets in manner indicated for use.
(b) Smoke Density: 75 or less when tested per ASTM D 2843 on plastic sheets in thickness indicated for use.

(3) Burning Characteristics: Tested per ASTM D 635.

(a) Polycarbonate-Insulating-Panel Glazing: Class CC1, burning rate of 2-1/2 inches per minute or less for nominal thickness of 0.060 inch or thickness indicated for use.

1.6 COORDINATION

1.6.1. General

a. Coordinate unit skylight flashing requirements with roofing system.
b. Provide anchors and inserts to be placed in adjacent construction in proper sequence so as not to delay the Work.

1.6.2 Delivery, Storage, and Handling

a. Store products in manufacturer's unopened packaging until ready for installation.

b. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.6.3 Project Conditions

a. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 WARRANTY

1.7.1. Special Warranty

a. Manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period.

(1) Failures include, but are not limited to, the following:

(a) Uncontrolled water leakage.
(b) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
(c) Yellowing of acrylic glazing.
(d) Breakage of polycarbonate glazing.
(e) Breakage of acrylic glazing.

b. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Adhesives & Sealants

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.2 MANUFACTURERS

2.2.1. Basis-of-Design Products

a. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis

of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

b. Basis-of-Design Product: Sunoptics Prismatic Skylights; 6201 27th Street, Sacramento, CA 95822; (800) 289-4700 or www.sunoptics.com.

(1) Double Glazed Skylight with Galvanized Insulated Skylight Curb.

2.3 MATERIALS

2.3.1. Aluminum Components:

a. Sheets: ASTM B 209 alloy and temper to suit forming operations and finish requirements but with not less than the strength and durability of alclad Alloy 3005-H25.

b. Extruded Shapes: ASTM B 221 alloy and temper to suit structural and finish requirements but with not less than the strength and durability of Alloy 6063-T52.

2.3.2. Fasteners

a. Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened.

(1) Where removal of exterior exposed fasteners might allow access to building, provide nonremovable fastener heads.

2.4 GLAZING

2.4.1. Configuration: Fixed Dome or Pyramid – Double Glazed.

2.4.1.1. Outer Lens: Clear Polycarbonate (Lexan SLX or equal) Smooth or Prismatic Lens.

2.4.1.2. Inner Lens: White Prismatic Acrylic Lens.

2.5 INSTALLATION MATERIALS

2.5.1. General

a. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic, nominally free of sulfur and containing no asbestos fibers, formulated for 15-mil dry film thickness per coating.

b. Joint Sealants: As specified in Division 7 Section "Joint Sealants."

c. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

d. Roofing Cement: ASTM D 4586, asbestos free, designed for trowel application or other adhesive compatible with roofing system.

2.6 UNIT SKYLIGHTS

2.6.1. Double glazed fixed skylight mounted on prefabricated curbs

a. Factory assembled aluminum skylight frame with integral condensation gutters that drain interior moisture to the outside. Corners shall be mitered and welded. Interior skylight frame shall be insulated and thermally broken. Skylight glazing shall be separated from the skylight frame with an EDPM rubber air seal gasket. Continuous vinyl weather sweep between skylight frame and prefabricated curb.

b. Skylight unit shall be factory assembled and glazed, ready for installation.

c. Skylight shall be double glazed using CC1 rated polycarbonate outer lens with acrylic inner lens in a dome or pyramid configuration, and include insulated thermal break, foam tape, weather sweep, and screws.

d. Salient features:

(1) Dome or Pyramid Lens.
(2) I.D. Frame Dimension: 63-1/4 inches x 63-1/4 inches.
(3) Double Glazed.
(a) Outer Lens: Clear Polycarbonate (Lexan SLX or equal) Smooth or Prismatic Lens.
(b) Inner Lens: SR25 White Prismatic Acrylic Lens.
(4) Frame Model: 800MD with integral vinyl weather sweep.
(5) Skylight Frame Finish: Mill finished aluminum.
(6) Gasket: Pre-installed 1-1/2 inch wide x ¼ inch thick foam rubber gasket between skylight frame and prefabricated curb.

e. Prefabricated Curb:

(1) O.D. Curb Dimension: 62-inches x 62-inches
(2) I.D. Curb Dimension: 59-inches x 59-inches.
(3) Height: 12 inches.
(4) Construction: Fully welded, double wall, 14-gauge G-90 galvanized steel.
(5) Curb shall include a 2-inch x 2-inch pressure-treated wood nailer for mounting skylight.
(6) Curb shall include an OSHA compliant 3/16-inch wire mesh welded safety security guard, spaced no more than 4-inches O.C., each direction.
(7) Insulation: Manufacturer's standard 1-1/2 inch thick rigid foam insulation.
(8) Interior of curb, safety security guard, and wood nailer to have factory white primer finish.

2.7 ALUMINUM FINISHES

2.7.1. Mill Finish

a. Manufacturer's standard.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
b. Proceed with unit skylight installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Coordinate installation of unit skylight with installation of substrates, vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.
b. Comply with recommendations in AAMA 1607 and with manufacturer's written instructions for installing unit skylights.
c. Install unit skylights level, plumb, and true to line, without distortion.
d. Anchor unit skylights securely to supporting substrates.
e. Where metal surfaces of unit skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation recommended in writing by unit skylight manufacturer.
f. Set unit skylight flanges in thick bed of roofing cement to form a seal unless otherwise indicated.
g. Where cap flashing is indicated, install to produce waterproof overlap with roofing or roof flashing. Seal with thick bead of mastic sealant except where overlap is indicated to be left open for ventilation.

3.3 FIELD QUALITY CONTROL

3.3.1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

3.3.2. After completion of installation and nominal curing of sealant and glazing compounds, but before installation of interior finishes, test for water leaks according to AAMA 501.2.

3.3.3. Perform test for total area of each skylight unit.

3.3.4. Work will be considered defective if it does not pass tests and inspections.

3.3.5. Additional testing and inspections, at Contractor’s expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.3.6. Prepare test and inspection reports.

3.4 CLEANING

3.4.1. General

a. Clean exposed unit skylight surfaces according to manufacturer's written instructions. Touch-up damaged metal finishes.
b. Remove excess sealants, glazing materials, dirt, and other substances.
c. Remove and replace glazing that has been broken, chipped, cracked, abraded, or damaged during construction period.
d. Protect unit skylight surfaces from contact with contaminating substances resulting from construction operations.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08710

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Commercial door hardware for the following:

(1) Swinging doors.
(2) Sliding doors.
(3) Other doors to the extent indicated.

b. Cylinders for doors specified in other Sections.
c. Electrified door hardware.

1.1.2. Related Sections

a. Division 8 Section “Commissioning Openings” for commissioning requirements.
b. Division 11 Section "Key Control Cabinet" for key management system.

1.2 SUBMITTALS

1.2.1. Product Data

a. Manufacturer's technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

1.2.2. Product Certificates: For locksets, signed by product manufacturer.

a. Certify that locksets approved for use complies with “Buy American Act".

1.2.3. Hardware Schedule

a. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant. Coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
b. Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Use same door and hardware set designations as in the Contract Documents. Include the following information:

(1) Type, style, function, size, and finish of each hardware item.
(2) Name and manufacturer of each item.

(3) Fastenings and other pertinent information.
(4) Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
(5) Explanation of all abbreviations, symbols and codes contained in schedule.
(6) Mounting locations for hardware.
(7) Door and frame sizes and materials.
(8) Door handing and key side.

c. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.

1.2.4. Keying Schedule

a. Submit separate detailed schedule prepared by or under the supervision of Architectural Hardware Consultant (AHC) indicating clearly how the Contracting Officer's final instructions on keying of locks has been fulfilled.

1.2.5. AHC Report

a. Upon completion of the installation, and as a condition of its acceptance, deliver a report signed by the AHC stating that his inspection was made, that all adjustments recommended by him have been completed, that all finish hardware furnished under this Section has been installed and is in optimum working condition, and that finish hardware conforms to commissioning requirements.

1.2.6. Product Test Reports

a. Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for locks, latches, delayed-egress locks, and closers where indicated to comply with accessibility requirements.

1.2.7. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Product Certificates	X	I
1.2.3	Hardware Schedule	X	R
1.2.4	Keying Schedule	X	R
1.2.5	AHC Report	X	I
1.2.6	Product Test Reports	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Single Source Responsibility

a. Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.

1.3.2. Lockset Manufacturer Qualifications

a. A recognized architectural door hardware manufacturer that has a record of successful in-service performance for domestically manufacturing locksets similar in quantity, type, and quality to that indicated for this Project and that meets the requirements of the "Buy American Act".

1.3.3. Installer Qualifications

a. An employer of workers trained and approved by lock manufacturer.
b. Installer's responsibilities include supplying and installing door hardware, and providing a qualified Architectural Hardware Consultant (AHC) available at reasonable times during the course of the Work to consult with Contracting Officer, Architect, and Contractor about door hardware and keying.
c. Installer shall have warehousing facilities in Project's vicinity.
d. Scheduling Responsibility: Preparation of door hardware and keying schedules.
e. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
f. Meet with Contracting Officer to finalize keying requirements and to obtain final instructions in writing.

1.3.4. Architectural Hardware Consultant (AHC) Qualifications

a. A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

1.3.5. Electrified Door Hardware Consultant Qualifications

a. A qualified Architectural Hardware Consultant who is experienced in providing consulting services for electrified door hardware installations.

1.3.6. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1.4 MAINTENANCE

Furnish a complete set of specialized tools and maintenance instructions as needed for Government’s continued adjustment, maintenance and removal and replacement of door hardware.

1.5 COORDINATION

1.5.1. Base Installation Coordination

a. Coordinate with base installation locksmith requirements for exterior and other security locks for compatibility with base installation locks preferences and maintenance.

1.5.2. Templates

a. Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.5.3. Electrical System Preinstallation Conference

a. Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system , and building control system, as applicable to project.
b. Conduct conference at Project site to comply with requirements in Division 1 Section "Coordination." Review methods and procedures related to electrified door hardware including, but not limited to, the following:

(1) Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
(2) Review sequence of operation for each type of electrified door hardware.
(3) Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
(4) Review required testing, inspecting, and certifying procedures.

1.6 REGULATORY REQUIREMENTS

1.6.1. Accessibility Requirements

a. Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 as follows:

(1) Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
(2) Comply with the following maximum opening-force requirements:

(a) Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
(b) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

(3) Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.

1.7 DELIVERY, STORAGE, AND HANDLING

1.7.1. General

a. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
b. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.
c. Deliver keys and replacement cores to manufacturer of key control system for subsequent delivery to Contracting Officer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS AND FABRICATION

2.2.1. Manufacturer's Name Plate

a. Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Contracting Officer.

b. Manufacturer's identification will be permitted on rim of lock cylinders only.

2.2.2. Base Metals

a. Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

2.2.3. Fasteners

a. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
b. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
c. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

2.3 HINGES

2.3.1. Templates

a. Except for hinges to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

2.3.2. Screws

a. Furnish Phillips flat-head screws complying with the following requirements:

(1) For metal doors and frames, install machine screws into drilled and tapped holes.
(2) For wood doors, install wood screws.
(3) Finish screw heads to match surface of hinges or pivots.

2.3.3. Hinge Pins

a. Except as otherwise indicated, provide hinge pins as follows:

(1) Doors with Locks: Nonremovable pins.
(2) Out-Swing Exterior Doors: Nonremovable pins.
(3) Out-Swing Corridor Doors with Locks: Nonremovable pins.
(4) Interior Doors: Nonrising pins.
(5) Tips: Flat button and matching plug, finished to match leaves.

2.3.4. Number of hinges

a. Provide number of hinges indicated but not less than 2 hinges per door leaf for doors 60 inches or less in height and one additional hinge for each 30 inches, or fraction thereof, of additional height.

2.3.5. Butts

a. 5 knuckle, full mortise hinges with ball bearings conforming to ANSI/BHMA A156.1 and as follows:

(1) Exterior Door Hinges: Stainless steel base metal, A5111, 4-1/2 by 4-1/2 by 0.180 inches, with 4 ball bearings.
(2) Interior Door Hinges: Cold rolled steel base metal, A8112, 4-1/2 by 4-1/2 by 0.134 inches, with 2 ball bearings.
(3) Provide doors greater than 3 feet in width with hinges 5 inches high.
(4) Where required to clear trim or permit doors to swing 180 degrees, furnish hinges of sufficient throw.
(5) Nylon and oil impregnated bearing hinges shall not be substituted for ball bearing hinges.
(6) Ball bearing hinges which are not adequately greased shall be rejected.

2.4 LOCK CYLINDERS AND KEYING

2.4.1. General

a. Provide cylinders for each hardware device requiring cylinder operation. Cylinders and the locks in which they are used shall be functionally compatible.
b. Coordinate preparation of doors receiving cylinders with door manufacturer to assure their compatibility.

2.4.2. Cylinders

a. Equip locks with cylinders that comply with performance requirements for Grade 1 cylinders as listed in ANSI/BHMA A 156.5.

(1) Number of Pins: Seven.
(2) Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.

(3) Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
(4) Bored-Lock Type: Cylinders with tailpieces to suit locks.

b. Equip locks with cylinders for interchangeable-core pin tumbler inserts, compatible with Installation's locking system. Provide temporary inserts for the construction period, and remove these when directed. Provide key control for removal and insertion of cores.
c. Furnish final cores (complete with materials to combinate) and keys for installation by Government. After final acceptance and keying, Government will return construction cores to Contractor.
d. Metals: Construct lock cylinder parts from brass or bronze, stainless steel or nickel silver.
e. Furnish replacement cores in the quantity of 10 percent of total locks with interchangeable core pin tumbler inserts.

2.4.3. Keys and Keying

a. Installer shall meet with Contracting Officer at Project site to finalize keying requirements and obtain final instructions in writing.
b. Keying System: Factory registered, complying with guidelines in ANSI/BHMA A156.28, Appendix A. Except as otherwise indicated, provide new master key system for Project. Review the keying system with the Contracting Officer and provide the type required (master, grandmaster or great-grandmaster), either new or integrated with Government's existing system.
c. Comply with Contracting Officer's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.

(1) Key Type: Verify with Installation if a special key section is required to match existing.

d. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation "U.S. GOVERNMENT - DO NOT DUPLICATE."
e. Key Material: Provide keys of nickel silver only.
f. Key Quantity: Furnish 2 change keys for each lock, 3 master keys for each master system, and 2 grandmaster keys for each grandmaster system.
g. Furnish blank keys in the quantity of 10 percent of total locks.

2.4.4. Delivery

a. Deliver keys and replacement cores to Contracting Officer.

2.5 BUILDING KEY BOX

2.5.1. General

a. Provide flush mounted recessed building key box to contain key for emergency access to building. Install in locations indicated.

2.5.2. Basis-of-Design Products: The Knox Company, Model 3200-RTS with recessed mounting kit Model 3200-RMK.

a. Recessed mount heavy duty KNOX-BOX with hinged door.
b. ½ inch solid steel plate door.
c. Recessed mount 1/4 inch thick steel case, outside body dimensions 4 inches wide by 5 inches high by 3 inches deep.

d. Flange Dimensions: 7 inches by 7 inches.
e. Color of surfaces exposed to view: Dark bronze.
f. Mounting height: 72 inches above ground unless otherwise indicated.
g. Install using the 3200 Recessed Mounting Kit in accordance with manufacturer's written instructions.

2.6 LOCKS, LATCHES, AND BOLTS

2.6.1. General

a. Keyed locks shall conform to general requirements and cylinder requirements specified under "LOCK CYLINDERS AND KEYING".

2.6.2. Tactile Warnings on Doors to Hazardous Areas

a. Provide a textured surface on the door handle, knob, pull, and other operating hardware of doors that lead to areas that might prove dangerous to a blind person, i.e., doors to loading platforms, boiler rooms, mechanical equipment rooms, electrical equipment rooms, and janitor's closets

2.6.3. Strikes

a. Provide manufacturer's standard wrought box strike for each latch and lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
b. Mortise-type locks and latches for doors 1-3/4 inches thick and over: Provide adjustable bevel fronts or otherwise conform to the shape of the door edge.
c. Provide mortise locks with armored fronts.
d. Provide flat lip strikes for locks with 3-piece, antifriction latchbolts as recommended by manufacturer.
e. Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.
f. Provide dust-proof strikes for foot bolts, except where special threshold construction provides nonrecessed strike for bolt.

2.6.4. Certified Locks & Latches

a. Mortise type locks shall be listed under Category F in BHMA's "Certified Product Directory."

2.6.5. Mortise Type

a. Stamped steel case with steel or brass parts; ANSI/BHMA A156.13; Series 1000. Provide mortise locks and latches with escutcheon, minimum 7 by 1-3/4 inches.

(1) Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with ANSI/BHMA A156.13.

b. Lever Handle: Cast lever handle and cast shank. Breakaway feature on lock functions (such as weakened spindle or shear key) to prevent irreparable damage to lock when force in excess of that specified in reference standard is applied to the lever handle. Lever handles shall return to within ½ inch of door face.
c. Type 1: Operational Grade 1.
d. Type 2: Security Grade 1; meet both operational and security criteria.
e. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

(1) Best Access Systems.

(2) Corbin Russwin Architectural Hardware, Div. Black & Decker Corp.
(3) Sargent Manufacturing Company.
(4) Schlage Lock, Div. Ingersoll-Rand Door Hardware Group.
(5) Yale Security, Inc.

2.6.6. Bored Type

a. ANSI/BHMA A156.2, Grade 1; Series 4000

(1) Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with ANSI/BHMA A156.2.

(a) Compactor door: Dead locking latch bolt operated by trim on inside of building only. Non-removable blank trim or no trim (no cutout) outside.

b. Lock Trim:

(1) Knobs: Machined from solid brass or bronze.
(2) Escutcheons (Roses): Brass or bronze reinforced with steel liner.
(3) Basis-of-lockset-design: Best Access Systems, 8K Series, 2-3/4 back set, round knob, standard strike plate.

c. Lock Throw: Minimum 1/2-inch latchbolt throw.

2.6.7. Latch Guard

a. Provide stainless steel latchguards appropriate for the type of lock and strike used; concealed, through-bolt fasteners.

2.6.8. Electric Strikes:

a. Conform to ANSI/BHMA A156.31, US32D, Grade 1. Provide appropriate strike for use with type of lock specified, i.e., rim latch, mortise lock, deadlatch.
b. Intermittent action; fail secure; audible operations.
c. Provide appropriate rectifier, current limiter, and transformer.
d. Provide concealed conduit and wiring in door frame and building construction to remote electric power supply junction box and strike release switch junction box.

2.7 AUXILIARY LOCKS, LATCHES AND BOLTS

2.7.1. General

a. Keyed auxiliary locks shall conform to general requirements and cylinder requirements specified under "LOCK CYLINDERS AND KEYING".
b. Keyed auxiliary locks shall conform to requirements for strikes and rabbeted doors specified under "LOCKS, LATCHES, AND BOLTS".
c. Locate centerline of deadlock and deadlatch strikes 48 inches above finished floor.

2.7.2. Deadlocks:

a. Bored auxiliary deadlock; Type 1, ANSI/BHMA A156.5, keyed both sides, E2141. Where indicated in Hardware Schedule provide sign "THIS DOOR TO REMAIN UNLOCKED WHEN THE BUILDING IS OCCUPIED" in line with lock. Letters shall be not less than 1 inch high in a contrasting background.

2.7.3. Deadlatches

a. Two-Point Deadlatch with Paddle: Basis-of-Design Product Adams Rite 4781: concealed vertical rod mechanism which latches to header and bolts to threshold; inside operation with 4781 push paddle (located 39 inches above finished floor at centerline) unblocks top bolt and withdraws bottom bolt; outside operation with key operation retracts bolts; provide dogging using hex screw in paddle escutcheon to hold paddle down; provide outside 8650 key cylinder escutcheon; match door finish.

b. Type 2: Basis-of-Design Product Adams Rite 4900 Series, 5/8 inch throw, 1-1/2 inches backset; keyed outside, 4561 black nylon lever.

2.7.4. Flush Bolts:

a. Manual flush bolt, ANSI/BHMA A156.16; L04081; provide extension at head and dustproof strike, L04011 or L04021 as applicable, at floor.

2.7.5. Foot Slide Bolt

a. Slide Bolt, Stainless Steel: Stanley Hardware Model #808840, ¼-inch carriage bolts. Provide flat floor strike anchored into concrete.

2.7.6. Padlocks:

a. Padlock; ASTM F 883, Grade 1, Type P01 (key operated), 6 pin deadlock, option E (corrosion resistant), 4-inch shackle unless otherwise indicated, sash chain with clevis on each end of chain. Secure chain to padlock and frame. Option B (removable cylinder).

2.8 EXIT ALARMS

2.8.1. General

a. Local sound alarm produced by a high decibel horn; armed and disarmed by control key; cylinders as specified under "LOCK CYLINDERS AND KEYING" automatic rearming after authorized use; sign stating "EMERGENCY EXIT/ALARM WILL SOUND"

b. Basis-of-Design Product:∶Detex Corporation, EAX 2500S surface mount on wall.

(1) 115V AC 50/60 Hz power to 24V Transformer, PP-5152-2; automatically switches to 9-volt alkaline battery back-up upon loss of power

(2) Surface magnetic switch mounted overhead, MS-2049SC with all wiring concealed within rigid conduit.

(3) Cylinder controlled alarm armed and disarmed by inside mortise cylinder key switch. Conform to general requirements and cylinder requirements specified for LOCK CYLINDERS AND KEYING.

2.9 EXIT DEVICES

2.9.1. General

a. Conform to ANSI/BHMA A156.3, Grade 1.

b. Classified by UL as to Accident Hazard for panic protection and shall be listed in UL's Mechanical Equipment Directory.
c. Cylinder controlled locks: Conform to general requirements and cylinder requirements specified for LOCKS, LATCHES, AND BOLTS.
d. Mount exit device centerline of strike approximately 40 inches above finished floor.
e. Design: Push pad, wide stile.
f. Basis-of-Design Product: Von Duprin Series 99

2.9.2. Exit Device Type 1

a. Type: 1, Rim Exit Device.
b. Function: 08, entrance by lever; key locks or unlocks lever.
c. Outside Trim: Escutcheon, breakaway lever, and double cylinder (inside key cylinder locks or unlocks outside lever, outside key cylinder only retracts latch bolt.

2.9.3. Exit Device Type 1A

a. Type 2: Surface Vertical Rod Exit Device.
b. Function: 03, entrance by trim; key retracts active leaf latch bolt, no dogging.

(1) Active Leaf Outside Trim: Escutcheon, pull, outside key cylinder only retracts latch bolt.
(2) Inactive Leaf Outside Trim: Escutcheon, pull.

c. Basis-of-Design Product: LD9927NL x LD9927DT.

2.9.4. Exit Device Type 1B

a. Type 2: Surface Vertical Rod Exit Device
b. Function: 01, Exit only, no trim.
c. Outside Trim: None
d. Basis-of-Design Product: LD9927EO

2.9.5. Exit Device Type 1C

a. Type 2: Surface Vertical Rod Exit Device
b. Function: 14, Entrance by trim when latch bolt is released by lever. Always active, no cylinder.
c. Outside Trim: Lever
d. Basis-of-Design Product: 9927L-BE-F-LBR.

2.9.6. Exit Device Type 1D

a. Type 2: Surface Vertical Rod Exit Device.
b. Function: 03, entrance by trim; key retracts active leaf latch bolt, no dogging.

(1) Active Leaf Outside Trim: Escutcheon, pull, outside key cylinder only retracts latch bolt.
(2) Inactive Leaf Outside Trim: Escutcheon, pull.

c. Basis-of-Design Product: LD9927NL-F x LD9927DT-F.

2.9.7. Delayed-Egress Lock

a. Exit Device: Depressing push pad for more than 2 seconds initiates irreversible alarm and 15-second delay for egress. Fire alarm voids 15-second delay. Comply with the following:

(1) Conform to ANSI/BHMA A156.24.
(2) Locked when energized, unlocked when de-energized.
(3) Connect to fire alarm system.
(4) Provide power supply hard wired to electrical service: Locked box with transformer, battery backup activated during power failure, fire alarm contact deactivation, surface mounted.
(5) Provide electric power transfer unit from door/gate frame to door/gate stile to exit device lock.
(6) Self-contained local alarm in exit device.
(7) Provide gate exit hardware with push pad actuating bar suitable for exterior use.
(8) Gate exit hardware mounting channel: Bent-plate channel formed from 1/8-inch- thick, galvanized steel plate, 12-inch wide web. Channel spans gate frame. Exit device is mounted on channel web, recessed between flanges, with flanges extending 1/8 inch beyond push pad surface.
(9) Alarm armed, disarmed, and reset by inside mortise cylinder key switch on exit device.
(10) Cylinders as specified under "LOCK CYLINDERS AND KEYING."
(11) Sign stating "PUSH UNTIL ALARM SOUNDS DOOR CAN BE OPENED IN 15 SECONDS" or similar language.
(12) Type: 1, Rim Exit Device.
(13) Function: 01, Exit only, no trim.
(14) Outside Trim: None
(15) Design: Push pad, wide stile.

b. Basis-of-Design Products: Von Duprin.

(1) Electric Power Transfer: EPT-10.
(2) Power Supply: PS873BK-FA
(3) Interior Doors: Series CX99.
(4) Exterior Gates: Series 2670.

2.10 PUSH/PULL UNITS

2.10.1. General

a. Conform to ANSI/BHMA A156.6.
b. Concealed Fasteners: Provide manufacturer's special concealed fastener system for installation, through-bolted for matched pairs but not for single units.
c. Mount pushes and pulls on centerline of stiles unless otherwise indicated. Where length of push or pull is "by door width", length shall be centerline to centerline of stiles unless otherwise indicated or required to clear door jamb.

(1) Mount push/pull sets back to back with concealed threaded sleeves.
(2) Locate centerline of horizontal pushes 42 inches above finished floor.
(3) Locate center of top return of vertical pulls 42 inches above finished floor.

2.10.2. Material and Finish

a. BHMA 630, satin stainless steel (US 32D).

2.10.3. Push and Pull Types:

a. Type 1: Push/Pull set; J304/J407; 1/8 inch by 4-inch by 16-inch push plate with beveled edges and 3/4 inch round bar by 8-inch center-to-center pull.
b. Type 2: Push/Pull set; push bar J501, 1 inch round bar by door width; pull J402, 90 degree offset, 1 inch round bar by 9 inches center-to-center.
c. Type 3: Pull; J402, 90 degree offset; 1 inch round bar by 9 inches center-to-center.

2.11 CLOSERS

2.11.1. General:

a. Conform to ANSI/BHMA A156.4, Grade 1.
b. Closers shall be the product of a single manufacturer.
c. Provide closers with adjustable back check, which becomes effective between 60 and 85 degrees of door opening.
d. Provide closers without hold-open feature.
e. Locate closers on pull side of door, except where door swings to exterior or into corridor and as indicated.

2.11.2. Size of Units

a. Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending upon size of door, exposure to weather, and anticipated frequency of use.
b. Wind conditions and mechanical ventilation systems shall be taken into consideration, and closer size shall be increased accordingly.
c. If, after closers are installed, a larger size is required, provide the larger size.
d. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.

2.11.3. Overhead Closers

a. Warranty closers against mechanical defects for a period of 10 years.
b. Modern-Type-with-Cover Surface Closers: Rack-and-pinion hydraulic type; with high strength cast iron cylinders, one piece forged steel pistons, hardened, double heat-treated steel pinions, full-complement bearings, and adjustable sweep and latch speeds controlled by key-operated valves; with forged-steel main arm; enclosed in full plastic covers. Provide specified finish on all parts of closer, including arms, pivots, brackets and fasteners, exposed to view regardless of position of door.
c. Provide closers with fluid complying with ANSI/BHMA A156.4, including cold storage rooms.
d. Overhead closer types:

(1) C02011 surface mounted on pull side, regular arm with closing power adjustment at least 50 percent more than minimum tested value.
(2) C02021 surface mounted on push side, parallel arm with closing power adjustment at least 50 percent more than minimum tested value and spring stop function in soffit shoe set at approximately 90 degrees to 110 degrees.

2.12 DOOR TRIM UNITS

2.12.1. General

a. Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.

b. Fabricate protection plates not more than 1- 1/2 inches less than door width on pull side and not more than 1/2 inch less than door width on pull side by height indicated.
c. Stainless steel, 0.050 inch thick (U.S. 18 gage).
d. Bevel plate top and 2 sides.
e. Provide kickplates on both sides of door leaf unless otherwise indicated.

2.12.2. Types:

a. Kickplate: 12 inches high unless otherwise indicated.

2.13 ASTRAGALS

2.13.1. Types

a. Type 1: Steel, 2 inches wide by 1/8 inch thick minimum, prime coat. Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted. Paint finish to match doors. Provide with tamperproof fasteners. Basis-of-Design Product: National Guard Products, Inc., 139SP
b. Type 2: Aluminum, spring loaded, adjustible. Provide in accordance with NFPA 80 for fire-performance rating. Paint finish to match doors. Provide with tamperproof fasteners. Basis-of-Design Product: National Guard Products, Inc., 140PA.

2.14 DOOR STOPS

2.14.1. General

a. Conform to ANSI/BHMA A156.8 for overhead stops and ANSI/BHMA A156.16 for floor and wall stops.
b. Provide stops at all doors except where closers with integral stops are indicated or no stops are indicated.
c. Provide wall stops except where floor stops are more appropriate or overhead stops are indicated.
d. Place door stops in such a position that they permit maximum door swing but do not present hazard or obstruction.
e. Provide floor stops with risers at carpeted floors, at undercut doors, and at thresholds, as required for at least ½ inch contact with door bottom.
f. Size overhead stops in accordance with manufacturer's printed instructions for each door opening.
g. Set overhead stops for 110 degree opening, unless limited by building construction or equipment.

2.14.2. Stop Types:

a. Wall bumper, concave, L02251.
b. Floor stop, dome, L02141 without threshold, L02161with threshold, or with risers.
c. Type 2 overhead surface mounted slide holder/stop: Stop and shock absorber; adjustable holding pressure.

(1) C02511; hold open and release by push and pull of door unless control is set in inactive position.
(2) C02541, without hold open.

2.15 ELECTROMAGNETIC HOLDERS

2.15.1. Electromagnetic Door Holders

a. BHMA A156.15, Grade 1; wall-mounted electromagnetic single unit with strike plate attached to swinging door; coordinated with fire and smoke detectors and interface with fire alarm system for labeled fire-rated door assemblies.

2.16 JAMB, HEAD AND SILL SEALS

2.16.1. General

a. Provide continuous jamb, head and sill seals on exterior doors and on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
b. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

2.16.2. Weatherstripping

a. ANSI/BHMA 156.22, R3B196; bumper-type resilient insert and metal retainer strips, surface applied to stop, screw fastened, slotted holes for adjustment.

(1) Metal and finish: Extruded aluminum with natural anodized finish, 0.062-inch minimum thickness of main walls and flanges.
(2) Bumper material: Solid neoprene conforming to ASTM D 2000 and AAMA 701/702.

(a) Flexible, hollow bulb or loop insert.

2.16.3. Door Bottom Protection

a. ANSI/BHMA 156.22, R3D536; door bottom consisting of contact-type resilient insert and metal housing, applied to door face, screw fastened, slotted holes for adjustment, as follows:

(1) Metal and finish: Extruded aluminum rain drip type sweep retainer with natural anodized finish, 0.062-inch minimum thickness of main walls and flanges.
(2) Resilient seal strip: Flexible vinyl wiper or sweep seal strip.

2.17 THRESHOLDS

2.17.1. ANSI/BHMA A156.21. Mill Finish Aluminum.

a. Type 1: J32130, 5 inches wide.
b. Type 2: J36130, 5 inches wide with stop and gasket, ½ inch high to top of stop, beveled rise slope no greater than 1:2.

2.18 DOOR HEAD PROTECTION

Extruded aluminum drip, 0.59 inch minimum projection, 0.082 inch minimum thickness, applied to frame face, screw fastened.

2.19 DOOR SILENCERS (MUTES)

Conform to ANSI/BHMA A156.16. L03011 for metal frames. Provide 3 silencers at strike jamb of single doors and 2 silencers at tops of frames of double doors. Install silencers on all door frames except frames receiving weatherstripping or gaskets.

2.20 HARDWARE FINISHES

2.20.1. U.S. and BHMA Finishes

a. US 26D, satin chromium except hardware exposed to the weather shall be US 32D, satin stainless steel.
b. Provide finishes that match those established by BHMA.
c. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
d. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

2.21 FASTENERS

2.21.1. General:

a. Furnish door hardware with necessary screws, bolts and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
b. Furnish fastenings where necessary with expansion shields, toggle bolts, sex bolts, and other approved anchors according to material which the hardware is to be applied and instructions of the hardware manufacturer.
c. Fasteners exposed to weather shall be stainless steel, and shall match the finish of the trim.
d. Design: All fastenings shall harmonize with hardware as to material and finish.

2.22 OTHER MATERIALS

All other materials, such as brackets, fasteners, back-up plates and other accessories not specifically described but required for a complete operable finish hardware installation, shall be as provided by the Contractor and subject to approval.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Mounting Heights

a. Mount door hardware units at heights indicated in following applicable publications, unless otherwise specifically indicated or required to comply with governing regulations:

(1) Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

(2) Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3.1.2. General

a. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
b. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation (wall mounted door stops, etc.).
c. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
d. Install closers, overhead stops, and similar hardware subject to hard use with sex nut and bolt type fastening on wood doors unless doors have been fabricated with wood blocking, plywood or similar substrate to receive screw type fasteners for absolute holding power.
e. Cope metal thresholds neatly to opening frame profiles. Attach thresholds to substrate with No. 10 or larger flat head, countersunk, wood screws. Use lead shield for anchoring to concrete. Provide fasteners of bronze or stainless steel which will not corrode in contact with the threshold metal; match threshold finish.
f. Set thresholds in a bed of non-shrink, non-metallic, grout or mortar to completely support threshold from deflecting and bending; remove excess grout and mortar.
g. To prevent water infiltration into building at exterior doors, install elastomeric urethane sealant around exterior and interior perimeter of threshold including joint where ends of threshold abut door frame. Provide sealant that is compatible with substrates and is recommended by manufacturer for traffic use. Remove excess sealant.
h. Install jamb and head seals to provide a complete seal against air and moisture, when door is in closed position. Install seals so as not to interfere with latching function of door. Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

3.2.1. Adjusting

a. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
b. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.2.2. Cleaning

a. Clean adjacent surfaces soiled by hardware installation.

3.2.3. Demonstrating

a. Instruct Government's personnel in the proper adjustment and maintenance of door hardware and hardware finishes. Refer to Division 1 Section "Demonstration and Training."

3.3 HARDWARE SCHEDULE

3.3.1. General

a. Provide finish hardware in sets according to the following schedule. Unless otherwise modified in the hardware sets, provide hardware as previously specified in this Section. Hardware indicated is for each door leaf in an opening except where a single item serves a pair of doors, and unless additional items are indicated.

Automatic Sliding Doors
HDW SET 1:
Cylinders, mortise type, thumbturn inside and keyed outside. Provide sign "THIS DOOR TO REMAIN UNLOCKED WHEN THE BUILDING IS OCCUPIED" in line with lock. Letters shall be not less than 1 inch high in a contrasting background.

Cashier's Office
HDW SET 2:
Butts
Storeroom Lock F07, Type 2
Closer C02011
Kickplate
Stop

Cash Counting Room from Customer Service
HDW SET 2A:
Butts
Storeroom Lock F07, Type 2
Closer C02021
Kickplate
Stop

Cash Counting Room
HDW SET 3:
Butts
Storeroom Lock F07, Type 2
Electric Strike (controlled from Cashier's Office)
Closer C02011
Kickplate
Stop

Private Offices (Customer Service Office/ Medical Food Inspection Office/Region Management Support, etc.)
HDW SET 4:
Butts
Entrance Lock F04, Type 2
Kickplate
Stop

HDW SET 4A:
Butts
Entrance Lock F04, Type 2
Closer C02021
Kickplate
Stop

Administrative Corridor
Omit sign if opening is not a required means of egress.
HDW SET 5:
Butts
Bored Auxiliary Deadlock Type 1 with Sign
Push/Pull Set Type 1
Closer C02011
Kickplate
Stop

Administrative Corridor
HDW SET 6:
Butts
Passage Set F01, Type 1
Closer C02011
Kickplate
Stop

Restroom/Breakroom/Training Room/Locker Room/Vendor Room
HDW SET 7:
Butts
Push/Pull Set Type 1
Closer C02011
Kickplate
Stop

Administrative Entry - Exterior
HDW SET 8:
Butts
Two-Point Deadlatch with Paddle
Pull Type 3
Closer C02021
Threshold Type 1

Administrative Entry Vestibule
HDW SET 9:
Butts
Push/Pull Set Type 2
Closer C02011
Stop

Janitor's Closet/Storage Rooms – Single Doors
HDW SET 10:
Butts
Storeroom Lock F07, Type 1
Closer C02011 (Omit closer where door is not visible from customer areas.)
Kickplate
Stop

CONSTRUCTION ISSUE

Damaged Merchandise/Storage Rooms/Sensitive Storage – Pair of Doors
HDW SET 11:
Butts
Storeroom Lock F07, Type 1
Manual Flush Bolt, Head and Sill
Kickplate
Astragal Type 1
Overhead Stop C02511

Rolling Grille
HDW SET 12:
Cylinder, one at each jamb and at midpoint of grille, keyed inside and outside

Utility Rooms
HDW SET 13:
Butts
Storeroom Lock F07, Type 1
Kickplate, 32 inches high
Stop

Electrical Utility Room containing equipment rated 1200 amperes or more and over 6 feet wide – Single Exterior Door
HDW SET 14
Butts
Exit Device Type 1
Overhead Stop C02511
Kickplate, 32 inches high
Threshold Type 2
Door Bottom Protection
Weatherstripping
Head Drip

Receiving Overhead Door and Ventilation Door
HDW SET 15:
Padlock, one at each jamb

Personnel Door Entrance/Exit (Receiving and Staging Areas)
HDW SET 16:
Butts
Exit Device Type 1
Exit Alarm
Closer C02021
Kickplate
Threshold Type 2
Door Bottom Protection
Weatherstripping
Head Drip

Personnel Door Entrance/Exit (Receiving and Staging Areas)
HDW SET 16A:

Butts
Exit Device Type 1, active leaf
Exit Alarm, active leaf
Manual Flush Bolts, Head and Sill, inactive leaf
Closer C02021, active leaf
Overhead Stop C02511, inactive leaf
Astragal Type 1, active leaf
Kickplate
Threshold Type 2
Door Bottom Protection
Weatherstripping
Head Drip

Personnel Door Entrance/Exit (Receiving and Staging Areas)
HDW SET 16B:

Butts
Exit Device Type 1A
Exit Alarm
Closer C02021 w/integral dead stop
Astragal Type 2
Kickplate
Threshold Type 2
Door Bottom Protection
Weatherstripping
Head Drip

HDW SET 16C:

Butts
Exit Device Type 1D
Exit Alarm
Closer C02021
Astragal Type 2
Stop
Kickplate

Personnel Door Emergency Exit to Exterior
HDW SET 17:

Butts
Delayed-Egress Lock
Overhead Stop C02541 Threshold Type 2
Door Bottom Protection
Weatherstripping
Head Drip

HDW SET 18

Butts
Exit Device Type 1
Stop
Kickplate, 32 inches high

CONSTRUCTION ISSUE

Door to Compactor (in-swinging)
HDW SET 19:
Butts
F111 Bored Lock. Locate centerline of lock 6 inches above bottom of door
Weatherstripping at Jambs, Head & Sill

Access Door Above Cold Storage Rooms
HDW SET 20:
Butts
Passage Set F01

Communications Room(CISIC)
HDW SET 21:
Butts
Storeroom Lock F07, Type 1
Closer C02011
Kickplate
Stop

Sub Hub Communication Room – Pair of Doors
HDW SET 22:
Butts
Storeroom Lock F07, Type 1
Manual Flush Bolt, Head and Sill
Kickplate
Astragal Type 1
Overhead Stop C02511

Administration Overhead Counter Door
HDW SET 23:
Cylinder, mortise type, keyed inside

HDW SET 24:
Butts
Storeroom Lock F07, Type 1
Kickplate
Stop

Door to Exterior From Stairwell, Sprinkler Room
HDW SET 25:
Butts
Storeroom Lock F07, Type 1
Latch Guard
Kickplate
Overhead Stop C02511
Threshold Type 2
Door Bottom Protection
Weatherstripping
Head Drip

Door to Roof From Stairwell
HDW SET 26:
Butts
Entrance Lock F04, Type 1
Latch Guard
Kickplate
Overhead Stop C02511
Threshold Type 2
Door Bottom Protection
Weatherstripping
Head Drip

Gate at Garden Center
HDW SET 27:
Delayed-Egress Lock, active leaf
Foot Slide Bolt, inactive leaf
Padlock, 2-inch shackle
Rest of hardware by gate supplier

HDW SET 28:
Butts
Cylinders, mortise type, keyed inside and outside. Provide sign "THIS DOOR TO REMAIN UNLOCKED WHEN THE BUILDING IS OCCUPIED" in line with lock. Letters shall be not less than 1 inch high in a contrasting background.
Push/Pull Type 2
Closer C02021
Threshold Type 1

Aluminum & Glass - Interior
HDW SET 29:
Butts
Push/Pull Type 2
Deadlatch Type 2
Closer C02021

Personnel Door Emergency Exit to Exterior
HDW SET 30:
Butts
Exit Device Type 1B
Exit Alarm
Astragal Type 2
Overhead Stop C02541Threshold Type 2
Door Bottom Protection
Weatherstripping
Head Drip

HDW SET 31:
Privacy Lock F19, Type 1, with Vacant/Occupied indicator
Stop

HDW SET 32:
Push/Pull Type 2

Deadlatch Type 2
Closer C02011

HDW SET 33:
Butts
Storeroom Lock F29
Kickplate
Stop

HDW SET 34:
Butts
Storeroom Lock F07, Type 1
Stop

HDW SET 35:
Butts
Exit Device Type 1C
Closer C02011
Electromagnetic Holder
Kickplate

HDW SET 36:
Butts
Classroom Lock F05, Type 2
Closer C02021
Kickplate
Stop

Trash Enclosure
HDW SET 37:
Padlock and chain
Rest of hardware by gate supplier

HDW SET 38:
Padlock

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08800

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

(1) Windows.
(2) Doors.
(3) Glazed entrances.
(4) Interior borrowed lites.
(5) Storefront framing.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”

1.2 DEFINITIONS

1.2.1. Manufacturer

a. A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.

1.2.2. Interspace

a. Space between lites of an insulating-glass.

1.2.3. Deterioration of Laminated Glass

a. Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.2.4. Deterioration of Insulating Glass

a. Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. General

a. Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

1.3.2. Glass Design

a. Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

(1) Blast-Resistant Security Protection: Provide exterior glazing systems capable of resisting the effects of blast loads, including connections to their surroundings, in accordance with ASTM F 2248 and ASTM E 1300 based on an explosive weight of II (see United Facilities Criteria (UFC) 4-010-02, DoD Minimum Antiterrorism Standoff Distances for Buildings) and the standoff distance indicated.

(2) Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

(a) Specified design wind loads.
(b) Provide exterior glazed assemblies, including anchorage, capable of withstanding wind pressures acting inward and outward normal to the plane of the wall.
(c) Refer to Division 1 Section "Description of Work" for design wind velocity and building exposure factor..
(d) Determine design loads using the appropriate coefficients for the exterior glazed assembly configurations indicated.
(e) Specified blast-resistant security protection loads.

(3) Probability of Breakage for Vertical Glazing At Design Wind Pressure: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

(a) Load Duration: 60 seconds or less.

(4) Glass Deflection:

(a) Deflection Normal to Wall Plane At Design Wind Pressure: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.

b. Deflection Normal to Wall Plane At Design Blast Pressure: Except where more stringent requirements are dictated by project conditions, restrict deflections of edges of blast resistant glazing the frames support to 1/160 of the length of the supported edge at allowable stress levels determined in accordance with ASTM F 2248.

(a) The supported edge length of punched windows shall be equal to the span of the glass, regardless of any intermediate support connections. For multi-panel glazing systems, the supported edge length shall be equal to the span of a single glass panel and the deflection shall be calculated based on simple support conditions for that length.

c. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm (1/4 inch).

1.3.3. Thermal Movements

a. Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3.4. Structural Sealant

a. Capable of withstanding tensile and shear stresses imposed by window and door systems without failing adhesively or cohesively. Provide sealant that fails cohesively before sealant releases from substrate when tested for adhesive compatibility with each substrate and joint condition required.

(1) Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
(2) Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

1.4 PRECONSTRUCTION TESTING

1.4.1. Preconstruction Testing Service: Provide structural-sealant-glazed windows and doors that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies by a qualified testing agency.

1.4.2. Preconstruction Structural-Sealant Testing: Perform sealant manufacturer's standard tests for compatibility with and adhesion of each material that will come in contact with sealants and each condition.

a. Test a minimum five production-run samples each of metal, glazing, and other material.
b. Prepare samples using techniques and primers required for installed assemblies.
c. Perform tests under environmental conditions that duplicate those under which assemblies will be installed.
d. For materials that fail tests, determine corrective measures necessary to prepare each material to ensure compatibility with and adhesion of sealants including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.

1.5 SUBMITTALS

1.5.1. Product Data

a. For each glass product and glazing material indicated.

1.5.2. Glazing Schedule

a. Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

1.5.3. Product Certificates

a. Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1.5.4. Preconstruction Adhesion and Compatibility Test Report

a. From glazing structural-sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

1.5.5. Field quality-control reports.

1.5.6. Sustainable Design Submittals

a. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.5.7. Submittal List

Reference	Submittal Item	Quantity	Action
1.5.1	Product Data	X	R
1.5.2	Glazing Schedule	X	R
1.5.3	Product Certificates	X	R
1.5.4	Preconstruction Adhesion and Compatibility Test Report	X	I
1.5.5	Field quality-control reports	X	R
1.5.6	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.6 QUALITY ASSURANCE

1.6.1. Installer Qualifications

a. An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

1.6.2. Source Limitations for Insulating Glass

a. Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.

1.6.3. Source Limitations for Laminated Glass

a. Obtain laminated-glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.

1.6.4. Source Limitations for Glazing Accessories

a. Obtain glazing accessories from one source for each product and installation method indicated.

1.6.5. Safety Glass

a. Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
b. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

1.6.6. Glazing Publications

a. Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

(1) GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
(2) SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines."

1.6.7. Insulating-Glass Certification Program

a. Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:

(1) Insulating Glass Certification Council.
(2) Associated Laboratories, Inc.
(3) National Accreditation and Management Institute.

1.6.8. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of structural-sealant-glazed windows and doors.

1.7 DELIVERY, STORAGE, AND HANDLING

1.7.1. General

a. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
b. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

1.8.1. Environmental Limitations

a. Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

b. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Adhesives & Sealants

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.2 Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 ANNEALED FLOAT GLASS

2.3.1. Annealed Float Glass

a. ASTM C 1036, Type I (transparent flat glass), Quality Q3 (glazing select); class indicated.

2.4 HEAT-TREATED FLOAT GLASS

2.4.1. Heat-Treated Float Glass

a. ASTM C 1048; Type I (transparent flat glass); Quality Q3 (glazing select); class, kind, and condition indicated.

2.5 LAMINATED GLASS

2.5.1. Laminated Glass

a. Comply with ASTM C 1172 and other requirements specified.

2.5.2. Interlayer

a. Interlayer material as indicated below of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

(1) Interlayer Material: Polyvinyl butyral sheets.

2.5.3. Laminating Process

a. Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:

(1) Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

2.6 INSULATING GLASS

2.6.1. Insulating-Glass Units

a. Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

2.6.2. Overall Unit Thickness and Thickness of Each Lite

a. Dimensions indicated are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.

2.6.3. Sealing System

a. Dual seal, with primary and secondary sealants as follows:

(1) Polyisobutylene and silicone.

2.6.4. Spacer Specifications

a. Manufacturer's standard spacer material and construction complying with the following requirements:

(1) Aluminum with mill or clear-anodized finish.
(2) Desiccant: Molecular sieve or silica gel, or blend of both.
(3) Corner Construction: Manufacturer's standard corner construction.

2.7 ELASTOMERIC GLAZING SEALANTS

2.7.1. General

a. Provide products of type indicated, complying with the following requirements:

(1) Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

(2) Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

2.7.2. Elastomeric Glazing Sealant Standard

a. Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

(1) Additional Movement Capability: Where additional movement capability is specified in the Glazing Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.

2.7.3. Structural Sealants

a. As recommended by manufacturer for joint type and as follows:

(1) ASTM C 1184, neutral-curing silicone formulation compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant, and approved by structural-sealant manufacturer for use in window and door systems indicated.

2.8 GLAZING TAPES

2.8.1. Back-Bedding Mastic Glazing Tape

a. Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800.

2.8.2. Expanded Cellular Glazing Tape

a. Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

(1) Type 1, for glazing applications in which tape acts as the primary sealant.
(2) Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 GLAZING GASKETS

2.9.1. Dense Compression Gaskets

a. Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

(1) EPDM, ASTM C 864.
(2) Silicone, ASTM C 1115.
(3) Thermoplastic polyolefin rubber, ASTM C 1115.

(4) Any material indicated above.

2.9.2. Soft Compression Gaskets

a. Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

(1) EPDM.
(2) Silicone.
(3) Thermoplastic polyolefin rubber.
(4) Any material indicated above.

2.10 MISCELLANEOUS GLAZING MATERIALS

2.10.1. General

a. Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

2.10.2. Cleaners, Primers, and Sealers

a. Types recommended by sealant or gasket manufacturer.

2.10.3. Setting Blocks

a. Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

2.10.4. Spacers

a. Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

2.10.5. Edge Blocks

a. Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.11 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

2.11.1. General

a. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and unless otherwise indicated glass bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

(1) Glass shall have a minimum frame bite of 3/8 inch for structurally glazed systems.
(2) Glass shall have a minimum frame bite of 1 inch for systems that are not structurally glazed.

b. Grind smooth and polish exposed glass edges.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine framing glazing, with Installer present, for compliance with the following:

(1) Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
(2) Presence and functioning of weep system.
(3) Minimum required face or edge clearances.
(4) Effective sealing between joints of glass-framing members.

b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING

3.3.1. General

a. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
b. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
c. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
d. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
e. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
f. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
g. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:

(1) Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
(2) Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

h. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
i. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
j. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
k. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

3.4.1. General

a. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
b. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
c. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
d. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
e. Do not remove release paper from tape until just before each glazing unit is installed.
f. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.5 GASKET GLAZING (DRY)

3.5.1. General

a. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
b. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
c. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
d. Install gaskets so they protrude past face of glazing stops.

3.6 STRUCTURAL SEALANT GLAZING (WET)

3.6.1. Security Protection for Exterior Window and Door Assemblies

a. Install glass with structural silicone sealant applied between glass and metal window frame creating a bond between the two materials to resist expulsion of the glass under pressure from the exterior, in accordance with performance requirements.

(1) Apply the structural silicone sealant bead to both sides of the glass panel for single pane glazing but only to the inboard side for insulating glass units.
(2) Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
(3) Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
(4) Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 FIELD QUALITY CONTROL

3.7.1. Testing Agency

a. Engage a qualified testing agency to perform tests.

3.7.2. Testing Services

a. Testing of representative areas of structural-sealant-glazed windows and doors shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.

(1) Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.

(a) Test a minimum of two areas on each building facade.
(b) Repair installation areas damaged by testing.

3.7.3. Structural-sealant-glazed windows and doors will be considered defective if they do not pass tests.
3.7.4. Prepare test and inspection reports.

3.8 PROTECTION AND CLEANING

3.8.1. General

a. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
b. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
c. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
d. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

e. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

3.9 GLASS SCHEDULE

3.9.1. **Type 1** - Security Protection Uncoated Tinted Insulating Heat-Treated and Laminated Float Glass Unit

a. Outdoor Lite:

(1) Kind FT (fully tempered).
(2) Condition A (uncoated surfaces).
(3) Type I (transparent flat glass).
(4) Class 2 (tinted, heat-absorbing, and light-reducing).

(a) Basis-of-Design Tint Color: PPG Industries, Inc.; Solargray.

(5) Thickness: 6 mm (1/4 inch).

b. Indoor Lite: Kind LA, consisting of two lites of annealed float glass.

(1) Inner and Outer Laminated Lites:

(a) Type I (transparent flat glass).
(b) Class 1 (clear).
(c) Thickness of each individual ply of glass used in the laminate: Comply with system performance requirements for glass, but not less than 3 mm (1/8 inch) per ply.

(2) Plastic Interlayer: 0.030 inch thick.

(a) Interlayer Color: Clear.

c. Interspace Content: Argon.
d. Interspace: 13 mm (½ inch).

3.9.2. **Type 2** - Security Protection Uncoated Clear Laminated Float Glass

a. Kind LA, consisting of two lites of annealed float glass.

(1) Inner and Outer Laminated Lites:

(a) Type I (transparent flat glass).
(b) Class 1 (clear).
(c) Thickness of each individual ply of glass used in the laminate: Comply with system performance requirements for glass, but not less than 3 mm (1/8 inch) per ply.

(2) Plastic Interlayer: 0.030 inch thick.

(a) Interlayer Color: Clear.

3.9.3. **Type 3** - Uncoated Clear Heat-Treated Float Glass

a. Kind FT (fully tempered).

(1) Condition A (uncoated surfaces).
(2) Type I (transparent flat glass).
(3) Class 1 (clear).

(a) Thickness: 6 mm (1/4 inch).

3.9.4. **Type 4** - Uncoated Clear Annealed Float Glass

a. Type I (transparent flat glass).
b. Class 1 (clear).
c. Thickness: 6 mm (1/4 inch).

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08830

MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Annealed monolithic glass mirrors.

1.1.2. Related Section

a. Division 1 Section "Sustainable Design Requirements."

1.2 SUBMITTALS

1.2.1. Preconstruction Test Reports

a. From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing and substrates on which mirrors are installed.

1.2.2. Warranty: Sample of special warranty.

1.2.3. Sustainable Design Submittals

a. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.2.4. Submittal List:

Reference	Submittal Item	Quantity	Action
1.2.1	Preconstruction Test Reports	X	I
1.2.2	Warranty	X	I
1.2.3	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements".
I Submittal is for information or record purposes only. No action will be taken

1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications

a. A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.3.2. Source Limitations for Mirrors

a. Obtain mirrors from one source for each type of mirror indicated

1.3.3. Source Limitations for Mirror Glazing Accessories

a. Obtain mirror glazing accessories from one source for each type of accessory indicated.

1.3.4. Glazing Publications

a. Comply with the following published recommendations:

(1) GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
(2) GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors".

1.3.5. Preconstruction Mirror Mastic Compatibility Test

a. Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing and substrates on which mirrors are installed.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1. Mirror Protection

a. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from condensation, temperature changes, direct exposure to sun, or other causes.

1.4.2. Shipping, Storing, and Handling

a. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.5 PROJECT CONDITIONS

Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.6 WARRANTY

1.6.1. Special Warranty

a. Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal

use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

(1) Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Adhesives & Sealants

a. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

b. Aerosol Adhesives – Interior, On-Site Applied Only:

(1) Products shall meet the VOC limits of the Green Seal Standard for Commercial Adhesives GS-36, October 19, 2000.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 SILVERED FLAT GLASS MIRROR MATERIALS

2.3.1. Clear Glass Mirrors

a. ASTM C 1503, Mirror Glazing Quality.
b. Nominal Thickness: 6.0 mm.

2.3.2. Annealed Float Glass

a. ASTM C 1036, Type I (transparent flat glass), Quality-Q3; Class 1 (clear).

2.4 MISCELLANEOUS MATERIALS

2.4.1. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.

2.4.2. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

2.4.3. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

2.5 MIRROR HARDWARE

2.5.1. Top and Bottom Aluminum J-Channels

a. Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.

(1) Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.
(2) Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.04 inch.
(3) Finish: Clear bright anodized unless otherwise indicated.

2.5.2. Outside Corners

a. Extruded aluminum, anodized clear. Provide 4 inch long setting blocks in channel at quarter points and 1/4 inch weeps at channel bottom. Provide felt or plastic pads between mirror and metal.
b. Basis-of-Design Product: The Engineered Products Co. (EPCO), Model No. 2015.

2.5.3. Fasteners

a. Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

2.5.4. Anchors and Inserts

a. Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.6 FABRICATION

2.6.1. Mirror Sizes

a. To suit Project conditions, cut mirrors to final sizes and shapes.

2.6.2. Cutouts

a. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

2.6.3. Mirror Edge Treatment

a. Flat polished edge.
b. Seal edges of mirrors after edge treatment to prevent chemical or atmospheric penetration of glass coating.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers. Proceed with mirror installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

3.3.1. General

a. Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
b. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

3.3.2. Mounting

a. For wall-mounted mirrors, install mirrors with mastic and mirror hardware.
b. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
c. For mirror hardware in the form of continuous J-channels at bottom, provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, 2 slotted weeps not less than 1/4 inchs20 wide by 3/8 inch long.
d. Install mastic as follows:

(1) Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
(2) Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.

e. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch between back of mirrors and mounting surface.
f. Install column-mounted mirrors similar to wall-mounted mirrors except install with outside corner channels.

3.4 CLEANING AND PROTECTION

Protect mirrors from breakage and contaminating substances resulting from construction operations. Do not permit edges of mirrors to be exposed to standing water. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 08997

COMMISSIONING OPENINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
1. Division 8 responsibilities in the commissioning process.
2. Commissioning of Overhead Doors and Controls.
3. Commissioning of Automatic Entrance Doors.
4. Commissioning of Door Hardware.

B. Related Sections
1. Section 01810 - Commissioning Requirements.

1.2 DEFINITIONS

A. CA: Commissioning Agent.

B. CO: Contracting Officer.

C. GC: Contractor; General Contractor, not a Subcontractor.

D. O&M: Operations and Maintenance.

E. QC: Contractor's Quality Control Manager.

F. TI: Technical Inspector

1.3 DESCRIPTION

A. This Section describes commissioning requirements applicable to commissioned items and systems specified in Division 8 that contain any moving parts to ensure that all systems are operating in a manner consistent with the Contract Documents.

B. Conform to commissioning requirements and the commissioning plan issued by the CA.

1.4 RESPONSIBILITIES

A. Construction and Acceptance Phases
1. Include the cost of commissioning in the contract price.
2. In each purchase order or subcontract written, include requirements for submittal data, O&M data and training.
3. Conduct a commissioning scoping meeting and other meetings necessary to facilitate the Commissioning process.
4. Provide requested documentation to the TI developed for functional testing procedures.

5. Provide functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
6. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the prefunctional checklists for all commissioned equipment. Submit to QC for review prior to startup. TI will verify plan for compliance. Refer to Section 01810 for further details related to start-up.
7. During the startup and initial checkout process, execute the prefunctional checklists for all commissioned equipment.
8. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the QC and TI.
9. Correct system deficiencies before functional testing.
10. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
11. Provide all test equipment necessary to fulfill specified testing requirements.
12. Assist the CA and TI in interpreting the monitoring data, as necessary.
13. Correct deficiencies (differences between specified and observed performance) as interpreted by the TI, CA and A/E and retest the equipment.
14. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
15. During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).
16. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

B. Operation Manuals shall include:
1. Schedules.
2. Instructions for operation of each piece of equipment for emergencies.
3. Seasonal adjustment.
4. Instructions for energy savings operations and descriptions of the energy savings strategies in the facility (from O&M Manuals).

C. Warranty Period
1. Execute seasonal or deferred functional performance testing, witnessed by the GCR, according to the specifications.
2. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 STARTUP

A. Contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section and in 01810. Division 8 has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the commissioning agent, technical inspector, or Government.

B. Functional testing will generally begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CO. Beginning system testing before full completion does not relieve the Contractor from fully completing the system, including all prefunctional checklists.

3.2 OPERATION AND MAINTENANCE (O&M) MANUALS

A. The following O&M manual requirements are in addition to O&M manual documentation requirements elsewhere in these specifications.

B. Division 8 shall compile and prepare documentation for all commissioned systems covered in Division 8 and deliver this documentation to the GC for inclusion in the O&M manuals prior to the training of Government personnel.

3.3 TRAINING OF GOVERNMENT PERSONNEL

A. The GC shall be responsible for training coordination and scheduling to ensure that training is completed.

B. The QC shall be responsible for reviewing the content and adequacy of the training of Government personnel for commissioned equipment or systems. TI will verify compliance.

C. The Division 8 contractor shall have the following training responsibilities for the commissioned systems:
1. Provide the TI with a training plan four weeks before the planned training.
2. Provide designated Government personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of commissioned equipment.
3. Training shall start with classroom sessions followed by hands-on training on each piece of equipment.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
6. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
7. Training shall include:
   a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
   b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
   c. Discussion of relevant health and safety issues and concerns.
   d. Discussion of warranties and guarantees.
   e. Common troubleshooting problems and solutions.
   f. Explanation of information included in the O&M manuals.
   g. Discussion of any peculiarities of equipment installation or operation.
   h. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.

8. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
9. Training shall occur after functional testing is complete, unless approved otherwise by the Contracting Officer.
10. Minimum Duration of Training. Contractor shall meet for 8 hours with facility staff after completion of the work and instruct them as indicated above.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Non-load-bearing steel framing members for interior gypsum board assemblies.
b. Integrated metal stud and slotted standard framing members for gypsum board assemblies.
c. Gypsum board assemblies attached to steel framing.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.
b. Division 5 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.2 SUBMITTALS

1.2.1. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements”.

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Sustainable Design Submittals	S	I

I Submittal is for information or record purposes only. No action will be taken.
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements”.

1.3 DEFINITIONS

Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

1.5.1. Environmental Conditions, General

a. Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

1.5.2. Room Temperatures

a. For non-adhesive attachment of gypsum board to framing, maintain not less than 40 º F. Do not exceed 95 º F when using temporary heat sources.

1.5.3. Ventilation

a. Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements”.

2.1.2. Steel

a. Steel to contain no less than 25% of Post-consumer recycled content and 5% pre-consumer recycled content.
b. 50% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.3. Gypsum Board

a. To contain Post-consumer recycled content and pre-consumer recycled content.

b. 50% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.4. Sealants and Adhesives, Interior on-site applied only.
a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 FRAMING SYSTEMS

2.2.1. Framing Members, General

a. Comply with ASTM C 754 for conditions indicated.

(1) Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
(2) Protective Coating: Manufacturer's standard rust-inhibiting coating.

2.3 STEEL FRAMING COMPONENTS FOR SUSPENDED CEILINGS

2.3.1. General

a. Provide components complying with ASTM C 754 for materials and sizes unless otherwise indicated.

2.3.2. Wire for Hangers and Ties

a. ASTM A 641, Class 1 zinc coating, soft temper.

(1) Wire hangers: 0.16 inch in diameter.
(2) Tie wire: 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

2.3.3. Channels

a. Cold-rolled steel, 0.053 inch minimum thickness of base (uncoated) metal and 1/2 inch wide flanges, and as follows:

(1) Carrying Channels: 1-1/2 inches deep.
(2) Furring Channels: 3/4 inch deep.

2.3.4. Steel Rigid Furring Channels

a. ASTM C 645, hat-shaped, depth of 7/8 inch, and minimum thickness of base (uncoated) metal of 0.018 inch.

2.3.5. Grid Suspension System for Interior Ceilings

a. ASTM C 645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross furring members that interlock.

2.4 STEEL FRAMING FOR WALLS AND PARTITIONS

2.4.1. General

a. Provide steel framing members complying with the following requirements:

(1) Component Sizes and Spacings: As indicated but not less than that required to comply with ASTM C 754.

2.4.2. Steel Studs and Runners

a. ASTM C 645:

(1) Minimum base metal thickness: 0.033 inch (20 gage).
(2) Depth: As indicated.

2.4.3. Integrated Metal Stud And Slotted Standard

a. Slotted standard with ½ inch slots 1-inch on center, 0.125 inch thick steel minimum base metal thickness.
b. Depth: As indicated.
c. Basis-of-design product: Garcy Stud, No. 1301 One-way, Type A (with 11/16 inch trim angles for 5/8 inch gypsum board).
d. Length: As indicated.

2.4.4. Slip-Type Head Joints (Deflection Track)

a. Where indicated, provide steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

2.4.5. Fasteners for Metal Framing

a. Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing to substrates.

2.5 INTERIOR GYPSUM BOARD

2.5.1. General

a. Complying with ASTM C 1396.
b. Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end butt joints.

(1) Thickness: Provide gypsum board in thicknesses indicated or, if not otherwise indicated, in either 1/2 inch or 5/8 inch thicknesses to comply with ASTM C 840 for application system and support spacing indicated.
(2) Long Edges: Tapered unless otherwise indicated.

2.5.2. Types

a. Regular Type
b. Type X
c. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board

d. Moisture- and Mold-Resistant Type (Water-Resistant Gypsum Backing Board): With moisture- and mold-resistant core and surfaces.

(1) Core: Regular type.
(2) Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

2.6.1. Accessories for Interior Installation

a. Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

(1) Material: Formed metal, or metal combined with paper, with metal complying with the following requirement:

(a) Sheet steel coated with zinc by hot-dip or electrolytic processes, or with aluminum or rolled zinc.

(2) Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:
(3) Cornerbead on outside corners, unless otherwise indicated.
(4) Bullnose bead with flanges formed to receive joint compound. Use rounded cornerbead for vertical corner joints.
(5) LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim unless otherwise indicated.
(6) L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
(7) U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
(8) One-piece expansion (control) joint formed with V-shaped slot, with removable strip covering slot opening.

b. Reveal Channel Screed

(1) Material: 6063 T5 extruded aluminum alloy with clear anodized finish.
(2) Basis-of-Design Product: Fry Reglet Corporation, Reveal Channel Screed, non-vented, DCS-625-150, 5/8 inch deep by 1-1/2 inch wide reveal.

2.7 JOINT TREATMENT MATERIALS

2.7.1. General

a. Provide joint treatment materials complying with ASTM C 475.

2.7.2. Joint Tape for Gypsum Board

a. Paper reinforcing tape, unless otherwise indicated.

2.7.3. Setting-Type Joint Compounds for Gypsum Board

a. Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

(1) Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
(2) For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.
(3) For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.
(4) For topping compound, use sandable formulation.

2.8 MISCELLANEOUS MATERIALS

2.8.1. General

a. Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

2.8.2. Steel Drill Screws

a. Complying with ASTM C 1002 for fastening gypsum board to steel members less than 0.033 inch thick.
b. Complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

2.8.3. Isolation Strip at Exterior Walls: Provide one of the following:

a. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), non-perforated.
b. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

2.8.4. Sound-Attenuation Blankets

a. Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

(1) Mineral-Fiber Type: Fibers manufactured from glass-fiber or slag-wool-fiber/rock-wool-fiber.

2.8.5. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.3 INSTALLING STEEL FRAMING, GENERAL

3.3.1. Steel Framing Installation Standard

a. Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.
b. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, wall mounted door stops, and similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook".
c. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

(1) Where building structure abuts ceiling perimeter or penetrates ceiling.
(2) Where partition framing and wall furring abut structure, except at floor.

(a) Install deflection track top runner to attain lateral support and avoid axial loading.

d. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

3.4 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

3.4.1. Suspend Ceiling Hangers From Building Structural Members And As Follows:

a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
b. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
c. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
d. Do not attach hangers to steel deck tabs.
e. Do not attach hangers to steel roof deck. Attach hangers to structural members.

(1) Do not connect or suspend steel framing from ducts, pipes, or conduit.

f. Sway-brace suspended steel framing with hangers used for support.

g. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.

(1) Wire Hangers: 48 inches o.c.
(2) Carrying Channels (Main Runners): 48 inches o.c.
(3) Furring Channels (Furring Members): 16 inches o.c.

h. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.
i. Wire-tie or clip furring members to main runners and to other structural supports as indicated.
j. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

3.5.1. General

a. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.

(1) Where studs are installed directly against exterior walls, install asphalt felt strips between studs and wall.

b. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where otherwise indicated. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
c. Install steel studs and furring in sizes and at spacings indicated.

(1) Single-Layer Construction: Space studs 16 inches o.c., unless otherwise indicated.

d. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.

e. Slip-Type Head Joints (Deflection Track): Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
f. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

(1) Install 2 studs at each jamb, unless otherwise indicated.

g. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

3.6 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

3.6.1. Gypsum Board Application and Finishing Standards

a. Install and finish gypsum panels to comply with ASTM C 840 and GA-216.
b. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
c. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
d. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
e. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.
f. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
g. Attach gypsum panels to framing provided at openings and cutouts.
h. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.
i. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
j. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.

(1) Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
(2) Fit gypsum panels around ducts, pipes, and conduits.
(3) Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

k. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed.
l. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.
m. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.7 GYPSUM BOARD APPLICATION METHODS

3.7.1. Single-Layer Application

a. Install gypsum wallboard panels as follows:

(1) On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
(2) On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.

3.7.2. Wall Tile Substrates

a. For substrates indicated to receive thin-set ceramic tile and similar rigid applied wall finishes, comply with the following:

(1) Install gypsum wallboard panels with tapered edges taped and finished to produce a flat surface except at locations indicated to receive water-resistant panels.

3.7.3. Single-Layer Fastening Methods

a. Apply gypsum panels to supports as follows:

(1) Fasten with screws.

3.8 INSTALLING TRIM ACCESSORIES

3.8.1. General

a. For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.
b. Install cornerbead at external corners.
c. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

(1) Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
(2) Install L-bead where edge trim can only be installed after gypsum panels are installed.
(3) Install U-bead where indicated.

d. Install control joints according to ASTM C 840 and manufacturer's recommendations.

3.8.1.2. Reveal Channel Screed

a. Use where indicated on drawings.
b. Secure to metal stud framing as recommended by manufacturer.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

3.9.1. General

a. Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.
b. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
c. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.
d. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

(1) Level 1 for ceiling plenum areas and concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.

(a) At joints and angles, embed tape in joint compound. Finish panel surfaces free of excess joint compound, but tool marks and ridges are acceptable.

(2) Level 2 where panels form substrates for tile and where indicated.

(a) At joints and angles, embed tape in joint compound and apply one separate coat of joint compound over tape, fastener heads, and flanges of trim accessories. Joint compound applied on the face of the tape when the tape is embedded is considered a separate coat. Finish panel surfaces free of excess joint compound, but tool marks and ridges are acceptable.

(3) Level 4 for all gypsum board exposed surfaces, unless otherwise indicated.

(a) At joints and angles, embed tape in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads, and flanges of trim accessories. Finish panel surfaces and joint compound smooth and free of tool marks and ridges.

e. Use the following joint compound combination as applicable to the finish levels specified:

(1) Embedding and First Coat: Setting-type joint compound.
(2) Fill (Second) Coat: Setting-type joint compound.
(3) Finish (Third) Coat: Sandable, setting-type joint compound.

f. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.
g. Where Level 2 gypsum board finish is indicated, embed tape in joint compound and apply first coat of joint compound.
h. Where Level 1 gypsum board finish is indicated, embed tape in joint compound.
i. Finish water-resistant gypsum backing board forming base for ceramic tile to comply with ASTM C 840 and gypsum board manufacturer's directions for treatment of joints behind tile.

3.10 CLEANING AND PROTECTION

Promptly remove any residual joint compound from adjacent surfaces. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of final acceptance.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 09310

CERAMIC TILE

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Glazed wall tile.
b. Porcelain tile.
c. Stone thresholds installed as part of tile installations.

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements" for adhesives and sealants.
b. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated.

1.2.2. Samples for Verification

a. Assembled samples with grouted joints for each type and composition of tile and for each color and finish required, at least 12 inches square and mounted on rigid panel. Use grout of type and in color or colors approved for completed work.

1.2.3. Sustainable Design Submittals:

a. Materials shall comply with requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer’s product data or certification confirming compliance with FloorScore certification requirements.
e. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements”.

    1. Adhesive and sealant MSDS for each material applied on-site in the interior.
    2. Paint and coating MSDS for each product applied on-site in the interior.

1.2.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Samples for Verification	X	R
1.2.3	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Source Limitations for Tile

a. Obtain all tile of same type and color or finish from one source or producer.
b. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

1.3.2. Source Limitations for Setting and Grouting Materials

1.3.3. Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1. Delivery

a. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

1.4.2. Storage

a. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
b. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
c. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.

1.4.3. Handling

a. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.5 PROJECT CONDITIONS

Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.6 EXTRA MATERIALS

1.6.1. Materials and Quantity

a. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

(1) Tile and Trim Units: Furnish quantity of full-size units equal to 2 percent of amount installed, for each type, composition, color, pattern, and size indicated. Extra stock shall be from the same production run as installed materials.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Tiles

a. To be certified in accordance with FloorScore Certification standard.

2.1.3. Clear wood finishes, floor coatings, stains, sealants, primers & shellacs

a. Products shall meet the VOC limits of the South Coast Air Quality Management District Rule #1113, Architectural Coatings, January 1, 2004.

2.1.3.2. Tile Settings and Grout

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1168, effective date July 1, 2005 and rule amendment date January 7, 2005.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 PRODUCTS, GENERAL

2.3.1. ANSI Ceramic Tile Standard

a. Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
b. Provide tile complying with Standard grade requirements, unless otherwise indicated.

2.3.2. ANSI Standards for Tile Installation Materials

a. Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

2.3.3. Colors, Textures, and Patterns

a. Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

(1) As indicated by manufacturer's designations.

2.3.4. Factory Blending

a. For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.3.5. Mounting

a. For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.

2.4 TILE PRODUCTS

2.4.1. Tile Type CT-1 and CT-2: Glazed Wall Tile for Thin-Set Mortar Installations

a. Flat tile as follows:

(1) Basis-of-Design Product: Daltile; Div. of Dal-Tile International Inc.; product as indicated by manufacturer's designations.
(2) Module Size: 4-1/4 by 4-1/4 inches.
(3) Thickness: 5/16 inch.
(4) Face: Pattern of design indicated, with manufacturer's standard edges.
(5) Finish: Semi-gloss glaze.
(6) Mounting: Factory back-mounted unless otherwise indicated by reference to manufacturer’s product.
(7) External Corners: Surface bullnose, module size 4-1/4 by 4-1/4 inches, No. S-4449.
(8) Internal Corners: Surface coved internal angle, module size 4-1/4 by 4-1/4 inches, No. A-3401.

2.4.2. Tile Type CT-3: Glazed Wall Tile Trim Units for Thin-Set Mortar Installations

a. Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:
b. Basis-of-Design Product: Daltile; Div. of Dal-Tile International Inc.; product as indicated by manufacturer's designations.
c. Base: Sanitary cove.

(1) Square top unless otherwise indicated, module size 4-1/4 by 4-1/4 inches, No. A-3401.
(2) Internal corners: Field-butted square corners except with mitered coved base designed to fit with stretcher shapes, module size 4-1/4 by 4-1/4 inches, No. A-3401.
(3) External corners: Unless otherwise indicated, surface bullnose, square top, module size 4-1/4 by 4-1/4 inches, No. SCR-L-3401.

2.4.3. Tile Types CT-4, CT-5 and CT-6: Polished and Unpolished Wall Tile for Thin-Set Mortar Installations

a. Flat tile as follows:

(1) Basis-of-Design Product: Crossville, Inc.; product as indicated by manufacturer's designations.
(2) Composition: Porcelain.
(3) Facial Dimensions: As indicated.
(4) Thickness: 10.5 mm.
(5) Face: Pattern of design indicated, with manufacturer’s standard edges for product as indicated by manufacturer's designations.
(6) For latex-portland cement-mortared and -grouted tile, precoat polished tile with temporary protective coating.
(7) External corners finishing and edge protection: Basis-of-design product Schluter Systems L.P., Schluter-Quadec, clear anodized aluminum.

2.4.4. Tile Type CT-7: Unpolished Floor Tile for Thin-Set Mortar Installations

a. Flat tile as follows:

(1) Basis-of-Design Product: Crossville, Inc.; product as indicated by manufacturer's designations.
(2) Composition: Porcelain.
(3) Facial Dimensions: As indicated.
(4) Thickness: 7/16 inches.
(5) Face: Pattern of design indicated, with manufacturer’s standard edges for product as indicated by manufacturer's designations.

2.4.5. Tile Types CT-8: Unpolished Paver Tile Trim Units for Thin-Set Mortar Installations

a. Basis-of-Design Product: Crossville, Inc.; product as indicated by manufacturer's designations.
b. Base: Coved.
(1) Mitered internal and external corners.

2.4.6. Tile Type CT-15: Unpolished Wall Tile Units for Thin-Set Mortar Installations

a. Flat tile as follows:

(1) Basis-of-Design Product: Ceramiche Marca Corna; product as indicated by manufacturer's designations.
(2) Composition: Porcelain.
(3) Facial Dimensions: As indicated.
(4) Thickness: 10.0 mm.
(5) Face: Pattern of design indicated, with manufacturer’s standard edges for product as indicated by manufacturer's designations.

2.4.7. Tile Type CT-16 and CT-17: Unpolished Floor Tile Units for Thin-Set Mortar Installations

a. Flat tile as follows:

(1) Basis-of-Design Product: Ceramiche Marca Corna; product as indicated by manufacturer's designations.
(2) Composition: Porcelain.
(3) Facial Dimensions: As indicated.
(4) Thickness: 10.0 mm.
(5) Face: Pattern of design indicated, with manufacturer's standard edges for product as indicated by manufacturer's designations.

2.4.8. Tile Types CT-18: Unpolished Paver Tile Trim Units for Thin-Set Mortar Installations

a. Flat tile as follows:

(1) Basis-of-Design Product: Ceramiche Marca Corna; product as indicated by manufacturer's designations.
(2) Composition: Porcelain.
(3) Facial Dimensions: As indicated.
(4) Thickness: 10.0 mm.
(5) Face: Pattern of design indicated, with manufacturer's standard edges for product as indicated by manufacturer's designations.

2.4.9. Tile Type PPT-1: Polished Floor Tile for Thin-Set Mortar Installations

a. Flat tile as follows:

(1) Basis-of-Design Product: Granito CT316 color 101 Treviso, NEXCOM Contract #NNA 250-08-D-0021. Contact Deborah Creamer 757-635-7749.
(2) Composition: Porcelain.
(3) Facial Dimensions: As indicated.
(4) Thickness: 7/16 inches.
(5) Face: Pattern of design indicated, with manufacturer's standard edges for product as indicated by manufacturer's designations.

2.5 THRESHOLDS

2.5.1. General

a. Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
b. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to ½ inch or less, and finish bevel to match face of threshold.

2.5.2. Marble Thresholds

a. ASTM C 503 with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish.
b. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.6 SETTING AND GROUTING MATERIALS

2.6.1. Latex-Portland Cement Mortar (Thin Set)

a. ANSI A118.4, consisting of the following:

(1) Prepackaged dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive.
(2) For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

2.6.2. Polymer-Modified Tile Grout

a. ANSI A118.7, color as indicated.
b. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.

(1) Unsanded grout mixture for joints 1/8-inch and narrower.
(2) Sanded grout mixture for joints over 1/8-inch.

2.7 ELASTOMERIC SEALANTS

2.7.1. General

a. Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."

2.7.2. Colors

a. Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

2.8 MISCELLANEOUS MATERIALS

2.8.1. Trowelable Underlayments and Patching Compounds

a. Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

2.8.2. Temporary Protective Coating

a. Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

(1) Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 º F per ASTM D 87.
(2) Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

2.8.3. Tile Cleaner

a. A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8.4. Metal Edge Protection and Transitions

a. PPT Tile / Carpet Edge Strip

(1) Basis-of-Design Product: Schluter – SCHIENE, Schluter Systems, Plattsburgh, NY.
(2) Material and Finish: Satin Anodized Aluminum

b. PPT Tile / Concrete Edge Strip

(1) Basis-of-Design Product: Schluter – RENO-RAMP, Schluter Systems, Plattsburgh, NY.
(2) Material and Finish: Satin Anodized Aluminum

2.9 MIXING MORTARS AND GROUT

2.9.1. General

a. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
b. Add materials, water, and additives in accurate proportions.
c. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

(1) Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
(2) Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
(3) Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Contracting Officer.

b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

b. Prepare concrete substrates for tile floors that require substrate have a fine broom finish in compliance with referenced ANSI A108 series of tile installation standards for installations indicated.

(1) Roughen concrete substrate as necessary to assure conditions are satisfactory for tile installation.

c. Provide concrete substrates for tile floors installed with thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.

(1) Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.

(2) Remove protrusions, bumps, and ridges by sanding or grinding.

d. Treat substrate control joints, construction joints, and other nonmoving substrate cracks to prevent cracks from reflecting through ceramic tile flooring with crack and joint isolation membrane in accordance with manufacturer's written recommendations.

3.2.2. Blending

a. For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.2.3. Field-Applied Temporary Protective Coating

a. Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION, GENERAL

3.3.1. ANSI Tile Installation Standards

a. Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

3.3.2. TCA Installation Guidelines

a. TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

3.3.3. General

a. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

b. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

3.3.4. Jointing Pattern

a. Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

(1) For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

3.3.5. Expansion Joints

a. Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

(1) Locate joints in tile surfaces directly above joints in concrete substrates.

3.3.6. Grouting Standards

a. Grout tile to comply with requirements of the following tile installation standards:

(1) For ceramic tile grouts (latex-portland cement grouts), comply with ANSI A108.10.

3.4 FLOOR TILE INSTALLATION

3.4.1. General

a. Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.

(1) For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.

(a) Tile floors composed of rib-backed tiles.

3.4.2. Joint Widths

a. Install tile on floors with the following joint width:

(1) Paver Tile: 1/8 inch.

3.4.3. Stone Thresholds

a. Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.
b. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

3.5 WALL TILE INSTALLATION

3.5.1. General

a. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

3.5.2. Joint Widths

a. Install Tile Types CT-1, CT-2 and CT-3 on walls with the following joint width: 1/16 inch.
b. Install Tile Types CT-4, CT-5, CT-6, CT-8, and CT-15 on walls with the following joint width: 1/8 inch unless otherwise indicated or recommended by tile manufacturer.

3.6 CLEANING AND PROTECTING

3.6.1. Cleaning

a. On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

(1) Remove latex-portland cement grout residue from tile as soon as possible.
(2) Clean grout smears and hazes from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
(3) Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

3.6.2. Protection

a. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
b. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
c. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.7 FLOOR TILE INSTALLATION SCHEDULE

3.7.1. Tile Installation

a. Interior floor installation on concrete; thin-set mortar; TCA F113 and ANSI A108.5.
b. Tile Type: CT-7, CT-16, CT-17, PPT-1.
c. Thin-Set Mortar: Latex- portland cement mortar.
d. Grout: Polymer-modified sanded grout.

3.8 WALL TILE INSTALLATION SCHEDULE

3.8.1. Tile Installation

a. Interior wall installation over gypsum board; thin-set mortar; TCA W243 and ANSI A108.5.
b. Tile Types: CT- 1, CT-2, CT-3, CT-4, CT-5, .CT-6, .CT-8, CT-15.
c. Thin-Set Mortar: Latex- portland cement mortar.
d. Grout: Polymer-modified unsanded grout.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 09511

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Ceilings composed of acoustical panels and exposed suspension systems.

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements".

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of acoustical panel specified.

1.2.2. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer (post-industrial) recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements".

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.3. Maintenance Data

a. For finishes to include in maintenance manuals.

1.2.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Sustainable Design Submittals	S	I
1.2.3	Maintenance Data	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications

a. Engage an experienced Installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.3.2. Single-Source Responsibility for Ceiling Units and Suspension System

a. Obtain acoustical ceiling panel and suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.3.3. Fire-Test-Response Characteristics

a. Provide acoustical panel ceilings that comply with the following requirements:

(1) Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

(a) Smoke-Developed Index: 50 or less.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.5 PROJECT CONDITIONS

Space Enclosure and Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels indicated for Project when occupied for its intended use.

1.6 COORDINATION

Coordinate layout and installation of acoustical panels and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition assemblies (if any).

1.7 EXTRA STOCK

1.7.1. General

a. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7.2. Acoustical Ceiling Panels

a. Full-size panels equal to 1.0 percent of quantity installed.

1.7.3. Suspension System Components

a. Quantity of each exposed component equal to 1.0 percent of quantity installed.

1.7.4. Seismic Clips

a. Equal to 1.0 percent of amount installed.

1.8 WARRANTY

1.8.1. General Warranty

a. The special warranties specified in this Article shall not deprive the Government of other rights the Government may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

1.8.2. Special Acoustical Panel Ceiling System Warranty

a. Submit a written warranty executed by acoustical panel ceiling system manufacturer to repair or replace acoustical panel ceiling system that falls within the warranty period. Failures include, but are not limited to:

(1) Acoustical Panels: Sagging or warping.

(a) Warranty Period: Ten years from date of substantial completion.

(2) Grid System: Rusting and manufacturing defects.

(a) Warranty Period: Ten years from date of substantial completion.

(3) Mold, Mildew, and Bacteria Resistance.

(a) 30 years from date of substantial completion.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Acoustical Panel Ceiling

a. To contain Post-consumer and Pre-consumer recycled content.
b. 50% of the materials to be manufactured and extracted, harvested or recovered within a 500 mile radius of the project site.

2.1.3. Metal Suspension System

a. To contain Post-consumer and Pre-consumer recycled content.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 ACOUSTICAL PANELS, GENERAL

2.3.1. Acoustical Panel Standard

a. Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
b. Mounting Method for Measuring Noise Reduction Coefficient (NRC): ASTM C 423.
c. Test Method for Ceiling Attenuation Class (CAC): Where acoustical panel ceilings are specified to have a CAC, provide units identical to those tested per ASTM E 1414 by a qualified testing agency.

2.3.2. Acoustical Panel Colors and Patterns

a. Match appearance characteristics indicated for each product type.

2.4 ACOUSTICAL PANELS

2.4.1. Acoustical Panel Characteristics

a. Provide panels complying with ASTM E 1264 and Basis-Of-Design Product for characteristics described below:

(1) Pattern: CE (perforated, small holes and lightly textured).
(2) Type and Form: Type III, mineral base with washable painted finish; Form 2, water felted.
(3) Color: White.
(4) NRC (Noise Reduction Coefficient): 0.55.
(5) CAC (Ceiling Attenuation Class): 35.
(6) LR (Light Reflectance): 0.85.
(7) Edge/Joint Detail: Angled Tegular for interface with basis-of-design exposed tee grid system.
(8) Thickness: 5/8 inch.
(9) Modular Size: 24- by 24-inches.
(10) Sag Resistant.
(11) Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated, on surface and back of panels, with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273.

2.4.2. Basis-of-Design Product

a. Armstrong World Industries, Inc.
b. Type: Fine Fissured Tegular.
c. Item Number: 1732.
d. Dimensional Stability: HumiGuard Plus; resistance to high humidity conditions.
e. Mold and Mildew Resistance: Surface and back treated with BioBlock paint containing a special biocide that inhibits or retards growth of mold and mildew.

2.5 METAL SUSPENSION SYSTEMS, GENERAL

2.5.1. Metal Suspension-System Standard

a. Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

2.5.2. Attachment Devices

a. Size for five times design load indicated in ASTM C 635, Table 1, “Direct Hung,” unless otherwise indicated. Comply with seismic design requirements.

2.5.3. Wire Hangers, Braces, and Ties

a. Provide wires complying with the following requirements:

(1) Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.

b. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, “Direct-Hung”), will be less than yield stress of wire, but provide not less than 0.106-inch diameter wire

2.6 METAL SUSPENSION SYSTEM

2.6.1. Wide-Face Capped Double-Web Steel Suspension System

a. Main and cross-runners roll-formed from commercial-quality hot dipped galvanized steel coating. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester. 15/16-inch wide metal caps on flanges; other characteristics as follows:

(1) Structural Classification: Intermediate-Duty System.
(2) Cross Tees: Light gauge steel with rotary stitching to improve column strength and staked-onend detail allowing easy cross tee removal and remounting.
(3) End Condition of Cross-Runners: Override (stepped) or butt-edge type, as standard with manufacturer.
(4) Cap Material and Finish: Steel sheet baked polyester painted to match color of panels supported.

2.6.2. Basis-of-Design Product

a. Armstrong World Industries, Inc.; Prelude XL 15/16-inch Exposed Tee System.

2.7 METAL EDGE MOLDINGS AND TRIM

2.7.1. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

a. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
b. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
c. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

Measure each ceiling area and establish the layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans.

3.3 INSTALLATION

3.3.1. General

a. Install acoustical panel ceilings to comply with publications referenced below and per manufacturer's written instructions.

(1) Standard for Ceiling Suspension System Installations: Comply with ASTM C 636 and seismic design requirements indicated.

b. Suspend ceiling hangers from building's structural members and as follows:

(1) Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of the supporting structure or of the ceiling suspension system.
(2) Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
(3) Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
(4) Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers either directly to structures or to inserts, eye screws, or other devices that are secure, that are appropriate for substrate, and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
(5) When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
(6) Do not attach hangers to steel deck tabs.
(7) Do not attach hangers to steel roof deck. Attach hangers to structural members.
(8) Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise shown; and provide hangers not more than 8 inches from ends of each member.
(9) Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

c. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

(1) Screw attach moldings to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

d. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
e. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide neat, precise fit.

(1) For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
(2) Paint the cut panel edges remaining exposed after installation; match color of exposed panel surfaces using coating recommended for this purpose by acoustical panel manufacturer.

3.4 CLEANING

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Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 09651

RESILIENT FLOOR TILE

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Vinyl enhanced tile (VET).
b. Resilient wall base and accessories.

1.1.2. Related Sections

1.1.3. Division 1 Section “Sustainable Design Requirements”.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated.

1.2.2. Samples for Verification

a. Full-size units of each color and pattern of resilient floor tile required.

(1) Resilient Wall Base and Accessories: Manufacturer's standard-size Samples, but not less than 12 inches long, of each resilient product color and pattern required.

1.2.3. Maintenance Data

a. For resilient products to include in maintenance manuals.

1.2.4. Moisture/Bond Tests

a. Submit moisture/bond tests prior to installation of resilient tile.

1.2.5. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements”.

b. Submit manufacturer’s product data or certification confirming compliance with FloorScore certification requirements

c. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements”.

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.6. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Samples for Verification	X	R
1.2.3	Maintenance Data	X	I
1.2.4	Moisture/Bond Tests	X	I
1.2.5	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section "Administrative Requirements"
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements"
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

1.3.2. Fire-Test-Response Characteristics

a. As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

(1) Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 DELIVERY, STORAGE, AND HANDLING

Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 degree F or more than 90 degree F. Store tiles on flat surfaces.

1.5 PROJECT CONDITIONS

1.5.1. General

a. Maintain temperatures within range recommended by manufacturer, but not less than 70 degree F or more than 95 degree F, in spaces to receive floor tile during the following time periods:

(1) 48 hours before installation.
(2) During installation.
(3) 48 hours after installation.

b. After post-installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 degree F or more than 95 degree F.
c. Close spaces to traffic during floor covering installation.

d. Close spaces to traffic for 48 hours after floor covering installation.
e. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

1.6.1. General

a. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Furnish extra materials from the same production run as installed materials.

(1) Furnish not less than one percent of each type, color, pattern, class, wearing surface, and size of resilient tile flooring, accessory, and wall base installed.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Vinyl Enhanced Tile

a. Products to be certified as compliant with the FloorScore standard.

2.1.3. Resilient Wall Base

a. Products to be certified as compliant with the FloorScore standard.

2.1.4. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.1.5. Clear wood finishes, floor coatings, stains, primers & shellacs – Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1113, Architectural Coatings, January 1, 2004.

2.2 BASIS-OF-DESIGN PRODUCTS

2.2.1. General

a. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis

of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 COLORS AND PATTERNS

Colors and Patterns: As indicated by manufacturer's designations and drawing notes.

2.4 VINYL ENHANCED TILE

2.4.1. Vinyl Enhanced Tile (VET)

a. ASTM F 1066.
b. Class: 2 (through-pattern tile).
c. Wearing Surface: As indicated.
d. Thickness: 0.125 inch.
a. Size: 12 inches by 12 inches.
b. Special Features: Total material binder content shall be greater than 25 percent; material surface shall be treated with urethane.
c. Smoke Density: Provide materials with smoke density of less than 450 when tested in accordance with ASTM E 662.
d. Static Load: Provide materials with static load limit of 400 psi or higher.
e. Slip Resistance: Provide materials with minimum rating for floors of greater than 0.60.

2.4.2. Basis-of-Design Product

a. Azrock by Tarket, Inc.

2.5 RESILIENT WALL BASE

2.5.1. Wall Base

a. ASTM F 1861.
b. Type (Material Requirement): TP (rubber, thermoplastic).
c. Group (Manufacturing Method): I (solid, homogeneous) or II (layered).
d. Style:

(1) Cove with top-set toe at resilient tile flooring and where indicated.
(2) Straight with no toe at carpet and where indicated.

e. Minimum Thickness: 0.125 inch.
f. Height: 4 inches.
g. Lengths: Coils in manufacturer’s standard length.
h. Corners: Premolded.
i. Surface: Smooth.

2.5.2. Basis-of-Design Product

a. Johnsonite.

2.6 MOLDING ACCESSORIES

2.6.1. Vinyl Flooring Molding Accessory

a. Description: Reducer strip for resilient flooring.
b. Material: Vinyl; color coordinate with flooring.
c. Profile and Dimensions: Tapered or bullnose edge, thickness matching flooring, and width not less than one inch.

2.6.2. Accessibility for the Disabled

a. Provide edge, transition, and other flooring accessory materials that comply with accessibility requirements of authorities having jurisdiction.

2.7 INSTALLATION MATERIALS

2.7.1. General

a. Basis-of-Design Products: Provide either the named products or products provided or approved by resilient tile flooring manufacturer for applications indicated.

2.7.2. Concrete Sealer

a. Material recommended by resilient tile flooring manufacturer where required to ensure adhesion of resilient tile to concrete substrates, as determined from preconstruction resilient-tile-concrete-substrate tests and field tests.

2.7.3. Concrete Primer

a. Basis-of-Design Product: Ardex Engineered Cements. Ardex P-51 Primer.

2.7.4. Trowelable Leveling and Patching Compounds

a. For repairing substrates and ramping:

(1) Basis-of-Design Product: Ardex Engineered Cements. Ardex SD-P InstantPatch.

b. For flash patching and skim coating:

(1) Basis-of-Design Product: Ardex Engineered Cements. Ardex SD-F Feather Finish.

c. Do not use gypsum-based formulations.

2.7.5. Adhesives (Cements):

a. Basis-of-Design Product: The W.W. Henry Company, Henry 530 TilePro High-Performance “Fast Tack” Adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

(1) Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
(2) Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

3.2.2. Concrete Substrates

a. Prepare according to ASTM F 710 and as follows:

(1) Review prospective floor covering manufacturer’s recommendations for slab preparation. Identify requirements of levelness, texture, water vapor transmission limits and similar criteria and compare against the found condition of the subject slab.
(2) Remove dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, curing, sealing, hardening, or parting compounds, alkaline salts, excessive carbonation or laitence, mold mildew, and other foreign materials that might prevent adhesive bond.
(3) Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
(4) 48 hours, minimum, before testing substrate for moisture, bead-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed beads within the apparatus, and re-circulates the beads by vacuum pickup. Acid etching, mechanical sanding, or mechanical scarification will not be accepted.

(a) Bead-blast concrete surfaces where resilient flooring is required.

(5) Moisture Testing:

(a) Perform anhydrous calcium chloride test, ASTM F 1869, or other test methods acceptable to the resilient flooring manufacturer and as follows. Proceed with installation of resilient flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
(b) Prepare 3 test sites for the first 1,000 sq. ft. and include 1 more test for each additional 1,000 sq. ft. area.
(c) Proceed with installation only after substrates pass testing.

(6) Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer only after shot-blasting of surfaces has been completed. Proceed with installation only after substrates pass testing.

3.2.3. Concrete Sealing

a. Seal concrete substrates, where recommended in writing by resilient tile flooring manufacturer, based on preconstruction resilient-tile-concrete-substrate tests or prior experience. Apply sealer to comply with resilient tile manufacturer's written instructions.

(1) Contract completion time will not be extended due to time interval between sealer application and flooring installation.

3.2.4. Leveling And Patching

a. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

(1) Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with latex patching or underlayment compound recommended by the resilient flooring manufacturer.

3.2.5. Material Preconditioning

a. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
b. Do not install resilient products until they are same temperature as space where they are to be installed.

3.2.6. Substrate Preparation

a. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 TILE INSTALLATION

3.3.1. General

a. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

(1) Lay tiles square with room axis.

b. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

(1) **LAY TILES WITH GRAIN RUNNING IN ONE DIRECTION, IN PATTERN OF COLORS AND SIZES INDICATED, AND WITH JOINTS IN STRAIGHT LINE**.

c. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

(1) Where a visible gap occurs between joints of vertical surfaces and edge of resilient flooring, install clear elastomeric joint sealant ES-3 as specified in Division 7 Section “Joint Sealants” to form a waterproof seal.

d. Extend tiles into toe spaces, door reveals, closets, and similar openings, except in Sales Areas, run flooring full under checkstands, shelving, and display cases.
e. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
f. Install tiles on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of tile installed on covers. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
g. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
h. Hand roll tiles immediately after installation according to tile manufacturer's written instructions, except if rolling is not required for products specified.

3.4 RESILIENT WALL BASE INSTALLATION

3.4.1. General

a. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
b. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
c. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
d. Do not stretch wall base during installation.
e. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.
f. Premolded Corners: Install premolded corners before installing straight pieces.

3.5 RESILIENT ACCESSORY INSTALLATION

Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed. Install expansion joint insert strip in isolation joints around columns in slabs on grade to allow movement of tile below cap and keep tile from cracking; miter corners.

3.6 CLEANING AND PROTECTION

3.6.1. General

a. Perform the following operations immediately after completing resilient product installation:

(1) Remove adhesive and other blemishes from exposed surfaces.
(2) Sweep and vacuum surfaces thoroughly.
(3) Damp-mop surfaces to remove marks and soil.

(a) Do not wash surfaces until after time period recommended by manufacturer.

b. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

(1) Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

(a) Apply two coats of liquid floor finish.
(b) Use commercially available product acceptable to manufacturer.

(2) Cover products installed on horizontal surfaces with undyed, untreated building paper until final acceptance. Coordinate with manufacturers' written recommendations for products used.
(3) Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

(a) When required by flooring manufacturer, allow a minimum of 72 hours after resilient tile installation before moving and installing equipment on flooring.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 09671

RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. RES-1 - Chemical and thermal-shock resistant urethane mortar flooring.
b. RES-2 - Primer, trowel-applied epoxy mortar flooring, chemical resistant topcoat.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.

1.2 UNIT PRICE FOR OSMOTIC RESISTANT GROUT

1.2.1. Unit Price

a. Provide a unit price per square foot, with initial bid, for osmotic resistant grout application in the event concrete floor slab moisture tests indicate the need for same.

1.2.2. Procedures

a. Unit price includes all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

b. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of product specified. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.

1.3.2. Samples for Verification

a. For each resinous flooring system required, provide 6-inch by 6-inch square sample, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1.3.3. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements”.

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.3.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Samples for Verification	X	R
1.3.3	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Engage an experienced installer (applicator) who has specialized in installing resinous flooring similar in material, design, and extent to that indicated for this Project and who is acceptable to resinous flooring manufacturer. Contractor shall have completed at least five projects of similar size and complexity.
b. Engage an installer who employs only persons trained and approved by resinous flooring manufacturer for installing resinous flooring systems specified.

1.4.2. Source Limitations

a. Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials from manufacturer of primary materials.

1.4.3. Pre-Installation Conference

a. Conduct conference at Project site. Comply with requirements in Division 1 Section "Coordination".
b. Review methods and procedures related to resinous flooring including, but not limited to, the following:

(1) Meet with Contracting Officer’s representative; testing and inspecting agency representative; resinous flooring Installer; resinous flooring system manufacturer's representative; and installers whose work interfaces with or affects resinous flooring, including installers of cold storage rooms regarding effect of temperature change to resinous flooring system upon activation of refrigeration system.
(2) Inspect and discuss condition of substrate and other preparatory work performed by other trades.
(3) Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.4.4. Fire-Test-Response Characteristics

a. As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

(1) Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. Delivery

a. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.5.2. Storage

a. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.6 PROJECT CONDITIONS

1.6.1. Environmental Limitations

a. Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.

1.6.2. Lighting

a. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.
b. Provide side lighting focused horizontally across work area during installation to aid installers in eliminating trowel marks.

1.6.3. Traffic Limitations

a. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.1.3. Clear wood finishes, floor coatings, stains, primers & shellacs – Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1113, Architectural Coatings, January 1, 2004.

2.1.4. Grout– Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1168, effective July 1, 2005 and rule amendment date of January 7, 2005.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 MATERIALS

2.3.1. VOC Content of Resinous Flooring

a. Provide resinous flooring systems, for use inside the weatherproofing system, that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

(1) Resinous Flooring: 100 g/L

2.3.2. Resinous Flooring

a. RES-1 - Chemical and thermal-shock resistant urethane mortar flooring consisting of a high performance, four-component polyurethane mortar system including urethane-urea binder, pigments, powders and quartz aggregates; sealant and seal coats. Comply with requirements indicated in the Resinous Flooring Schedule located at end of this Section.

b. RES-2 - Resinous flooring includes penetrating, moisture tolerant, two-component epoxy primer, a high performance, three-component mortar consisting of epoxy resin, curing agent and selected, graded aggregates blended with inorganic pigments and a two-component, chemical resistant, epoxy coating. Comply with requirements indicated in the Resinous Flooring Schedule located at end of this Section.

2.3.3. Crack and Joint Isolation Membrane

a. Manufacturer's flexible resin recommended for crack isolation to help prevent substrate cracks from reflecting through RES-2 trowel-applied epoxy mortar flooring system.

2.3.4. Osmotic Resistant Grout

a. A three-component, polymer modified, cementitious osmotic pressure resistant grout at a minimum 1/8-inch thickness. Comply with requirements indicated in the Resinous Flooring Schedule.

2.3.5. Patching and Fill Material

a. Resinous product manufactured by resinous flooring manufacturer and recommended by manufacturer for application indicated.

2.3.6. Joint Sealant

a. Type manufactured by resinous flooring manufacturer for type of service and joint condition indicated. Match resinous flooring color.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of resinous flooring. Do not proceed with installation until unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

3.2.1. General

a. Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.
b. At the juncture of resinous flooring with other floor finishes, saw cut and chase concrete as indicated on drawings for a flush transition of flooring surfaces.

3.2.2. Concrete Substrates

a. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminates incompatible with resinous flooring.
b. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
c. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
d. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
e. Verify that concrete substrates are dry

(1) Perform anhydrous calcium chloride test, ASTM F 1869, in all areas of installations. Proceed with resinous flooring application only after substrates do not exceed a maximum moisture-vapor-emission rate of 7 lbs of water/1000 sq. ft. of slab in 24 hours.

(a) Prepare 3 test sites for the first 1,000 sq. ft. and include 1 more test for each additional 1,000 sq. ft. area.

f. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

3.2.3. Resinous Materials

a. Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

3.2.4. Patching and Filling

a. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

3.2.5. Joints and Cracks

a. Treat nonmoving joints and other nonmoving substrate cracks to prevent cracks from reflecting through RES-2 trowel applied epoxy mortar flooring according to manufacturer's written recommendations.

3.3 APPLICATION

3.3.1. General

a. Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

(1) Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum intercoat adhesion.
(2) Except where materials are indicated by product manufacturer as self-priming, apply primer over prepared substrate at manufacturer's recommended spreading rate.

b. Apply troweled or screeded body coat(s) in thickness indicated for flooring system. Hand or power trowel to obtain uniform finish. When cured, sand to remove trowel marks and roughness.
c. Apply topcoat(s) in number of coats indicated for flooring system and at spreading rates recommended by manufacturer.
d. Coating/Texture: Remove surface imperfections by lightly abrading and vacuuming the floor surface. Mix coating according to manufacturer’s recommended procedures. Squeegee apply and backroll coating with strict adherence to manufacturer’s installation procedures and coverage rates. Allow coating to cure and apply a second layer of coating according to manufacturer’s recommended procedures.
e. Integral Cove Base: Apply cove base mix to vertical curb surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.
f. Where RES-1 is installed, saw cut resinous flooring where substrate joints occur and apply joint sealant to comply with manufacturer's written recommendations.
g. Where RES-2 is to be installed, apply crack and joint membrane at substrate joints to bridge joints with resinous flooring, except at substrate isolation joints. At substrate isolation joints, saw cut resinous flooring and apply joint sealant to comply with manufacturer's written recommendations.
h. For both RES-1 and RES-2 locations: Apply osmotic resistant grout over areas indicated to receive resinous flooring, bridging all joints except isolation joints. At substrate isolation joints, saw cut resinous flooring and apply joint sealant to comply with manufacturer's written recommendations.

3.4 CURING, PROTECTION AND CLEANING

3.4.1. Curing

a. Cure resinous flooring materials according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process. Close application area for a minimum of 24 hours.

3.4.2. Protection

a. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

3.4.3. Cleaning

a. Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of final acceptance in each Project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

3.5 RESINOUS FLOORING SCHEDULE

3.5.1. **RES-1** - Chemical and Thermal-Shock Resistant Urethane Mortar Resinous Flooring

a. Basis-of-Design Products: Provide the following Stonhard, Inc. component products:

(1) Stonproof CT5 crack and joint isolation membrane..
(2) Stonclad UT four-component, troweled urethane mortar.
(3) Stonclad UT seal coat two-component.
(4) Stonflex MP7 two-component, self-leveling, polyurethane sealant.
(5) Stonfil OP2 osmotic resistant grout.

b. Color: Brick Red.
c. Total Thickness of Body Coat(s): 1/4 inch.
d. Wearing Surface: Light Texture finish.
e. Base: Integral cove base as indicated.
f. Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:

(1) Compressive Strength: 7,700 psi after 7 days per ASTM C 579.
(2) Tensile Strength: 1,000 psi per ASTM C 307.
(3) Flexural Strength: 2,400 psi per ASTM C 580.
(4) Flexural Modulus of Elasticity: 2.6×10^{6} psi per ASTM C 580.
(5) Water Absorption: 0.056% per ASTM C 413.
(6) Coefficient of Thermal Expansion, Linear: 1.1×10^{-5} in/inEC per ASTM C 531.
(7) Impact Resistance: 160 in/lbs per ASTM D-4226.
(8) Abrasion Resistance: 0.05 gm. maximum weight loss per ASTM D 4060, CS-17 Wheel.
(9) Flammability: Self-extinguishing per ASTM D 635. Extent of burning 0.31 inches maximum.
(10) Hardness: 80-84, Shore D per ASTM D 2240.
(11) Bond Strength: >400 psi, 100 percent concrete failure per ASTM D-4541.
(12) Heat Resistance Limitation: 200EF//93EC for continuous exposure, 250EF//121EC for intermediate spills.
(13) Cure Rate allow (at 77º F/25º C): 6 hours for foot traffic, 24 hours for normal operations.

g. Chemical Resistance: As indicated by system designation and components indicated above.

3.5.2. **RES-2 -** Trowel-Applied Epoxy Mortar Resinous Flooring

a. Basis-of-Design Products: Provide the following Stonhard, Inc. component products:

(1) Standard Primer two-component epoxy based priming system.
(2) Stonproof CT5 Crack and joint isolation membrane.
(3) Stonclad GS three-component, troweled, epoxy mortar system.
(4) Stonkote GS4 two-component, 100% solids, general service, epoxy.
(5) Stonflex MP7 two-component, self-leveling, polyurethane sealant.
(6) Stonfil OP2 osmotic resistant grout.

b. Color: Beechwood.
c. Total Thickness of Body Coat(s): 1/4 inch.
d. Wearing Surface: Texture #2 finish.
e. Base: 4-inch- high integral cove base.
f. Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to standard test methods indicated:

(1) Compressive Strength: 10,000 psi per ASTM C 579.
(2) Tensile Strength: 1,750 psi per ASTM C 307.
(3) Flexural Modulus of Elasticity: 2.0 x 10^6 psi per ASTM C 580.
(4) Flexural Strength: 4,000 psi per ASTM C 580.
(5) Water Absorption: 0.2 % per ASTM C 413.
(6) Thermal Coefficient of Linear Expansion: 3.5 x 10^{-5} in/in-º C per ASTM E 831.
(7) Indentation: No indentation per MIL-D-3134F.
(8) Abrasion Resistance: 0.1 gm maximum weight loss per ASTM D 4060 Taber Abrader CS-17 wheel.
(9) Coefficient of Friction: 0.74 ASTM D 2047 - Neoprene Dry.
(10) Flammability: Self-extinguishing per ASTM D 635 Extent of burning 0.25 inches maximum.
(11) Hardness: 85 - 90, Shore D per ASTM D 2240.
(12) Bond Strength: >400 psi, 100 percent concrete failure per ASTM D 4541.Heat
(13) Resistance Limitations: 140º F/60º C for continuous exposure, 200º F/93º C for intermittent spills.
(14) Cure Rate allow (at 77º F/25º C): 6 hours for foot traffic, 18 hours for light traffic, 24 hours for normal operations.

g. Chemical Resistance: As indicated by system designation and components indicated above.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 09680

CARPET

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Direct glue-down carpet and installation.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.
b. Division 9 Section “Resilient Floor Tile” for resilient wall base and accessories installed with carpet.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of carpet material and installation accessory specified. Submit manufacturer's printed data on physical characteristics.

1.2.2. Samples for Verification

a. Carpets, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected.

1.2.3. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer (post-industrial) recycled content for products having recycled content.
c. Submit product data indicating the flooring meets the CRI’s Green Label Plus standard. Include statement indicating costs for each product having recycled content.
d. Submit manufacturer’s product data or certification information for each of the following materials per Section 01115 Sustainable Design Requirements.

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Samples for Verification	X	R
1.2.3	Sustainable Design Submittals	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1. General

a. Comply with the Carpet and Rug Institute's CRI 104, Section 5: "Storage and Handling."

1.3.2. Delivery

a. Deliver materials to Project site in original factory wrappings and containers, labeled with identification of manufacturer, brand name, and lot number.

1.3.3. Storage

a. Store materials on-site in original undamaged packages, inside well-ventilated area protected from weather, moisture, soilage, extreme temperatures, and humidity. Lay flat, with continuous blocking off ground.

1.4 PROJECT CONDITIONS

1.4.1. General

a. Comply with CRI 104, Section 6: "Site Conditions”.

1.4.2. Space Enclosure and Environmental Limitations

a. Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

1.4.3. Subfloor Moisture Conditions

a. Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 º F.

1.4.4. Subfloor Alkalinity Conditions

a. A pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Carpet

a. Products to meet the Carpet and Rug Institute's (CRI) Green Label Plus certification requirements.

2.1.3. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 CARPET

2.3.1. Carpet Type CPT-1; Carpet Tile

2.3.1.1. Basis-of-Design Product

a. Kinetic Tile 59359, Black to Business 58505, Shaw Contract Group, Dalton, GA 30722, NEXCOM Contract #NNA 250-08-D0021, Contact Deborah Creamer 757-635-7759:

(1) Construction: Multi-level pattern loop.
(2) Pile Content: eco solution q nylon.
(3) Pile Weight (Tufted): 18 oz/sq. yd.
(4) Rows: 9.0 per inch.
(5) Color Technique: 86% solution dyed / 14% yarn dyed.
(6) Density: 7,624.
(7) Weight Density: 137,214.
(8) Primary Backing: Synthetic
(9) Pattern Repeat: None.
(10) Flammability, Flooring Radiant Panel: Class 1 (exceeds 0.45 watts/cm^{2}Cridical Radiant Flux) Direct glue down.
(11) Static Propensity: Less than 3.0 KV.
(12) Soil Release: ssp Shaw soil protection.
(13) Installation: Quarter turn.

2.3.2. Carpet Type CPT-2; Carpet Tile

2.3.2.1. Basis-of-Design Product

a. Welcome Tile 59410, Charcoal 10119, Shaw Contract Group, Dalton, GA 30722, NEXCOM Contract #NNA 250-08-D0021, Contact Deborah Creamer 757-635-7759:

(1) Construction: Hobnailed thermal bonded.
(2) Pile Content: PET polyester.
(3) Pile Weight (Tufted): 50 oz/sq. yd.
(4) Color Technique: 100% solution dyed.

(5) Density: 11,392.
(6) Primary Backing: Synthetic
(7) Pattern Repeat: None.
(8) Flammability, Flooring Radiant Panel: Class 1 (exceeds 0.45 watts/cm^2Cridical Radiant Flux) Direct glue down.
(9) Static Propensity: Less than 3.0 KV.
(10) Soil Release: ssp Shaw soil protection.
(11) Installation: Quarter turn.

2.4 INSTALLATION ACCESSORIES

2.4.1. Concrete-Slab Primer

a. Nonstaining type as recommended by the carpet manufacturer.

2.4.2. Trowelable Underlayments and Patching Compounds

a. As recommended by the carpet manufacturer.
b. Do not use gypsum-based formulations.

2.4.3. Adhesives

a. Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated and to comply with flammability requirements for installed carpet as recommended by the carpet manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine subfloors and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of carpet. Do not proceed with installation until unsatisfactory conditions have been corrected. Verify that subfloors and conditions are satisfactory for carpet installation and comply with requirements specified in this Section and those of the carpet manufacturer.

3.2 PREPARATION

3.2.1. General

a. Comply with carpet manufacturer's installation recommendations to prepare substrates indicated to receive carpet installation.

3.2.2. Floor Flatness and Levelness

a. Prepare subfloor to F(F) (floor flatness) and F(L) (floor levelness) tolerances indicated in Division 3, Section “Cast-In-Place Concrete” for trowel finish of monolithic slabs. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions.
b. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor

c. Allow underlayment patching compounds to cure prior to installation of finish materials.

3.2.3. Preparation

a. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.
b. Broom or vacuum clean subfloors to be covered with carpet. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust.
c. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended carpet manufacturer.

3.3 INSTALLATION

3.3.1. Direct Glue-Down Installation

a. Comply with CRI 104, Section 8: "Direct Glue-Down."

3.3.2. General

a. Comply with carpet manufacturer's recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Do not bridge building expansion joints with continuous carpet.
b. Where demountable partitions or other items are indicated for installation on top of finished carpet floor, install carpet before installation of these items.
c. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
d. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
e. Install pattern parallel to walls and borders.

3.4 CLEANING

3.4.1. Perform The Following Operations Immediately After Completing Installation.

a. Remove visible adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
b. Remove protruding yarns from carpet surface.
c. Vacuum carpet using commercial machine with face-beater element.

3.5 PROTECTION

3.5.1. General

a. Comply with CRI 104, Section 15: "Protection of Indoor Installation."
b. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure carpet is without damage or deterioration at the time of final acceptance.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 09720

WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Vinyl wall covering.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements”.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.

1.2.2. Shop Drawings

a. Show location and extent of each wall-covering type. Indicate pattern placement, seams and termination points.

1.2.3. Samples

a. For each type of wall covering and for each color, texture, and pattern required.

1.2.4. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements”.
b. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements”.

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Shop Drawings	X	R
1.2.3	Samples	X	R
1.2.4	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Fire-Test-Response Characteristics

a. Provide wall coverings and adhesives with the following fire-test-response characteristics as determined by testing identical products applied with identical adhesives to substrates per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

(1) Surface-Burning Characteristics: As follows, per ASTM E 84:
(2) Flame-Spread Index: 25 or less.
(3) Smoke-Developed Index: 450 or less.

PART 2 - PRODUCTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements”.

2.1.2. Adhesives, Sealants and Sealant Primers – Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 WALL-COVERING PRODUCTS

2.2.1. General

a. Provide rolls of each type of wall covering from the same run number or dye lot.

2.2.2. Vinyl Wall Covering

a. Vinyl Wall-Covering Standards: Provide mildew-resistant products complying with the following:

(1) FS CCC-W-408 A and CFFA-W-101-A for Type II, Medium-Duty products.
(2) ASTM F 793 for strippable wall coverings that qualify as Category V, Type II Commercial Serviceability products.

b. Total Weight Excluding Coatings: 16 oz./sq.yd. minimum.
c. Width: 54 inches.
d. Backing Material: Osnaburg.
e. Stain-Resistant Coating: Silvadur ET Technology.
f. Colors, Textures, and Patterns: As indicated.

2.3 ACCESSORIES

2.3.1. Adhesive

2.3.2. Mildew-resistant, non-staining, strippable adhesive, for use with specific wall covering and substrate application, as recommended in writing by wall-covering manufacturer.

2.3.3. Primer/Sealer

a. Mildew-resistant primer/sealer recommended in writing by wall-covering manufacturer for intended substrate.

2.3.4. Seam Tape

a. As recommended in writing by wall-covering manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

a. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
b. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity.
c. Metals: If not factory primed, clean and apply metal primer.
d. Gypsum Board: Prime with primer recommended by wall-covering manufacturer.
e. Check painted surfaces for pigment bleeding. Sand gloss, semi-gloss, and eggshell finishes with fine sandpaper.

3.1.2. Hardware

a. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

3.1.3. Acclimatize Wall-Covering Materials

a. Remove wall covering materials from packaging in the installation areas not less than 24 hours before installation.

3.2 INSTALLATION

3.2.1. General

a. Cut wall-covering strips in roll number sequence. Change roll numbers at partition breaks and corners.
b. Install strips in same order as cut from roll unless otherwise recommended by wall-covering manufacturer.
c. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.
d. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.
e. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.

CONSTRUCTION ISSUE

END OF SECTION

CONSTRUCTION ISSUE

SECTION 09840

ACOUSTICAL WALL TREATMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Cementitious wood fiber plank acoustical wall panel system and installation accessories.

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements."

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of acoustical panel specified.

1.2.2. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating percentages by weight of post-consumer and pre-consumer (post-industrial) recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
c. Submit product data indicating percentages by weight of materials extracted, harvested or recovered, as well as manufactured within 500 miles of the project. Include a statement indicating costs for each product.
d. Submit Vendor's invoice for all wood materials and all wood-containing materials.
(1) Materials to be identified on a line-item basis with individual cost and FSC content amount indicated on each line.
(2) Vendor's FSC COC certificate number to be included on the invoice.

e. Submit a letter from the wood material Vendors stating the products provided are FSC Pure, FSC Mixed, or FSC Mixed [NN]%.
f. Submit manufacturer's product data indicating that all composite wood materials and laminating adhesives contain no added urea-formaldehyde resins.
g. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.3. Maintenance Data

a. For finishes to include in maintenance manuals.

1.2.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Sustainable Design Submittals	S	I
1.2.3	Maintenance Data	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
S Submit quantity specified in Division 1 Section "Sustainable Design Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications

a. Engage an experienced Installer who has completed acoustical wall treatment similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.3.2. Single-Source Responsibility for Wall Panels, moldings and accessories.

a. Obtain acoustical wall panel and moldings from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.3.3. Fire-Test-Response Characteristics

a. Provide acoustical panels that comply with the following requirements:

(1) Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

(a) Smoke-Developed Index: 0.

(b) Flamespread: 0

1.3.4. Provide acoustical wall panel system which has been manufactured, fabricated and installed to provide Noise Reduction Coefficient (NRC) rating as follows:

a. NRC rating .60

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.5 PROJECT CONDITIONS

Space Enclosure and Environmental Limitations: Do not install acoustical panels until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels indicated for Project when occupied for its intended use. Coordinate layout and installation of acoustical panel system with other construction that penetrates walls, including; HVAC equipment, fire-suppression system components (if any), and partition assemblies (if any).

1.6 EXTRA STOCK

1.6.1. General

a. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.6.2. Acoustical Panels

a. Full-size panels equal to 1.0 percent of quantity installed.

1.6.3. System Components, screws and moulding

a. Quantity of each exposed component equal to 1.0 percent of quantity installed.

1.6.4. Touch-up paint

a. 1 quart

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Acoustical Wall Panel System

a. To contain Post-consumer and Pre-consumer recycled content.
b. All wood materials or wood containing materials permanently installed in the building will be Forest Stewardship Council (FSC) Certified and purchased from an FSC Certified Vendor.
c. All composite wood and laminating adhesives to contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 ACOUSTICAL PANELS, GENERAL

2.3.1. Acoustical Panel Standard

a. Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
b. Mounting Method for Measuring Noise Reduction Coefficient (NRC): ASTM C 423.

2.3.2. Acoustical Panel Colors and Patterns

a. Match appearance characteristics indicated for each product type.

2.4 ACOUSTICAL PANEL PRODUCT

2.4.1. Acoustical Panel Characteristics

a. Provide panels complying with ASTM E 1264 and Basis-Of-Design Product for characteristics described below:

(1) Pattern: V-line Panels
(2) Material: Aspen wood fibers bonded with inorganic hydraulic cement.
(3) Color: White.
(4) NRC (Noise Reduction Coefficient): 0.60.
(5) LR (Light Reflectance): 0.75.
(6) Edge/Joint Detail: Long edges beveled.
(7) Thickness: 1-1/2 inch.
(8) Modular Size: As indicated on drawings.
(9) Mounting: D-20, Direct attached with painted screws 24” o.c.
(10) Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated, on surface and back of panels, with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273..

2.4.2. Basis-of-Design Product

a. Tectum, Inc.
b. Type: V-Line Wall Panels.

2.5 ACCESSORIES, GENERAL

2.5.1. Moulding

a. Plastic

2.5.2. Attachment Devices

a. Painted head drywall screws. Length as required.

2.5.3. Touch-up Paint

a. Color: White

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates and structural framing to which acoustical panels attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

Measure each wall area and establish the layout of acoustical panels to balance border widths at opposite edges of each wall. Avoid using less-than-half-width panels at borders, and conform to the layout shown.

3.3 INSTALLATION

3.3.1. General

a. Install acoustical panels to comply with publications referenced below and per manufacturer's written instructions .

b. Screw head to be flush with panel surface.

c. Securely affix wall panels by means of splines attached vertically to smooth wall or furring strips. Engage vertical kerfs on the edges of the wall panels with splines. Apply adhesive or use Velcro hook and loop fastening where necessary.

d. Cover field cut edges by means of matching trim or mouldings.

3.4 CLEANING

Clean exposed surfaces of acoustical panels, including trim, edge moldings, and suspension system members. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 09910

PAINTING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Surface preparation and the application of paint systems on the following substrates:

(1) Exterior Painting

(a) Steel substrates.
(b) Galvanized-metal substrates.

(2) Interior Painting

(a) Concrete masonry units (CMU).
(b) Steel, including exposed structure where indicated..
(c) Galvanized metal, including exposed structure where indicated, including roof deck.
(d) Wood indicated to receive opaque finish.
(e) Wood indicated to receive stain finish.
(f) Gypsum board.
(g) Concrete (traffic marking).

b. Customer Area Exposed Structure: Where areas above customer areas are not otherwise concealed by ceilings, soffits, or the like; apply dry-fall paint finishes indicated in the "Room Finish and Color Schedule".

1.1.2. Related Sections

a. Division 1 Section "Sustainable Design Requirements."
b. Division 5 Sections for shop priming of metal substrates with primers specified in this Section.
c. Division 8 Section "Flush Wood Doors" for stains and transparent finishes applied to interior wood doors.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated.

1.2.2. Samples

a. For each finish and for each color and texture required.

1.2.3. Product List

a. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.2.4. Sustainable Design Submittals:

a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.2.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Samples	X	R
1.2.3	Product List	X	I
1.2.4	Sustainable Design Submittals	S	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
S Submit quantity specified in Division 1 Section “Sustainable Design Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. MPI Standards:

a. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
b. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Architectural Paints, Coatings and Primers – Interior, On-Site Applied Only:

a. Products to meet the VOC limits of the Green Seal Standard GS-11, Paints, First Edition, May 20, 1993.

2.1.3. Anti-Corrosive and Anti-Rust Paints – Interior, On-Site Applied Only:

a. Shall meet the VOC limits of Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.

2.2 PAINT, GENERAL

2.2.1. Material Compatibility:

a. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
b. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.2.2. Chemical Components of Field-Applied Interior Paints and Coatings

a. Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:

(1) Flat Paints and Coatings: VOC content of not more than 50 g/L.
(2) Nonflat Paints and Coatings: VOC content of not more than 150 g/L.
(3) Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
(4) Restricted Components: Paints and coatings shall not contain any of the following:

(a) Acrolein.
(b) Acrylonitrile.
(c) Antimony.
(d) Benzene.
(e) Butyl benzyl phthalate.
(f) Cadmium.
(g) Di (2-ethylhexyl) phthalate.
(h) Di-n-butyl phthalate.
(i) Di-n-octyl phthalate.
(j) 1,2-dichlorobenzene.
(k) Diethyl phthalate.
(l) Dimethyl phthalate.
(m) Ethylbenzene.
(n) Formaldehyde.
(o) Hexavalent chromium.
(p) Isophorone.
(q) Lead.
(r) Mercury.
(s) Methyl ethyl ketone.
(t) Methyl isobutyl ketone.
(u) Methylene chloride.
(v) Naphthalene.
(w) Toluene (methylbenzene).
(x) 1,1,1-trichloroethane.
(y) Vinyl chloride.

2.2.3. Colors as indicated.

2.3 BLOCK FILLERS

2.3.1. Interior/Exterior Latex Block Filler

a. MPI #4.

2.3.2. Concrete unit masonry block filler under vapor barrier finish.

a. Duron, Block Kote Latex Block Filler,08-126: Applied at a dry film thickness of not less than 10.2 mils.

2.4 EXTERIOR PAINT PRODUCTS

2.4.1. Exterior Metal Primers

a. Quick-Drying Alkyd Metal Primer: MPI #76.
b. Cementitious galvanized-metal primer: MPI #26.

2.4.2. Exterior Quick-Drying Enamels

a. Quick-Drying Enamel (High Gloss): MPI #96 (Gloss Level 7).

2.4.3. Exterior Alkyd Paints

a. Exterior Alkyd Enamel (Gloss): MPI #9 (Gloss Level 6).

2.4.4. Exterior Latex Paints

a. Exterior Latex (FLAT) MPI #10 (Gloss Level 1)

2.5 INTERIOR PAINT PRODUCTS

2.5.1. Interior Metal Primers

a. Quick-Drying Alkyd Primer: MPI #76.
b. Interior Latex Primer/Seler: MPI #50.
c. Rust-Inhibitive Primer (Water Based): MPI #107.
d. Waterborne Galvanized-Metal Primer: MPI #134.

2.5.2. Interior Latex Primers/Sealers

a. Alkali-Resistant Primer: MPI #3.

2.5.3. Interior Latex Vapor Barrier Primer/Sealer.

a. Benjamin Moore; Super Spec Latex Vapor Barrier Primer Sealer 260.

(1) Film Thickness: Wet 3.6 mils, dry 1.0 mil.

2.5.4. Interior Wood Primers

a. Interior Latex-Based Wood Primer: MPI #39.

2.5.5. Interior Latex Paints

a. Institutional Low-Odor/VOC Latex (Flat): MPI #143 (Gloss Level 1).
b. Institutional Low-Odor/VOC Latex (Eggshell): MPI #145 (Gloss Level 3).
c. Institutional Low-Odor/VOC Latex (Semigloss): MPI #147 (Gloss Level 5).

2.5.6. Interior Dry Fog/Fall Coatings

a. Waterborne Dry Fall: MPI #133.

2.5.7. Interior Stains

a. Interior Wood Stain (Semitransparent): MPI #90.

2.5.8. Interior Polyurethane Finishes

a. Interior, Oil-Modified, Clear Urethane (Satin): MPI #57, Gloss Level 4.

2.5.9. Interior Traffic Paints

a. Safety Yellow Cross-Hatch Traffic Paint Striping:

(1) Sherwin-Williams Co. Setfast Fast Dry Latex Traffic Marking Paint, 8.5 mils dft.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
b. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

(1) Wood: 15 percent.
(2) Gypsum Board: 12 percent.

c. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
d. Primer is not required on shop-primed items that are compatible with system subsequent applied coats.
e. Provide barrier coats over incompatible primers or remove and reprime.
f. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

(1) Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

3.2.1. General

a. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

b. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

(1) Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

c. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

d. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer, except as follows:

(1) Exterior surfaces: Minimum of 5 mils.
(2) Interior surfaces: Minimum of 3 mils.

3.2.2. Painting Mechanical and Electrical Work

a. Paint items exposed in customer areas including, but not limited to, the following:

(1) Mechanical Work:

(a) Uninsulated metal piping.
(b) Uninsulated plastic piping.
(c) Pipe hangers and supports.
(d) Tanks that do not have factory-applied final finishes.
(e) Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
(f) Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
(g) Mechanical equipment that is indicated to have a factory-primed finish for field painting.

(2) Electrical Work:

(a) Switchgear.
(b) Panelboards.
(c) Conduit.
(d) Cable trays.
(e) Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.2.3. Protection

a. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Contracting Officer, and leave in an undamaged condition.

3.2.4. Clean-Up

a. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 EXTERIOR PAINTING SCHEDULE

3.3.1. Steel Substrates:

a. Quick-Drying Enamel System: MPI EXT 5.1A.

(1) Prime Coat: Quick-drying alkyd metal primer.
(2) Intermediate Coat: Quick-drying enamel matching topcoat.
(3) Topcoat: Quick-drying enamel (high gloss).

3.3.2. Galvanized-Metal Substrates:

a. Alkyd System: MPI EXT 5.3B.

(1) Prime Coat: Cementitious galvanized-metal primer.
(2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
(3) Topcoat: Exterior alkyd enamel (gloss).

3.4 INTERIOR PAINTING SCHEDULE

3.4.1. CMU Substrates except where vapor barrier finish is indicated:

a. Institutional Low-Odor/VOC Latex System: MPI INT 4.2E.

(1) Prime Coat: Interior/exterior latex block filler.
(2) Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
(3) Topcoat: Institutional low-odor/VOC interior latex (semigloss).

3.4.2. CMU Substrates where vapor barrier finish is indicated:

a. Flat Latex Finish: Two finish coats over a block filler.

(1) Block Filler: Concrete unit masonry block filler under vapor barrier finish.
(2) Finish Coats: Latex Vapor Barrier Primer/Sealer.

3.4.3. Steel Substrates Unless Otherwise Indicated:

a. Institutional Low-Odor/VOC Latex System: MPI INT 5.1S.

(1) Prime Coat: Rust-inhibitive primer (water based).
(2) Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
(3) Topcoat: Institutional low-odor/VOC interior latex (semigloss).

3.4.4. Galvanized-Metal Substrates Unless Otherwise Indicated:

a. Institutional Low-Odor/VOC Latex System: MPI INT 5.3N.

(1) Prime Coat: Waterborne galvanized-metal primer.
(2) Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
(3) Topcoat: Institutional low-odor/VOC interior latex (semigloss).

3.4.5. Galvanized-Metal Substrates Receiving Dry-Fall System:

a. Water-Based Dry-Fall System.

(1) Prime Coat: Waterborne dry fall.
(2) Topcoat: Waterborne dry fall.

3.4.6. Non-Galvanized Metal Substrates Receiving Dry-Fall System:

a. Water-Based Dry-Fall System.

(1) Prime Coat: Quick-drying alkyd metal primer.
(2) Topcoat: Waterborne dry fall.

3.4.7. Dressed Lumber Substrates Indicated To Receive Opaque Finish:

a. Including architectural woodwork.
b. Institutional Low-Odor/VOC Latex System: MPI INT 6.3V.

(1) Prime Coat: Interior latex-based wood primer.
(2) Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
(3) Topcoat: Institutional low-odor/VOC interior latex (semigloss).

3.4.8. Wood Panel Substrates Indicated To Receive Opaque Finish:

a. Including painted plywood, medium-density fiberboard, and hardboard.
b. Institutional Low-Odor/VOC Latex System: MPI INT 6.4T.

(1) Prime Coat: Interior latex-based wood primer.
(2) Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
(3) Topcoat: Institutional low-odor/VOC interior latex (semigloss).

3.4.9. Wood Indicated To Receive Transparent Finish over Stain.

a. Polyurethane Varnish Over Stain System: MPI INT 6.3E.

(1) Stain Coat: Interior wood stain (semitransparent).
(2) Three Finish Coats: Interior, oil-modified, clear urethane (satin).

3.4.10. Gypsum Board Substrates:

a. Institutional Low-Odor/VOC Latex System: MPI INT 9.2M.

(1) Prime Coat: Interior latex primer/sealer.
(2) Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
(3) Topcoat: Institutional low-odor/VOC interior latex:

(a) Ceilings: Flat.
(b) Walls and Soffits: Eggshell.

3.4.11. Concrete Indicated To Receive Traffic Paint Striping:

a. One Coat Safety Yellow Cross-Hatch Traffic Paint Striping.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10101

VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Markerboards.
b. Tackboards.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated.

1.2.2. Samples

a. For each type of visual display surface indicated.

1.2.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Samples	X	R

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver factory-built visual display boards, including factory-applied trim where indicated, completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or

more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS, GENERAL

2.2.1. Porcelain-Enamel Face Sheet

a. Porcelain-enamel-clad, ASTM A 463/A 463M, Type 1, stretcher-leveled aluminized steel, with 0.0236-inch (24 gage) uncoated thickness; with porcelain-enamel coating fused to steel at approximately 1000 deg F.

2.2.2. Particleboard

a. ANSI A208.1, Grade 1-M-1.

2.2.3. Cork Sheet

a. MS MIL-C-15116-C, Type II with surface-burning characteristics indicate.

2.2.4. Polyester Fabric

a. Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. Yd.; with surface-burning characteristics indicated.

2.2.5. Extruded Aluminum

a. ASTM B 221, Alloy 6063.

2.2.6. Laminating Adhesive

a. Manufacturer's standard moisture-resistant thermoplastic type.

2.3 MARKERBOARD ASSEMBLIES

2.3.1. Porcelain-Enamel Markerboards

a. Balanced, high-pressure, factory-laminated markerboard assembly of 3-ply construction consisting of backing sheet, core material, and 0.013 inch thick porcelain-enamel face sheet with low gloaa finish.

(1) Basis-of-Design Product: Claridge Products & Equipment, Inc.; LCS-II Markerboard.

(a) Color: No. 75 Low Gloss White.

(2) Core: 7/16 inch medium density fiberboard (MDF).

2.4 TACK ASSEMBLIES

2.4.1. Polyester-Fabric-Faced Tack Assembly

a. 1/4-inch-thick, polyester-fabric-faced cork sheet factory laminated to 3/8-inch-thick particleboard backing.

(1) Basis-of Design Product: Claridge Products & Equipment, Inc.; Fabricork.

(a) Color: No. 1692, Wheat.

2.5 MARKERBOARD AND TACKBOARD ACCESSORIES

2.5.1. Aluminum Frames and Trim

a. Fabricated from not less than 0.062-inch- thick, extruded aluminum; of size and shape indicated.
b. Factory-Applied Trim:

(1) Basis-of Design Product: Claridge Products & Equipment, Inc.; Series 5.

(a) Perimeter trim: 5/8 inches wide.
(b) Joint slip between markerboard and tack surfaces: 803-F, 1-inch wide.
(c) Mounting: Steel mounting clips at top and angle clips at bottom.
(d) Color: Satin anodized aluminum frame.

2.5.2. Markertray

a. Manufacturer's standard, continuous, extruded aluminum, solid type with ribbed section and end closures. Match color of frame.

2.5.3. Markerboard Dry Erase Kit

a. Basis-of Design Product: Claridge Products & Equipment, Inc.

(1) Four fine point and eight broad-tipped LCS markers.
(2) One 8 oz. Bottle LCS 683 Markerboard. Cleaner.
(3) One Markerboard Eraser.

2.6 FABRICATION

2.6.1. General

a. Fabricate visual display surfaces to sizes indicated on Drawings.

2.6.2. Porcelain-Enamel Visual Display Assemblies

a. Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.

2.6.3. Unitized Markerboard and Tack Surfaces

a. Factory assemble markerboard and tack surfaces together as a single unit.
b. Coordinate unitized assembly with trim and accessories indicated.
c. Assemble and attach trim at manufacturer's factory before shipment. Join parts with a neat, precision fit.
d. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints.

2.6.4. Aluminum Anodic Finish

a. Class II, clear anodic coating complying with AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

3.1.2. Visual Display Boards

a. Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.

3.1.2.2. Field-Applied Aluminum Trim

a. Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c.

3.1.3. Clean and Protect

a. Attach one cleaning label to visual display surface in each room. Cover and protect visual display surfaces after installation and cleaning.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10155

TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Toilet Enclosures: Overhead braced.
b. Urinal Screens: Wall hung.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1.2.2. Shop Drawings

a. Include plans, elevations, sections, details, and attachments to other work.
b. Show locations of cutouts for compartment-mounted toilet accessories.
c. Show locations of reinforcements for compartment-mounted grab bars.

1.2.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Shop Drawings	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Reference Standards

a. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete."
b. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

1.4 PROJECT CONDITIONS

a. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 METAL UNITS

2.2.1. Basis-of-Design Product Manufacturers:

a. Accurate Partitions Corporation.
b. Global Steel Products Corp.
c. Metpar Corp.

2.2.2. Stainless-Steel Units

a. Facing sheets and closures fabricated from ASTM A 666, Type 304, stainless-steel sheet, leveled to stretcher-leveled flatness.
b. Stainless-Steel Facing Sheet Thicknesses: Specified thicknesses as follows:

(1) Toilet Enclosure Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.0375 inch.
(2) Integral-Flange, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than 0.0312 inch .
(3) Panels: Manufacturer's standard thickness, but not less than 0.0312 inch.
(4) Doors: Manufacturer's standard thickness, but not less than 0.0312 inch.

c. Finish: Textured finish on exposed faces. Exposed surfaces are protected from damage by application of strippable, temporary protective covering before shipment.

2.2.3. Door, Panel, and Pilaster Construction

a. Seamless, metal facing sheets are pressure laminated to core material. Units have continuous, interlocking molding strip or lapped and formed edge closures. Exposed surfaces are free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections. Corners are sealed by welding or clips. Exposed welds are ground smooth.

(1) Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.

(2) Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
(3) Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.
(4) Urinal-Screen Construction: Similar to panels, with integral full-height flanges for wall attachment, and maximum 1-1/4 inches thick.

2.2.4. Pilaster Shoes and Sleeves (Caps)

a. Stainless steel, ASTM A 666, Type 302 or 304, not less than 0.0312 inch specified thickness and 3 inches high, finished to match hardware.

2.2.5. Brackets (Fittings)

a. Stirrup Type: Ear or U-brackets, stainless steel.

2.3 ACCESSORIES

2.3.1. Hardware and Accessories

a. Manufacturer's standard design, heavy-duty operating hardware and accessories.
b. Material: Stainless steel.

2.3.2. Overhead Bracing

a. Manufacturer's standard continuous, aluminum head rail with antigrip profile and in manufacturer's standard finish.

2.3.3. Anchorages and Fasteners

a. Manufacturer's standard exposed fasteners of stainless steel finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.4 FABRICATION

2.4.1. Overhead-Braced Units

a. Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

2.4.2. Doors

a. Unless otherwise indicated, provide 24-inch- wide in-swinging doors for standard toilet compartments and 36-inch- wide out-swinging doors with a minimum 32-inch- wide clear opening for compartments indicated to be accessible to people with disabilities.
b. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
c. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility

requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.

d. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.

e. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.

f. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

b. Maximum Clearances:

(1) Pilasters and Panels: ½ inch.

(2) Panels and Walls: 1 inch.

c. Stirrup Brackets: Secure panels to walls and to pilasters with not less than two brackets attached near top and bottom of panel.

(1) Locate wall brackets so holes for wall anchors occur in masonry or tile joints.

(2) Align brackets at pilasters with brackets at walls

3.1.2. Overhead-Braced Units

a. Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

3.1.3. Floor Seal

a. Seal tight at all floor connections with single or multi-component silicone sealant appropriate for application.

3.1.4. Urinal Screens

a. Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10185

FITTING AREA ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Dressing compartment accessories.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1.2.2. Shop Drawings

a. Include plans, elevations, sections, details, and attachments to other work.

1.2.3. Samples for Verification

a. For the following products, in manufacturer's standard sizes unless otherwise indicated:

(1) Each type of material, color, and finish required for compartments, prepared on 6-inch- square samples of same thickness and material indicated for the work.
(2) Each type of hardware and accessory.

1.2.4. Maintenance Data

a. Include in maintenance manuals.

1.2.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Shop Drawings	X	R
1.2.3	Samples for Verification	X	R
1.2.4	Maintenance Data	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken

1.3 QUALITY ASSURANCE

1.3.1. Regulatory Requirements

a. Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for dressing compartments designated as accessible.

1.4 PROJECT CONDITIONS

1.4.1. Field Measurements

a. Verify actual locations of walls, columns, ceilings, and other construction contiguous with dressing compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

2.2.1. Aluminum Castings

a. ASTM B 26/B 26M.

2.2.2. Aluminum Extrusions

a. ASTM B 221.

2.2.3. Mirror Glass

a. ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.2.4. Stainless Steel

a. ASTM A 666, Type 304.

2.3 ACCESSORIES

2.3.1. Garment Hook / Pin Pad
a. Provide garment hooks in each dressing compartment.
b. Material: Clear-anodized aluminum.

c. Provide fabric covered pin pad in each dressing compartment located adjacent to each hook.
d. Latch and Keeper: Manufacturer's standard, latch unit designed for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
e. Door Bumper: Provide rubber-tipped bumper at out-swinging doors.
f. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

2.3.2. Seats

a. Custom fabricated, wall-mounted / floor-mounted benches as detailed on drawings.
b. Operation: Fixed.
c. Finish: Plastic laminate top with hardwood edge.

2.3.3. Grab Bars

a. Material: Stainless steel.
b. Configuration and Length: As indicated on Drawings.

2.3.4. Garment Pole

a. Material: Satin nickel steel, 1-5/16” diameter rod.

b. Mounting: Satin nickel steel closet rod flange set.

2.4 MIRRORS

2.4.1. General

a. Single pane mirror: 24 inches wide by 60 inches high.
b. Triple pane mirror: 60-inch high unit with 24-inch wide wall-mounted fixed center mirror and two 20-inch wide adjustable wing mirrors.

2.5 ACCESSIBLE IDENTIFICATION SIGNS

2.5.1. General

2.5.2. Provide identification signs complying with Regulatory Requirements.

a. Signage types:

(1) Identification sign with international accessibility symbol and word “Accessible”.

b. Panel:

(1) Size: Nominal 8-inch by 8-inch unless otherwise indicated.
(2) Phenolic resin bonded to Melamine; minimum 1/8-inch thick; 1/2-inch radius corners.
(3) Text, Braille, border and characters raised 1/32-inch with background blast etched and painted.

c. Colors of Braille, border and character: White on ADA blue.

(1) Match Braille color with background.

d. Characters (letters) and symbols:

(1) Typography: Helvetica medium.
(2) Character Height (measured using an upper case X): Approximately 3/4 inch.
(3) International accessibility symbol: Approximately 3 inches high.

e. Mounting: Vinyl-tape.
f. Basis-of-Design Product: Barlo Signs/Screen graphics. 800-227-5674 or www.barlosigns.com.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Comply with manufacturer's written installation instructions. Install accessories rigid, straight, level, and plumb. Secure accessories in position with manufacturer's recommended anchoring devices.
b. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
c. Seal entire perimeter of mirrors and seats with clear sealant to prevent concealment of clothing tags.
d. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10261

WALL AND EQUIPMENT GUARDS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes Stock-Manufactured Wall and Equipment Guards

a. Protection posts.
b. Cart rails.
c. Cart bumpers.
d. Case corner guards.
e. Stainless steel bumper rail system.
f. Wood bumper rail.
g. Rigid wall covering:
h. Metal Bumper Rail.

1.1.2. Related Sections

a. Division 1 Section “Sustainable Design Requirements.”
b. Division 5 Section "Metal Fabrications" for custom-fabricated metal bollards (bumper posts) and steel angle corner guards.
c. Division 10 Section "Storage Racks" for floor mounted corner guards specified with storage racks.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated.

1.2.2. Sustainable Design Submittals
a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”
b. Submit manufacturer’s product data or certification information for each of the following materials per Division 1 Section “Sustainable Design Requirements.”
(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.2.3. Submittal List:

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Source Limitations

a. Obtain each type of wall and equipment guard unit through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. Sealants and Adhesives, Interior on-site applied only.

a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 METALS, GENERAL

2.3.1. Metal Surfaces

a. Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.4 MISCELLANEOUS MATERIALS

2.4.1. Galvanizing Repair Paint

a. High-zinc-dust-content paint for re-galvanizing steel, complying with SSPC-Paint 20.

2.5 PROTECTION POSTS

2.5.1. Protection Post with Four-Way Anchors:

a. Post: 3-inch O.D. tube made from 11 gage cold rolled steel with a 5-1/2 inch diameter steel flange at the base containing four (4) anchor holes. The top of the post shall be sealed with a fully welded 3 inch diameter cold rolled steel post cap.
b. Post height 36 inches.
c. Anchor post to floor with expansion anchor bolts. Anchor Package consists of four (4) each SB anchors with 3/8 – 16 x 2-1/2 inch HHCS and washers. Each SB anchor is a 1-1/2 inch long x 5/8 inch diameter single-expansion system that expands to lock the anchor bolt securely in place.
d. 16 gage steel form-fit cover plate for covering post base anchors.
e. Finish: All external fabricated materials are composed of cold rolled chrome plated steel and mirror polished.
f. Basis-of-Design Products: Alvarado Mfg. Co., Inc., 3" Diameter Safety Bollard with Anchor Package. 800-423-4143 or www.alvaradomfg.com.

2.6 CART RAILS

2.6.1. Cart Post and Rail with Four-Way Anchors:

a. Post: 2-1/4-inch O.D. by 16 gage steel tubing welded to 1/4-inch thick by 5-1/2 inch diameter steel base plate, include post cap and railing outlets.
b. Rail: 1-3/4-inch O.D. by 16 gage steel tubing.
c. Anchor each post to floor with expansion anchor bolts. Anchor Package for each post consists of four (4) each SB anchors with 3/8 – 16 x 2-1/2 inch HHCS and washers. Each SB anchor is a 1-1/2 inch long x 5/8 inch diameter single-expansion system that expands to lock the anchor bolt securely in place.
d. Anchor rail to post with a vibration resistant self-locking bolt and railing setscrews.
e. 16 gage steel form-fit cover plate for covering post base anchors.
f. Polished chrome post, post cap, rails, and cover plate.
g. Double rail system:

(1) Post height: 35-1/2 inches.
(2) Post spacing: Equally spaced, 5 feet on center, maximum.
(3) Rail heights from finished floor, approximate:

(a) Bottom rail: 20-5/8 inches.
(b) Top rail: 34-1/2 inches.

h. Basis-of-Design Products: Alvarado Mfg. Co., Inc., Vogue Post - Type V and Rail with Anchor Package. 800-423-4143 or www.alvaradomfg.com.

2.7 CART BUMPER

2.7.1. Spring Action Cart Bumper:

a. 4-inch wide, 11 gage, steel channel with capped ends and, where required, interconnecting bolt-together assembly and angle ends.
b. 4.5-inch wide spring post support, 0.180 inch thick spring steel treated to RC40 to RC50 that forms a half-circle at its base.
c. Anchor cart bumper to floor with double Keystone expansion anchor bolts. Anchor Package consists of one (1) type SA anchors with 5/8 – 11 x 3-1/4 inch HHCS and washer at each support foot. Each SA anchor is a 2-3/4 inch long x 1 inch diameter double-expansion system that expands to lock the anchor bolt securely in place.

d. Where cart bumper is used to protect sliding doors provide bumper of length not less than door width.
e. Polished chrome finish.
f. Basis-of-Design Products: Alvarado Mfg. Co., Inc., Model CB, Cart Bumper System and Model SA floor anchors. 800-423-4143 or www.alvaradomfg.com.

2.8 CASE CORNER GUARDS

2.8.1. Corner Protection Semi-Circular Guard with 3 Anchors:

a. Guard: 7-gage steel, 7-1/2 inch diameter x 12 inches high.
b. Anchor case corner guard to floor with expansion anchor bolts through three anchor tabs on the interior of base. Anchor Package consists of three (3) each SB anchors with 3/8 – 16 x 2-1/2 inch HHCS and washers. Each SB anchor is a 1-1/2 inch long x 5/8 inch diameter single-expansion system that expands to lock the anchor bolt securely in place.
c. Polished chrome finish.

2.8.2. Basis-of-Design Products: Alvarado Mfg. Co., Inc., Corner Case Protector, Model CRI-C with Anchor Package. 800-423-4143 or www.alvaradomfg.com.

2.9 STAINLESS STEEL BUMPER RAIL SYSTEM

2.9.1. Removable Case And Fixture Protection Rails:

a. Rail: 1.75-inch diameter by 16 gage stainless steel tubing capped at each end with force fit, impact resistant plastic end caps designed to fit and adhere tightly into the rail.
b. Stem assembly supporting rail: Fully welded assembly constructed of tapered 2-inch by 4-inch long stainless steel tube welded at 90 degrees to a 0.75-inch diameter by 7.5-inch long stainless steel rod for insertion into floor socket. Grind welds smooth.

(1) Provide two ¼-20 set screws on the underside of each tube to secure stem assembly to rail.
(2) Provide 2 stems with each 2-foot, 4-foot, and 6-foot bumper rail length; 3 stems with each 8-foot and 10-foot bumper rail length; and 4 stems with each 12-foot bumper rail length.

c. Floor socket: 0.765-inch I.D. by 2.8-inch long stainless steel tube with a 1.7-inch diameter flange at top end. Socket tube is sealed at bottom end.
d. Stainless steel: Type 304 with No.4 polished satin finish.
e. Install bumper rail system with top of rail 6.75 inches above floor in accordance with manufacturer's written directions and instructions.

2.9.2. Basis-of-Design Products: Alvarado Mfg. Co., Inc., Stainless Steel Bumper, Model SSB. 800-423-4143 or www.alvaradomfg.com.

2.10 WOOD BUMPER RAIL

2.10.1. Salient Characteristics

a. Quality Standard: Comply with "Architectural Woodwork Standards" Section 3 - Lumber.
b. Grade: Custom.
c. Wood Species: Red oak, plain sawn.

d. Fabrication Method: One-piece lumber, no laminations or veneer construction, with eased edges machined to an 1/8 inch radius on exposed edges.

(1) Smoothness: 120 grit sanding. Cross-sanded finish not acceptable. Tear-outs, knife nicks and hit-or-miss machining not acceptable.

e. Finish: Transparent finish over stain as specified in Division 9 Section "Painting" and color as indicated on drawings.

2.11 RIGID WALL COVERING

2.11.1. Salient Characteristics

a. Basis-of-Design Products: Korogard Wall Protection Systems; Division of RJF International Corporation, Koroseal Korogard 500 Protective Wallcovering. 800-628-0449 or www.korogard.com.
b. Rigid acrylic/polyvinyl chloride sheet, 0.060 inch thick.
c. Color and texture: K-49 Quarry and P-1 Haircell.
d. Adhesive: As recommended by manufacturer.
e. Accessory Moldings and Caulk: Manufacturer's standard moldings and caulk matching wallcovering. Provide top and edge moldings, corners, and divider bars as required for a complete installation.
f. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

(1) Surface-Burning Characteristics: As follows, per ASTM E 84:

(a) Flame-Spread Index: 25 or less.
(b) Smoke-Developed Index: 450 or less.

2.12 METAL BUMPER RAIL

2.12.1. Stainless Steel Wall Guard system for wall protection

a. Manufactured entirely from Type 304 stainless steel with #4 satin finish.
b. 4-inch high by ¼-inch thick continuous bumper rail system extending 3-5/16 inches from wall, with matching profile radius returns to wall at ends of each railing section.
c. Manufactured as pre-assembled units per field measurements.
d. Mount bumper rail to wall at height indicated using manufacturer's standard wall guard brackets spaced as recommended by manufacturer. Secure brackets to wall with manufacturer furnished ¼ - 20 x 3-inch slotted flat head bolts and toggle wings.

2.12.1.2. Basis-of-Design Products: IPC Door and Wall Protection Systems, InPro Corporation, Model 50SS Stainless Steel Wall Guard with anchor package. (800) 222-5556 or www.inprocorp.com.

2.13 FINISHES, GENERAL

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Finish metal fabrications after assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Complete finishing operations, including painting, before installing wall and equipment guard system components.
b. Install wall and equipment guard units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
c. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.

3.2 ADJUSTING AND CLEANING

3.2.1. Galvanized Surfaces

a. Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10431

SIGNS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Construction sign.
b. Traffic and parking signs.
c. Exterior illuminated building sign.
d. Commissary store hours sign.
e. Automatic entrance door signage.
f. Restroom door identification signage.
g. Interior door identification signage.
h. Receiving door identification signage.
i. Exterior door identification signage.
j. Customer service signage.
k. Traffic door identification signage.
l. Storage height restriction sign.
m. Commissary Surcharge plaque.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

1.2.1. Wind Loading

a. Design, fabricate, and install exterior freestanding-type signs capable of withstanding wind pressures acting inward and outward normal to the plane of the sign.
b. Refer to Division 1 Section "Description of Work" for wind loading design criteria.
c. Determine design loads using the appropriate coefficients for the freestanding-type sign configurations indicated.

1.2.2. Seismic Performance

a. Seismic Loads:

(1) Provide signs capable of resisting the effects of earthquake motions.
(2) Refer to Division 1 Section "Description of Work" for seismic-load design criteria.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

1.3.2. Shop Drawings

a. Showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.

b. Provide message list for each sign required, including large-scale details of wording and lettering layout.
c. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
d. Templates: Furnish full-size spacing templates for individually mounted dimensional letters and numbers.

1.3.3. Sign Message Verification

a. Prior to sign fabrication, submit a list indicating the text required for each sign, including store hours where applicable, for verification by the Contracting Officer.

1.3.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Sign Message Verification	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

1.4.1. Sign Fabricator Qualifications

a. Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

1.4.2. UL and NEMA Compliance

a. Provide lighting fixtures and electrical components for illuminated signs that are labeled and listed by UL and comply with applicable NEMA standards.

1.4.3. Regulatory Requirements

a. Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.4.4. Single-Source Responsibility

a. For each separate sign type required, obtain signs from one source of a single manufacturer.

1.5 PROJECT CONDITIONS

Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

2.2.1. Plastic Laminate

a. Provide high-pressure plastic laminate engraving stock with face and core plies in contrasting colors, in finishes and color combinations indicated or, if not indicated, as selected from the manufacturer's standards.

2.2.2. Aluminum Sheet

a. Provide aluminum sheet of alloy and temper recommended by the sign manufacturer for the type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 209 for 5005- H32.

2.2.3. Aluminum Extrusions

a. Provide aluminum extrusions of alloy and temper recommended by the sign manufacturer for the type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 221 for 6063-T5.

2.2.4. Vinyl Film

a. Provide opaque vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior as well as interior applications.

2.2.5. Fasteners

a. Use concealed fasteners, unless otherwise indicated, fabricated from metals that are not corrosive to the sign material and mounting surface.
b. Exposed fasteners are permitted for construction sign and traffic signs.

2.2.6. Anchors and Inserts

a. Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.2.7. Colored Coatings for Acrylic Plastic Sheet

a. Use colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.

2.2.8. Brackets

a. Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit sign panel construction and mounting conditions indicated. Factory-paint brackets in a color matching the background color of the sign panel.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
b. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

3.1.2. Construction Sign

a. Immediately upon issuance of Notice to Proceed with construction, furnish, install, and maintain a Project Construction Sign capable of withstanding normal winds encountered in Project Area.
b. Locate sign where indicated, if not indicated locate as directed by Contracting Officer.
c. Sign shall remain the property of the Contractor, and upon completion of the Work shall be removed from Project site.

3.1.3. Restroom Door Identification Signage

a. Install where indicated. Where not indicated, install on wall adjacent to latch side of door. Where there is no wall space to latch side of door, place signs on nearest adjacent wall or center on door. Locate signage so that a person may approach within 3 inches of signage without standing within swing of door.

(1) Install tactile signage and signs with international accessibility symbol 60 inches above finished floor to centerline of sign. Install other restroom signs 48 inches above finished floor to centerline of sign.

b. Employee notice sign: Install where indicated. Where not indicated, install on center of restroom side of door 60 inches above finished floor to centerline of sign.

3.1.4. Interior and Exterior Door Identification Signage

a. Install where indicated. Where not indicated, install on wall adjacent to latch side of door. Where there is no wall space to latch side of door, including double leaf doors, place signs on nearest adjacent wall.
b. Locate signage so that a person may approach within 3 inches of signage without standing within swing of door.
c. Install interior and exterior door identification signage 60 inches above finished floor to centerline of sign.
d. Install receiving door identification signage centered above overhead door, at recessed docks, and adjacent to overhead door at grade level receiving doors.

3.1.5. Customer Service Signage

a. Unless otherwise indicated mount customer service sign at height above finished floor to centerline of pushbutton as follows:

(1) 48 inches maximum for wheelchair unobstructed forward reach.
(2) 54 inches maximum for wheelchair unobstructed side reach.
(3) 46 inches maximum for wheelchair obstructed side reach.

b. Coordinate location of sign with pushbutton specified in Division 16.

3.1.6. Wall-Mounted Panel Signs

a. Attach panel signs to wall surfaces using the methods indicated below:

(1) Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
(2) Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.
(3) Shim Plate Mounting: Provide 1/8-inch- thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.

3.2 CLEANING AND PROTECTION

After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until final acceptance.

3.3 SIGN SCHEDULE

3.3.1. Construction Sign (EXTERIOR)

a. Sign Panel Size: 64-inch wide by 48-inch tall
b. Facing: Single sided.
c. Sign Panel Fabrication: ¾-inch thick APA Medium Density Overlay (MDO), Veneer Grade A-A, Group 1 Exterior sign panel with preservative treated wood trim around sign panel. Comply with requirements in Division 6 Section “Miscellaneous Carpentry”.

d. Digital color print files shall be used for artwork. Artwork images shall be digitally printed on 3.4 mil minimum thickness gloss white vinyl and then applied over MDO panel. Artwork shall be laminated using 3.0 mil minimum thickness gloss shield. Edges and back of MDO shall be sealed.
e. Sign Supports: Preservative treated wood sign posts with cripple studs, embedded in concrete foundations, as indicated on Drawings,
f. Sign Finish: Exposed wood surfaces shall be painted with exterior-grade alkyd gloss enamel over exterior primer. Color as indicated on Drawings.
g. Sign Panel Content: Basic layout and artwork content to be included on sign panel shall be as indicated in artwork furnished by DeCA. Contractor shall add the following:

(1) Construction Cost
(2) Completion Date

h. Refer to artwork images attached at end of this Section.
i. Refer to construction sign details indicated on Drawings.
j. Provide two exterior construction signs at locations indicated on Drawings.

3.3.2. Construction Sign (INTERIOR)

a. Sign Panel Size: 32-inch wide by 24-inch tall
b. Facing: Single sided.
c. Sign Panel Fabrication: 1/2-inch thick APA Medium Density Overlay (MDO), Veneer Grade A-A, Group 1 Exterior sign panel with painted 1x2 wood trim around sign panel. Comply with requirements in Division 6 Section “Miscellaneous Carpentry”.
d. Digital color print files shall be used for artwork. Artwork images shall be digitally printed on 3.4 mil minimum thickness gloss white vinyl and then applied over MDO panel. Artwork shall be laminated using 3.0 mil minimum thickness gloss shield. Edges and back of MDO shall be sealed.
e. Sign Mounting: Easel (capable of supporting sign weight and size). Also provide hangers on backside of sign to accommodate mounting on wall.
f. Sign Finish: Exposed wood surfaces shall be painted with exterior-grade alkyd gloss enamel over exterior primer. Color as indicated on Drawings.
g. Sign Panel Content: Basic layout and artwork content to be included on sign panel shall be as indicated in artwork furnished by DeCA. Contractor shall add the following:

(1) Construction Cost
(2) Completion Date

h. Refer to artwork images attached at end of this Section.
i. Refer to construction sign details indicated on drawings.
j. Provide two interior construction signs with easels (to be located at existing Navy Exchange and Commissary facilities).

3.3.3. Traffic and parking signs

a. Sign Size: As indicated.
b. Lettering: Text, shape, and colors as indicated and in accordance with U.S. Department of Transportation, Manual on Uniform Traffic Control Devices.

(1) Parking Sign for the Disabled: Designation R7-8.

c. Sign Material and finish: As indicated. Paint back of sign also.
d. Sign Post: Steel; 12 gage flanged channel. Baked enamel finish.

3.3.4. DeCA Exterior Illuminated Building Sign

a. Custom fabricated as detailed on drawings.
b. Cabinet:

(1) Designed to accommodate 3/16 inch panel thickness.
(2) Welded aluminum framework by AWS certified welders.
(3) Finish: Painted 3 coats AXCO polyurethane. Retainer color to match cabinet.

c. Faces:

(1) G.E. Lexan, 0.15 inch thick, clear and white, with first and second surface 3M Brand Translucent film applications and custom logo of 3M Brand Translucent Scotch print Digital Graphic in high resolution.
(2) Colors shall match codes and descriptions for DeCA Commissary as indicated.

d. Electrical:

(1) Sign shall be powered by one dedicated 120V at 20 Amps circuit.
(2) Class 2 Compliant. Input Voltage: 24 Volt DC, 6300k White LED Illumination with life expectancy 60,000 hours or more. Operating Temperature: Minus 40 degrees to 60 degrees Celsius.
(3) US-LED, Tandem Series Sign Cabinet Model No. G1-14-24-4W.
(4) Underwriter's Laboratories listed.
(5) Provide photocell control or connect to existing exterior lighting control system.

e. Returns: Aluminum, with drain holes.
f. Back: 0.063 inch thick aluminum.
g. Basis-of-Design Product: I-5 Design & Manufacture (800) 459-2967 or www.i5design.com

3.3.5. Commissary Store Hours Sign

a. Extruded aluminum box frame
b. 0.125 inch thick aluminum faces.
c. Removable aluminum face at top of sign for service and lamp access.
d. Fixed Signage: Individual jigged out letters with pushed through copy. Copy shall be 3/8 inch thick clear Plexiglas facing with white diffuser vinyl 2nd surface. Copy shall be back-lit.
e. Removable panel on backside for access to changeable signage.
f. Changeable Signage: Removable jigged out pushed through panels. Panels shall consist of 1/4 inch thick clear Plexiglas facing with back surface and edges painted (color as indicated) except copy, with 1/8 inch thick white Plexiglas back-up. Copy shall be back-lit.
g. Message:

(1) Single face.
(2) Size of uppercase letters: As indicated.

h. Letter Style: Helvetica Medium.
i. Exterior Finish: As indicated on drawings.
j. Electrical:
(1) Sign shall be powered by one dedicated 120V at 20 Amps circuit.
(2) Class 2 Compliant. Input Voltage: 24 Volt DC, 6300k White LED Illumination with life expectancy 60,000 hours or more. Operating Temperature: Minus 40 degrees to 60 degrees Celsius.
(3) US-LED, Tandem Series Sign Cabinet Model No. G1-14-24-4W.
(4) Underwriter's Laboratories listed

(5) Provide photocell control with override connection from exterior lighting control panel.
k. Internal post supports and bracing in accordance with system performance requirements.
l. Aluminum skirt to conceal post supports.
m. Basis-of-Design Product: I-5 Design & Manufacture (800) 459-2967 or www.i5design.com.

3.3.6. NEX Exterior Illuminated Building Sign (Main Entry)

a. Custom fabricated as detailed on drawings.
b. Backer:

(1) 3” deep with 1/8"aluminum face, back and returns.
(2) Welded aluminum framework by AWS certified welders.
(3) Finish: Painted to match PMS 281 Blue with ¼” painted lines to match 50% PMS 281 Blue.

c. NEX Letters:

(1) 5” deep with .040 aluminum returns painted PMS 281 Blue.
(2) Faces: 7328 3/16” white plex.
(3) Trim: White.

d. Anchor Logo:

(1) 5” deep with .040 aluminum returns.
(2) Faces: 2447 3/16” milk white plex with 3630-015 Yellow applied to 1st surface.
(3) Trim: PMS 109 Yellow.

e. Welcome Letters:

(1) Cast Aluminum – clear anodized, Helvetica, pin mounted to illuminated channel.

f. Illuminated Channel:

(1) Fabricated aluminum with satin silver aluminum laminate #909, clear lens in back of where welcome letters are pin mounted for LED up lighting (light wash in back of letters).

g. Electrical:

(1) Sign shall be powered by one dedicated 120V at 20 Amps circuit.
(2) Class 2 Compliant. Input Voltage: 24 Volt DC, 6300k White LED Illumination with life expectancy 60,000 hours or more. Operating Temperature: Minus 40 degrees to 60 degrees Celsius.
(3) US-LED, Tandem Series Sign Cabinet Model No. G1-14-24-4W.
(4) Underwriter’s Laboratories listed.
(5) Provide photocell control or connect to exterior lighting control system.
h. Basis-of-Design Product: Barlo Signs (800) 227-5674 or www.barlosigns.com

3.3.7. NEX Exterior Illuminated Building Sign (Package Store)

a. Custom fabricated as detailed on drawings.
b. Backer:

(1) 3” deep with 1/8"aluminum face, back and returns.

(2) Welded aluminum framework by AWS certified welders.
(3) Finish: Painted to match PMS 281 Blue with ¼” painted lines to match 50% PMS 281 Blue.

c. NEX Letters:

(1) 5” deep with .040 aluminum returns painted PMS 281 Blue.
(2) Faces: 7328 3/16” white plex.
(3) Trim: White.

d. Anchor Logo:

(1) 5” deep with .040 aluminum returns.
(2) Faces: 2447 3/16” milk white plex with 3630-015 Yellow applied to 1st surface.
(3) Trim: PMS 109 Yellow.

e. Electrical:

(1) Sign shall be powered by one dedicated 120V at 20 Amps circuit.
(2) Class 2 Compliant. Input Voltage: 24 Volt DC, 6300k White LED Illumination with life expectancy 60,000 hours or more. Operating Temperature: Minus 40 degrees to 60 degrees Celsius.
(3) US-LED, Tandem Series Sign Cabinet Model No. G1-14-24-4W.
(4) Underwriter’s Laboratories listed.
(5) Provide photocell control or connect to exterior lighting control system.

f. Basis-of-Design Product: Barlo Signs (800) 227-5674 or www.barlosigns.com

3.3.8. NEX Exterior Illuminated Building Sign (Food Court)

a. Custom fabricated as detailed on drawings.
b. Cabinet:

(1) 6” deep with 1/8"aluminum face, back and returns.
(2) Welded aluminum framework by AWS certified welders.
(3) Finish: Painted to match PMS 281 Blue with ¼” painted lines to match 50% PMS 281 Blue.

c. NEX Letters, Anchor Logo and Tagline Letters:

(1) NEX Letters: Incised and push thru copy, 3/4” clear plex with 3630 white vinyl, 1st surface, 2nd surface diffuser.
(2) Anchor Logo: Incised and push thru copy, 3/4” clear plex with 3630-015 yellow vinyl, 1st surface.
(3) Tagline Letters: Incised and push thru copy, 1/2” clear plex with 3630 white vinyl, 1st surface, 2nd surface diffuser

d. Electrical:

(1) Sign shall be powered by one dedicated 120V at 20 Amps circuit.
(2) Class 2 Compliant. Input Voltage: 24 Volt DC, 6300k White LED Illumination with life expectancy 60,000 hours or more. Operating Temperature: Minus 40 degrees to 60 degrees Celsius.
(3) US-LED, Tandem Series Sign Cabinet Model No. G1-14-24-4W.
(4) Underwriter’s Laboratories listed.
(5) Provide photocell control or connect to exterior lighting control system.

e. Basis-of-Design Product: Barlo Signs (800) 227-5674 or www.barlosigns.com

3.3.9. Automatic Entrance Door Signs

a. No Smoking sign: Minimum 6-inch by 3-inch vinyl stick-on 2-sided decal transfer indicating international no smoking symbol and text “NO SMOKING.” Red circle, black cigarette, with red diagonal.
b. Exit, Emergency Exit Only, Entrance, Exit Only, and Carry-Out Return Only signs:

(1) Applied Copy: Die-cut characters from vinyl film with pressure-sensitive adhesive backing, pre-spaced and pre-aligned.
(2) Lower case helvetica medium.
(3) Color: As indicated.

c. Sliding Door Emergency Breakaway Sign: BHMA A156.10; red background with 1-inch- high contrasting letters with the words "IN EMERGENCY PUSH TO OPEN."
d. Sliding Door Caution Sign: BHMA A156.10; minimum 1/2-inch- high, lettering with the words "AUTOMATIC DOOR."

3.3.10. Restroom Door Identification Signs

a. Provide restroom identification signs complying with UFAS and ADAAG.
b. Signage types:

(1) Men's restroom verbal and silhouette symbol identification sign with international accessibility symbol. Text in uppercase.
(2) Women's restroom verbal and silhouette symbol identification sign with international accessibility symbol. Text in uppercase.
(3) Family’s restroom verbal and silhouette symbol identification sign with international accessibility symbol. Text in uppercase.
(4) "Employees Must Wash Hands Before Returning to Work" sign.

(a) Title text case: Lower case with first letter of each word in uppercase.

c. Size: Nominal 8 inch by 8 inch.
d. Panel:

(1) Size: Nominal 8-inch by 8-inch unless otherwise indicated.
(2) Phenolic resin bonded to Melamine; minimum 1/8-inch thick; 1/2-inch radius corners.
(3) Text, Braille, border and characters raised 1/32-inch with background blast etched and painted.

e. Colors of Text, Braille, border and character: As indicated.

(1) Match Braille color with background.

f. Characters (letters and numbers) and symbols:

(1) Typography: Helvetica medium.
(2) Character Height (measured using an upper case X): Approximately 3/4 inch.
(3) Male and female silhouette symbols (pictograms): Approximately 4 inches high with equivalent verbal description placed directly below pictogram.
(4) International accessibility symbol: Approximately 3 inches high.

g. Mounting: Vinyl-tape.

h. Basis-of-Design Product: Barlo Signs/Screen graphics. 800-227-5674 or www.barlosigns.com.

3.3.11. Interior Door Identification Signage

a. Provide identification signs complying with UFAS and ADAAG.
b. Panel:

(1) Size: Nominal 8-inch by 8-inch unless otherwise indicated.
(2) Phenolic resin bonded to Melamine; minimum 1/8-inch thick; 1/2-inch radius corners.
(3) Text, Braille, border and characters raised 1/32-inch with background blast etched and painted.

c. Colors of Text, Braille, border and character: As indicated.

(1) Match Braille color with background.

d. Text (letters and numbers):

(1) Typography: Helvetica medium.
(2) Text Height (measured using an upper case X):

(a) Signs with single room identification: Uppercase, approximately 3/4 inch.
(b) Signs with direction: Lowercase with an uppercase first letter of each word, approximately 5/8 inch.

e. Mounting: Vinyl-tape.
f. Basis-of-Design Product: Barlo Signs/Screen graphics. 800-227-5674 or www.barlosigns.com.

3.3.12. Receiving Door Identification Sign

a. Panel:

(1) Size: Nominal 8-inch by 8-inch unless otherwise indicated.
(2) Fiberglas; minimum 3/16-inch thick; 1/2-inch radius corners.
(3) Text and border raised 1/32-inch with background blast etched and painted.

b. Text and border colors: As indicated.
c. Text (numbers):

(1) Typography: Helvetica medium.
(2) Character Height (measured using an upper case X): Approximately 6 inches.

d. Mounting: Shim plate mounting.
e. Basis-of-Design Product: Barlo Signs/Screen graphics. 800-227-5674 or www.barlosigns.com.

3.3.13. Exterior Door Identification Signage

a. Provide identification signs complying with UFAS and ADAAG.
b. Panel:

(1) Size: Nominal 8-inch by 8-inch unless otherwise indicated.
(2) Fiberglas; minimum 3/16-inch thick; 1/2-inch radius corners.
(3) Text, Braille, border and characters raised 1/32-inch with background blast etched and painted.

c. Colors of Text, Braille, border and character: As indicated.
d. Text (letters and numbers):

(1) Typography: Helvetica medium.
(2) Text Height (measured using an upper case X):

(a) Signs with single room identification: Uppercase, approximately 3/4 inch.
(b) Signs with direction: Lowercase with an uppercase first letter of each word, approximately 5/8 inch.

e. Mounting: Shim plate mounting
f. Basis-of-Design Product: Barlo Signs/Screen graphics. 800-227-5674 or www.barlosigns.com.

3.3.14. Customer Service Sign

a. Provide signs complying with regulatory requirements for accessibility.
b. Panel:

(1) Size: Nominal 8-inch by 8-inch unless otherwise indicated.
(2) Phenolic resin bonded to Melamine; minimum 1/8-inch thick; 1/2-inch radius corners.
(3) Text, Braille, border and characters raised 1/32-inch with background blast etched and painted.
(4) Provide sign with hole for mounting with pushbutton device.

c. Colors of Text, Braille, border and character: As indicated.

(1) Match Braille color with background.

d. Characters (lettering):

(1) Text: Ring For Patron Service.
(2) Typography:

(a) Helvetica medium.
(b) Lowercase with an uppercase first letter of each word.

(3) Character Height (measured using an upper case X): Approximately 3/4 inch.

e. Mounting: Vinyl-tape.
f. Basis-of-Design Product: Barlo Signs/Screen graphics. 800-227-5674 or www.barlosigns.com.

3.3.15. Traffic Door Identification Signage

a. Unless other wise indicated provide pressure sensitive lettering in accordance with the following:

(1) Applied Copy: Die-cut characters from vinyl film with pressure-sensitive adhesive backing, pre-spaced and pre-aligned.
(2) Letter Color: As indicated.
(3) Letter Style: Helvetica Medium.

3.3.16. Storage Height Restriction Sign

a. Panel:

(1) Size: Nominal 8-inch by 48-inch.

(2) Phenolic resin bonded to Melamine; minimum 1/8-inch thick; 1/2-inch radius corners.
(3) Text and border raised 1/32-inch with background blast etched and painted.

b. Colors:

(1) Sign background: White.
(2) Text and border: Red.

c. Characters (lettering):

(1) Text: DO NOT STACK MERCHANDISE ABOVE THIS LINE.
(2) Typography:

(a) Helvetica medium.
(b) Uppercase.

(3) Character Height (measured using an upper case X): Approximately 2 inches.

d. Mounting: Silicone-adhesive mounting.
e. Basis-of-Design Product: Barlo Signs/Screen graphics. 800-227-5674 or www.barlosigns.com.

3.3.17. Surcharge Plaque

The Government will furnish a cast bronze surcharge plaque for installation by the Contractor. Permanently mount the plaque in a prominent location at the front entrance. The Contracting Officer will determine the exact location.

END OF SECTION

CONSTRUCTION ISSUE

EXAMPLE OF DeCA PROVIDED ART WORK

Joint Commissary and Navy Exchange
NSA Annapolis, Maryland
September 2011

SIGNS

10431 - 14

CONSTRUCTION ISSUE

SECTION 10445

INTERIOR DÉCOR SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Aisle directory signs
b. Banners
c. Department décor elements
d. Department blade signs
e. Frozen food identifier
f. Frozen food valance
g. Frozen dimensional letters
h. Frozen vinyl wall covering
i. Historic mural vinyl wall covering
j. Mission graphic vinyl wall covering
k. Produce décor grid
l. Phrase Letters
m. Soffit trim
n. Food Court Flag and Soldier graphic vinyl wall covering
o. Food Court valance/letters
p. Food Court Commissary logo
q. Food Court NEX logo

1.1.2. Related Sections
a. Division 1 Section "Sustainable Design Requirements."
b. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installation.
c. Division 6 Section "Interior Architectural Woodwork" for interior carpentry exposed to view that is not specified in this Section.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of interior decor specialty specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

1.2.2. Shop Drawings

a. Show fabrication and erection of interior decor specialties. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.
b. Provide message list for each sign required, including large-scale details of wording and lettering layout.

c. Show details of anchors supporting banners.

1.2.3. Samples

a. Provide digitally printed color sample, 2-inch by 2-inch minimum size for color matching with paint chip control samples. Submit paint chip color control samples with digitally printed color sample submittal.
b. Provide 2-foot by 2-foot banner sample.
c. Provide sample of anchors supporting banners.

1.2.4. Sustainable Design Submittals:
a. Submit manufacturer's product data indicating that all composite wood materials and laminating adhesives contain no added urea-formaldehyde resins.

b. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.

1.2.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Shop Drawings	X	R
1.2.3	Samples	X	R
1.2.4	Sustainable Design Submittals	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

1.3.1. Interior Decor Specialty Fabricator Qualifications

a. Firm experienced in producing interior decor specialties similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce interior decor specialty units required without causing delay in the Work.

1.3.2. Fire-Test-Response Characteristics

a. Provide materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1.4 PROJECT CONDITIONS

Field Measurements: Obtain field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

2.1.2. MDF

a. All composite wood and laminating adhesives to contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies to contain no added urea-formaldehyde resins.

2.1.3. Sealants and Adhesives, Interior on-site applied only.

a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 MANUFACTURERS

a. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

b. Basis of Design Interior Décor Specialties Fabricator: I-5 Design & Manufacture (800) 459-2967 or e-mail i5design.com

2.3 MATERIALS

2.3.1. Foamed Core Board Type 1

a. Extruded polystyrene foam board bonded on both sides with laminated facing materials. Lightweight structural panels of rigid polystyrene foam core faced on both sides with smooth, moisture resistant man-made wood fiber veneers. Foam and veneers are permanently bonded together in a sandwich construction. Face laminates specially developed to provide excellent surface for painting, silk screening, laminating, and photo mounting.

b. Fire-Test-Response Characteristics:

(1) Flame-spread index of not greater than 25 when tested according to ASTM E 84.
(2) Smoke-developed index of not greater than 450 when tested according to ASTM E 84.
(3) Rapid heat release rate of not greater than 150 kilowatts when tested according to UL 1975.

c. Basis-Of-Design Product: “Gatorfoam Graphic Arts Board,” International Paper Company, (800) 438-1701, www.gatorfoam.com.

2.3.2. Foamed Core Board Type 2

a. Rigid, foamed, closed-cell poly vinyl chloride (PVC) board bonded on both sides with laminated facing materials.
b. Fire-Test-Response Characteristics:

(1) Flame-spread index of not greater than 25 when tested according to ASTM E 84.
(2) Smoke-developed index of not greater than 450 when tested according to ASTM E 84.
(3) Rapid heat release rate of not greater than 150 kilowatts when tested according to UL 1975.

c. Basis-Of-Design Product: "Sintra," Alusuisse Composites, Inc., (800) 382-6445, www.alusuisse-comp.com.

2.3.3. Aluminum

a. Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
b. Extruded Bar and Tube: ASTM B 221, alloy 6063-T5/T52.
c. Extruded Structural Pipe and Tube: ASTM B 429, alloy 6063-T6.
d. Drawn Seamless Tube: ASTM B 210, alloy 6063-T832.
e. Aluminum Sheet or Plate: Alloy and temper recommended by the aluminum producer and finisher for the type of use and finish indicated, and with at least the strength and durability properties specified in ASTM B 209 for 5005- H32 alloy.

2.3.4. Medium-Density Fiberboard (MDF – Medite 3D)

a. ANSI A208.2, Grade MD
b. Basis-Of-Design Product: "Medite 3D" Sierra Pine Composite Solutions, (800) 676-3339, www.sierrapine.com

2.3.5. L.E.D. Lighting

a. L70 Rating of 60,000 hours or more.
b. Class 2 Compliant. Input Voltage: 12 Volt DC. Operating Temperature: minus 40 degrees to plus 60 degrees Celsius.
c. Basis-Of-Design Product: US-LED, MegaWhite Series Model No. QZR-6-12W, (866) 972-9191, www.usled.com

2.3.6. Styrene

a. Polystyrene Resin
b. Basis-Of-Design Product: "HIPS SP-2010 Styrene" Spartech, (888) 721-4242, www.spartech.com

2.3.7. Adhesive Tape

a. 3M Industrial Adhesives and Tapes Division, 3M VHB Tape.

b. Comply with manufacture's recommendations for tape type and application appropriate for conditions.

2.3.8. Vinyl Film Lettering

a. Except as otherwise indicated provide opaque vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior as well as interior applications.

2.3.9. Vinyl Wall Covering

a. Provide mildew-resistant products complying with the following:

(1) FS CCC-W-408 D and CFFA-W-101-D for Type II, Medium-Duty products.
(2) ASTM F 793 for strippable wall coverings that qualify as Category V, Type II Commercial Serviceability products.

b. Total Weight Excluding Coatings: 13 oz./sq. yd. minimum.
c. Width: 54 inches.
d. Backing Fiber Content: Polyester cellulose.
e. Backing Material: Osnaburg, drill, or nonwoven.
f. Stain-Resistant Coating: DuPont; Tedlar/Teflon.
g. Colors, Textures, and Patterns: Custom direct printed with resolution 6 color process and UV stable inks.
h. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application, as recommended in writing by wall-covering manufacturer.
i. Primer/Sealer: Mildew-resistant primer/sealer recommended in writing by wall-covering manufacturer for intended substrate.

2.4 FINISHES

2.4.1. Colors and Surface Textures

a. For exposed interior decor specialty material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated.

2.4.2. Metal Finishes

a. Comply with NAAMM “Metal Finishes Manual” for finish designations and applications recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Locate interior decor components where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
b. Install interior decor components level, plumb, and at the height indicated, with surfaces free from distortion or other defects in appearance.

3.1.2. Wall-Mounted Foamed Core Board Interior Decor Components

a. Attach foamed core board interior decor components to wall surfaces using the methods indicated below:

(1) Silicone-Adhesive & 3M VHB Double-back Tape Mounting: Use liquid silicone adhesive recommended by the interior decor component manufacturer to attach interior decor components to wall surfaces. Use

3M VHB double-sided vinyl tape to hold the interior decor components in place until the adhesive has fully cured.

3.1.3. Wall-Mounted Metal-Framed Interior Decor Components

a. Attach metal-framed interior decor components to wall surfaces using concealed fasteners, unless otherwise indicated, fabricated from metals that are not corrosive to the interior decor specialty material and mounting surface. Fasteners size and attachment method shall be determined by manufacturer.

3.2 CLEANING AND PROTECTION

After installation, clean soiled interior decor specialty surfaces according to the manufacturer's instructions. Protect units from damage until final acceptance.

3.3 INTERIOR DECOR SPECIALTY SCHEDULE

3.3.1. Aisle Directory Signs

a. Custom fabricated of Foamed Core Board Type 2 and MDF (Medite 3D) as detailed on drawings.
b. Mounting: Suspended from structure as indicated.
c. Product description panels: As indicated

3.3.2. Banners

a. Custom fabricated of styrene, MDF (medite 3D) and aluminum as detailed on drawings. Electronic artwork provided by Government.
b. Mounting: Suspended from structure as indicated

3.3.3. Department Décor Elements

a. Custom fabricated as detailed on drawings.
b. Department letters:

(1) MDF (Medite 3D) as indicated
(2) Finish: Aluminum face with painted sides as indicated.
(3) Mounting: Fabricated bracket to provide correct alignment and mounting as indicated.

c. Valance:

(1) Laminate faced or painted aluminum sheet on supporting aluminum tube framework as indicated.
(2) Mounting: Two part adjustable brackets as indicated.

d. LED Lighting

(1) Multiple linear strokes of LED lighting as indicated.
(2) Mounting: Recessed behind valance face.
e. Painted Wall Graphic:

(1) Department icons painted onto department feature walls using plotted 3M Gerbermask film. Artwork for graphics provided by Government.

f. Tagline Letters:

(1) MDF (Medite 3D) as indicated
(2) Finish: Aluminum face with painted sides as indicated.
(3) Mounting: 3M VHB double back tape and silicone adhesive

g. Logo panels:

(1) Direct printed on black Sintra as indicated.
(2) 3 separate pieces assembled.
(3) Mounting: Two part French cleat.
(4) Artwork provided by Government.

3.3.4. Department Blade Signs

a. Custom fabricated of MDF (Medite 3D) and aluminum with vinyl lettering as indicated and detailed on drawings.
b. Mounting: Soffit mounted as indicated

3.3.5. Frozen Food Identifiers

a. Custom fabricated of MDF (Medite 3D) and aluminum with vinyl lettering as indicated and detailed on drawings.
b. Mounting: Valance or soffit mounted as indicated

3.3.6. Frozen Food Valance

a. Custom fabricated of painted formed aluminum as indicated and detailed on drawings.
b. Mounting: Custom fabricated brackets attached to top of display case.

3.3.7. Frozen Dimensional Letters

a. Custom fabricated as detailed on drawings.

(1) MDF (Medite 3D) as indicated
(2) Finish: Aluminum face with painted sides as indicated.
(3) Mounting: 3M VHB double back tape and silicone adhesive

3.3.8. Frozen Vinyl Wall Covering

a. Custom direct printed vinyl wall covering with high resolution 6 color process and UV stable inks. Electronic artwork furnished by government.

3.3.9. Historical Mural Vinyl Wall Covering

a. Custom direct printed vinyl wall covering with high resolution black and white with UV stable inks.
b. Electronic artwork furnished by government.

3.3.10. Mission Graphic Vinyl Wall Covering

a. Custom direct printed vinyl wall covering with high resolution 6 color process and UV stable inks. Electronic artwork furnished by government.

3.3.11. Produce Décor Grid

a. Custom fabricated of laminated foam core board and aluminum as detailed on drawings.
b. Framing:

(1) Beams: laminate faced foamed core board Type 1 as indicated.
(2) Aluminum extrusions and aluminum tubing. As indicated.
(3) Finish and Color: As indicated.

c. Mounting: Suspended from structure as indicated.

3.3.12. Phrase Letters

a. Custom fabricated as detailed on drawings.

(1) MDF (Medite 3D) as indicated
(2) Finish: Aluminum face with painted sides as indicated.
(3) Mounting: 3M VHB double back tape and silicone adhesive

3.3.13. Soffit Trim

a. Laminate faced Foamed Core Board Type 1, face, edges and back.
b. Colors: Face and edges As indicated.
c. Profiles: As indicated.
d. Size: As indicated.
e. Mounting: Silicone adhesive.

3.3.14. Food Court Flag and Soldier Graphic Vinyl Wall Covering
a. Custom direct printed vinyl wall covering with high resolution 6 color process and UV stable inks. Electronic artwork furnished by government.

3.3.15. Food Court Valance/Letters
a. Custom fabricated of Foamed Core Board Type 1 as detailed on drawings.
b. Mounting: Soffit mounted as indicated.

3.3.16. Food Court Commissary Logo
a. Custom fabricated of Foamed Core Board Type 1 as detailed on drawings.
b. Mounting: Soffit mounted as indicated.

3.3.17. Food Court NEX Logo
a. Custom fabricated of Foamed Core Board Type 1 as detailed on drawings.
b. Mounting: Soffit mounted as indicated.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10451

QUEUING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Item 1E06-A Queuing System, Checkout, Traffic Control.
b. Item 3-2D04: Take-A-Number System, Digital.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each item of queuing systems required.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 1E06-A: QUEUING SYSTEM, CHECKOUT, TRAFFIC CONTROL

2.2.1. Pedestrian Control Devices

a. Post: heavy walled T5 tempered continuous aluminum extrusion, 0.1030 inch at its thinnest point. Post shall contain four grooves that run the length of the post. Each groove shall contain a 35-inch by 1 5/8-inch decorative high-pressure color plastic laminated trim strip. Each groove shall also serve as a belt attachment point allowing connection from any of three angles. Bright chrome anodized finish.

(1) Size: 36.88-inch overall height, 3.175-inch diameter.

b. Base Weight: Cast iron with an epoxy coating that fits snugly underneath a base cover. The entire outer rim of the base cover shall contain a non-marring black rubber rim that attaches to the cast base through the use of spru holes. Do not provide rollers.

c. Base Cover: 14 inches in diameter and fits over the base weight; 16 gage stamped steel with a, satin chrome finish.

d. Belt: 2 inches wide woven nylon. The belt shall be able to extend up to 82 inches from post to post center. The bottom of the belt shall be 34 inches from finished floor. Belt color: Black.A 1.269-inch by 3.125-inch plastic belt end shall attach to the end of the belt to allow the belt to be secured to another post. The belt end shall be able to be secured into place with locking tabs supplied with each unit.

e. Belt Spring: Stainless steel, power-wound constant force spring that retracts the complete length of the belt when not in use.

f. Sign frames and signs:

(1) Two chrome trimmed sign frames 7 by 11 inches with adapters for mounting on posts.
(2) One double faced sign engraved "PLEASE ENTER HERE" each side.
(3) One single faced sign engraved “PLEASE WAIT HERE FOR THE NEXT AVAILABLE CASHIER.
(4) Sign color , white letters on black background.

g. Basis-of-Design Product: Alvarado Mtg. Co., Inc. (800) 423-4143 or www.alvaradomfg.com.

(1) "Escort Retractable Belt Stanchion" system.

2.3 ITEM 3-2D04: DIGITAL “TAKE-A-NUMBER” SYSTEM

2.3.1. Salient Characteristics:

a. Electronic L.E.D. number indicator: Black with 2-digit number display, 12 inches long by 2-1/4 inches deep by 9-3/4 inches high.
b. Red ticket dispenser with “Please Take A Number” sign.
c. 12-volt transformer.
d. 100 feet of wire with hardware.
e. 3 push buttons.
f. Set of “Now Serving” decals in 12 languages.
g. 5-foot high portable floor stand for dispenser.
h. Tickets: Disposable, pre-cut, pre numbered, 15 rolls at 3000 tickets per roll. Provide white tickets. If more than one system is used, provide each system with a different roll of colored tickets.

2.3.2. Basis-of-Design Products: Hubert . (800) 543-7374 or www.hubert.com.

a. Electronic number indicator kit: Model 51310, includes number display, dispenser with sign, transformer, wire with hardware, pushbuttons, and decals.
b. Dispenser stand: Model 78118.
c. Take-A-Number tickets: Model 96272.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated.
b. Install units plumb and level, in locations and with mountings shown. Securely attach to the supporting structure with concealed fasteners, in accordance with the manufacturer's installations instructions.
c. Clearances: Verify that clearances are adequate to properly and freely operate queuing systems.
d. Connections: Connect queuing systems to electrical systems.

3.2 FIELD QUALITY CONTROL

Testing: Test, adjust, and verify operation of each unit and component of the queuing systems. Repair or replace any item found to be defective or operating below rated capacity.

3.3 ADJUSTING AND CLEANING

3.3.1. Adjusting

a. Verify that operating parts work freely and fit neatly. Adjust and lubricate hardware and moving parts.

3.3.2. Cleaning

a. After completing queuing systems installation, including accessories, inspect exposed finish. Remove protective coverings, if any, and clean queuing systems.

3.3.3. Repair or Replace

a. Repair or replace damaged parts, dents, buckles, abrasions, and other defects affecting appearance or serviceability so queuing systems are in an acceptable condition at time of final acceptance.

END OF SECTION

SECTION 10505
METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 4L01-ADA Locker, Clothing, Single Tier, ADA Compliant.
b. 4L02 Locker, Clothing, Double Tier.
c. 4L03 Locker, Clothing, Six Tier.
d. Locker room benches.

1.2 DEFINITIONS

1.2.1. Uncoated Steel Sheet Thicknesses

a. Indicated as the minimum thicknesses.

1.3 SUBMITTALS

1.3.1. Product Data

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and benches.

1.3.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. An authorized representative of metal locker manufacturer for installation and maintenance of units required for this Project.

1.4.2. Source Limitations

a. Obtain metal lockers, benches, and accessories through one source from a single manufacturer.

1.4.3. Regulatory Requirements

a. Where metal lockers and benches are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities".

1.5 DELIVERY, STORAGE, AND HANDLING

Do not deliver metal lockers and benches until spaces to receive them are clean, dry, and ready for metal locker and bench installation. Deliver master and control keys to Contracting Officer at beneficial occupancy by the Government.

1.6 PROJECT CONDITIONS

1.6.1. Field Measurements

a. Verify the following by field measurements before fabrication and indicate measurements on Shop Drawings:

(1) Concealed framing, blocking, and reinforcements that support metal lockers before they are enclosed.

1.7 COORDINATION

Coordinate size and location of concrete and wood bases for metal lockers. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

2.2.1. Cold-Rolled Steel Sheet

a. ASTM A 1008, Commercial Steel (CS) Type B, suitable for exposed applications.

2.2.2. Fasteners

a. Zinc-plated or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.

2.2.3. Anchors

a. Select material, type, size, and finish required for secure anchorage to each substrate.
b. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.3 4L01-ADA –LOCKER, CLOTHING SINGLE TIER, ADA COMPLIANT

2.3.1. Basis-of-Design Product

a. Republic Storage Systems Company; All-Welded Ventilated Lockers.

2.3.2. Locker Arrangement

a. Single tier.
b. Size of each locker: 15 inches wide by 18 inches deep by 72 inches high.

2.3.3. Body:

a. Assembled by welding body components together. Fabricate from cold-rolled steel sheet with thicknesses as follows:

(1) Tops and Bottoms: 0.0528 inch (16 gage) thick, with single bend at edges.
(2) Backs: 0.0528 inch (16 gage) thick.

2.3.4. Perforated Sides

a. Fabricated from 0.0528-inch- (16 gage) thick, cold-rolled steel sheet with manufacturer's standard diamond perforations.

2.3.5. Frames

a. Channel formed; fabricated from 0.0528-inch- (16 gage) thick, cold-rolled steel sheet or 0.0966-inch- (12 gage) thick steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

2.3.6. Perforated Doors

a. One-piece, fabricated from 0.0677-inch- (14 gage) thick, cold-rolled steel sheet with manufacturer's standard diamond perforations; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

2.3.7. Hinges

a. Welded to door and attached to door frame with not less than 2 factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

(1) Knuckle Hinges: Steel, full loop, 5 knuckles, tight pin; 2 inches high. Provide 3 hinges for each door.

2.3.8. Recessed Door Handle and Latch

a. Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry resistant.

(1) Multipoint Latching: Finger-lift latch control designed for use with built-in cylinder locks; positive automatic and prelocking.

(a) Latch Hooks: Equip doors with 3 latch hooks; fabricated from minimum 0.1116-inch- (11 gage) thick steel; welded to full-height door strikes; with resilient silencer on each latch hook.
(b) Latching Mechanism: Manufacturer's standard rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

2.3.9. Cylinder Locks

a. Built-in, flush, cam locks with five-pin tumbler keyway, keyed separately and master keyed. Furnish two change keys for each lock and five master keys.

(1) Key Type: Grooved.
(2) Bolt Operation: Automatically locking spring bolt.

2.3.10. Equipment

a. Equip each metal locker with identification plate and the following, unless otherwise indicated:

(1) Two hat/book shelves, one double-prong back hook and two single-prong wall hooks.
(2) Hooks: Steel, formed with ball points, zinc-plated and attached with two bolts or rivets.
(3) Height of equipment from finished floor for forward reach wheelchair approach:

(a) Lower shelf: No lower than 15 inches.
(b) Upper shelf: No more than 48 inches.
(c) Hooks: No more than 48 inches.
(4) Height of equipment from finished floor for parallel reach wheelchair approach:

(a) Lower shelf: No lower than 9 inches.
(b) Upper shelf: No more than 54 inches.
(c) Hooks: No more than 54 inches.

2.3.11. Accessories

a. Continuous Sloping Tops: Fabricated from minimum 0.0428-inch- (18 gage) thick, cold-rolled steel sheet; approximately 20-degree pitch.

(1) Closures at Exposed Ends: Hipped-end type.

b. Filler Panels: Fabricated from 0.0428-inch- (18 gage) thick, cold-rolled steel sheet.
c. Decal: International symbol of accessibility applied to face of locker door.

2.3.12. Finish

a. Baked enamel.
b. Color(s): As indicated.

2.4 4L02 –LOCKER, CLOTHING, DOUBLE TIER

2.4.1. Basis-of-Design Product

a. Republic Storage Systems Company; All-Welded Ventilated Lockers.

2.4.2. Locker Arrangement

a. Double tier.
b. Size of each locker: 15 inches wide by 18 inches deep by 72 inches high.
c. Size of each locker compartment: 15 inches wide by 18 inches deep by 36 inches high.

2.4.3. Body

a. Assembled by welding body components together. Fabricate from cold-rolled steel sheet with thicknesses as follows:

(1) Tops and Bottoms: 0.0528 inch (16 gage) thick, with single bend at edges.
(2) Backs: 0.0528 inch (16 gage) thick.

2.4.4. Perforated Sides

a. Fabricated from 0.0528-inch- (16 gage) thick, cold-rolled steel sheet with manufacturer's standard diamond perforations.

2.4.5. Frames

a. Channel formed; fabricated from 0.0528-inch- (16 gage) thick, cold-rolled steel sheet or 0.0966-inch- (12 gage) thick steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

2.4.6. Perforated Doors

a. One-piece, fabricated from 0.0677-inch- (14 gage) thick, cold-rolled steel sheet with manufacturer's standard diamond perforations; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

2.4.7. Hinges

a. Welded to door and attached to door frame with not less than 2 factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

(1) Knuckle Hinges: Steel, full loop, 5 knuckles, tight pin; 2 inches high. Provide 2 hinges for each door.

2.4.8. Recessed Door Handle and Latch

a. Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry resistant.

(1) Multipoint Latching: Finger-lift latch control designed for use with built-in cylinder locks; positive automatic and prelocking.

(a) Latch Hooks: Equip doors with 2 latch hooks; fabricated from minimum 0.1116-inch- (11 gage) thick steel; welded to full-height door strikes; with resilient silencer on each latch hook.
(b) Latching Mechanism: Manufacturer's standard rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

2.4.9. Cylinder Locks

a. Built-in, flush, cam locks with five-pin tumbler keyway, keyed separately and master keyed. Furnish two change keys for each lock and five master keys.

(1) Key Type: Grooved.
(2) Bolt Operation: Automatically locking spring bolt.

2.4.10. Equipment

a. Equip each metal locker with identification plate and the following, unless otherwise indicated:

(1) Double-Tier Units: One double-prong back hook and two single-prong wall hooks.
(2) Hooks: Steel, formed with ball points, zinc-plated and attached with two bolts or rivets.

2.4.11. Accessories

a. Continuous Sloping Tops: Fabricated from minimum 0.0428-inch- (18 gage) thick, cold-rolled steel sheet; approximately 20-degree pitch.

(1) Closures at Exposed Ends: Hipped-end type.

b. Filler Panels: Fabricated from 0.0428-inch- (18 gage) thick, cold-rolled steel sheet.

2.4.12. Finish

a. Baked enamel.

(1) Color: As indicated.

2.5 4L03 – LOCKER, CLOTHING, SIX TIER

2.5.1. Basis-of-Design Product
a. Republic Storage Systems Company; All-Welded Ventilated Lockers.

2.5.2. Locker Arrangement
a. Six-High Box Locker
b. Size of each locker: 12 inches wide by 18 inches deep by 60 inches high.
c. Size of each locker compartment: 15 inches wide by 18 inches deep by 12 inches high.

2.5.3. Body
a. Assembled by welding body components together. Fabricate from cold-rolled steel sheet with thicknesses as follows:
(1) Tops and Bottoms: 0.0528 inch (16 gage) thick, with single bend at edges.
(2) Backs: 0.0428 inch (18 gage) thick.

2.5.4. Perforated Sides
a. Fabricated from 0.0528-inch- (16 gage) thick, cold-rolled steel sheet with manufacturer's standard diamond perforations.

2.5.5. Frames
a. Channel formed; fabricated from 0.0528-inch- (16 gage) thick, cold-rolled steel sheet or 0.0966-inch- (12 gage) thick steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

2.5.6. Perforated Doors
a. One-piece, fabricated from 0.0677-inch- (14 gage) thick, cold-rolled steel sheet with manufacturer's standard diamond perforations; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

2.5.7. Hinges
a. Welded to door and attached to door frame with not less than 2 factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
(1) Knuckle Hinges: Steel, full loop, 5 knuckles, tight pin; 2 inches high. Provide 2 hinges for each door.

2.5.8. Recessed Door Handle and Latch
a. Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry resistant.
(1) Single-Point Latching: Nonmoving latch hook with steel padlock loop that projects through recessed cup and is finished to match metal locker body.
(a) Latch Hook: Equip each door with one latch hook, fabricated from 0.120-inch nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.

2.5.9. Equipment

a. Equip each metal locker with identification plate and the following, unless otherwise indicated:

2.5.10. Accessories
a. Continuous Sloping Tops: Fabricated from minimum 0.0428-inch- (18 gage) thick, cold-rolled steel sheet; approximately 20-degree pitch.
(1) Closures at Exposed Ends: Hipped-end type.
b. Filler Panels: Fabricated from 0.0428-inch- (18 gage) thick, cold-rolled steel sheet.

2.5.11. Finish
a. Baked enamel.
(1) Color: As indicated.

2.6 ADA COMPLIANT LOCKER ROOM BENCHES

2.6.1. Bench Height

a. Provide bench units with overall assembly seat height of 17 inches minimum (19 inches maximum) above finished floor.

2.6.2. Bench Tops

a. Manufacturer’s standard 1-piece units with laminated maple top 24 inches wide by 1-1/4 inches thick by 48 inches long. Round all corners, sand smooth, and apply manufacturer’s standard transparent sealer coating.

2.6.3. Fixed Pedestals

a. Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, and as follows:

(1) Tubular Steel: 1-1/4-inch- diameter steel tubing, with 0.1265-inch thick steel flanges welded at top and base; with baked-enamel finish; anchored with exposed fasteners.

(a) Color: Match metal lockers.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Install lockers on concrete and wood bases as indicated on drawings

b. Install level, plumb, and true; shim as required, using concealed shims.
c. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion, using concealed fasteners.
d. Anchor single rows of metal lockers to walls near top and bottom of lockers.

3.2.2. All-Welded Metal Lockers

a. Connect groups of all-welded metal lockers together with standard fasteners, with no exposed fasteners on face frames.

3.2.3. Equipment and Accessories

a. Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

(1) Attach hooks with at least two fasteners.
(2) Attach door locks on doors using security-type fasteners.
(3) Identification Plates: Identify metal lockers with identification selected by Contracting Officer.

(a) Attach plates to each locker door, near top, centered, with at least two aluminum rivets.

(4) Attach filler panels with concealed fasteners. Locate fillers panels to close openings between lockers and adjacent walls, and at internal corners between lockers.
(5) Attach sloping top units to metal lockers, with closures at exposed ends.
(6) Provide perforated end panels, matching locker sides, at ends of nonrecessed metal lockers.

3.2.4. Fixed Benches

a. Install locker benches complying with manufacture's instructions.
b. Provide no fewer than four pedestals for each bench, uniformly spaced.
c. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

3.3 ADJUSTING, CLEANING, AND PROTECTION

3.3.1. General

a. Clean, lubricate, and adjust hardware: Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.
b. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit metal locker use during construction.
c. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal locker manufacturer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10520

FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Portable fire extinguishers.
b. Fire extinguisher cabinets.
c. Accessories.
d. Signage.

1.2 SUBMITTALS

1.2.1. Product Data

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
b. Fire Extinguishers: Include rating and classification.
c. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

1.3.1. Source Limitations

a. Obtain fire extinguishers and cabinets through one source from a single manufacturer.

1.3.2. NFPA Compliance

a. Fabricate, install, and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

1.3.3. Fire Extinguishers

a. Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Basis-of-Design Products

a. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

b. Basis-of-Design Products: J.L. Industries, Inc.

(1) Unless otherwise indicated provide the following:

(a) Portable Fire Extinguisher: Cosmic 10E.
(b) Fire-Protection Cabinet: Ambassador – Steel, Model 1017, door style S21 solid with pull handle.
(c) Mounting Bracket: MB846.

(2) Where Type K is indicated provide the following:

(a) Portable Fire Extinguisher: Saturn 15.
(b) Fire-Protection Cabinet: Ambassador – Steel, Model 2012, door style S21 solid with pull handle.

(3) Signage:

(a) Wall surface: Decal, 11-3/4- by 3-1/2-inches, vertical, red and white, FIRE EXTIGUISHER, #DRFA.
(b) Cabinet Door: Die cut, ¾ by 18-inches, vertical, red, FIRE EXTINGUISHER, #LDCVRFE.

2.2 MATERIALS

2.2.1. Cold-Rolled Steel Sheet

a. ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

2.3 PORTABLE FIRE EXTINGUISHERS

2.3.1. Unless Otherwise Indicated Provide Multipurpose Dry-Chemical Type

a. UL-rated 4A:60BC, 10-lb nominal capacity, in enameled-steel container.

2.3.2. Where Type K Is Indicated Provide Wet-Chemical Type

a. UL-rated K, 6-liter. nominal capacity, with potassium acetate-based chemical in stainless-steel container; with pressure-indicating gage.

2.4 FIRE EXTINGUISHER CABINETS

2.4.1. Cabinet Construction: Non-rated

a. Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
b. Cabinet Metal: Enameled-steel sheet.
c. Cabinet Type: Suitable for fire extinguisher.
d. Cabinet Mounting: Suitable for the following mounting conditions:

(1) Semi-recessed: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated.

e. Cabinet Trim Style: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

(1) Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
(2) Return trim with rolled edge.

f. Cabinet Trim Material: Manufacturer's standard, same metal and finish as door.
g. Door Material: Manufacturer's standard, steel sheet.
h. Door Style: Manufacturer's standard design, flush opaque panel, frameless, with no exposed hinges.
i. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.
j. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

2.5 ACCESSORIES

2.5.1. Mounting Brackets

a. Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked-enamel finish.

(1) Provide brackets for extinguishers not located in cabinets.

2.5.2. Signage

a. Identify bracket-mounted extinguishers with signage "FIRE EXTINGUISHER" decal applied to wall surface.
b. Identify fire extinguishers in cabinets with signage "FIRE EXTINGUISHER" die cut lettering applied to door.

2.6 FINISHES, GENERAL

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
c. Finish fire protection cabinets after assembly.

2.6.2. Appearance of Finished Work

a. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6.3. Cabinet and Door Finishes

a. Provide manufacturer's standard baked-enamel paint for the following:

(1) Exterior of cabinet, door, and trim.
(2) Interior of cabinets and doors.

2.7 STEEL FINISHES

2.7.1. Surface Preparation

a. Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.

2.7.2. Baked-Enamel Finish

a. Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

(1) Color:

(a) Cabinets: Manufacturer’s standard white.
(b) Brackets: Manufacturer’s standard red.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets are to be installed.
b. Examine fire extinguishers for proper charging and tagging.

(1) Remove and replace damaged, defective, or undercharged units.

c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Comply with manufacturer's written instructions for installing fire-protection specialties.
b. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

(1) Prepare recesses for cabinets as required by type and size of cabinet and trim style.
(2) Fasten mounting brackets to structure and cabinets, square and plumb.
(3) Fasten cabinets to structure, square and plumb.

c. Signage: Apply decals and die cut lettering at locations indicated.

3.3 ADJUSTING, CLEANING, AND PROTECTION

Adjust cabinet doors that do not swing or operate freely. Refinish or replace cabinets and doors damaged during installation. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of final acceptance.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10670

STORAGE RACKS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 2R16 Storage Rack, Shelf, Galvanized.
b. 2R17 Storage Rack, Pallet, Painted.
c. Floor mounted corner guards.

1.1.2. Reference Standard: ANSI MH 16.1.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Seismic

a. Provide storage rack systems, including anchorage, capable of withstanding, without failure, the effects of seismic loads:
b. Design storage racks to resist earthquake loading requirements of ANSI MH 16.1.
c. Refer to Division 1 Section "Description of Work" for seismic-load design criteria.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of storage rack and accessory specified. Include installation methods for each type of substrate.
b. Commercial warranty.

1.3.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 2R16: STORAGE RACK, SHELF, GALVANIZED

2.2.1. Galvanized Steel Storage Pallet Shelves

a. Galvanized steel storage pallet shelves shall be assembled side by side in a row. The design of all galvanized steel load bearing components, hot rolled to shape, shall be as specified for design fabrication, and erection of structural steel for buildings, or one of the suitable ASTM designations for structural quality sheet or strip referenced for the design of light gauge cold-formed steel structural members. The design and construction of each load bearing component shall assure that the component is capable of sustaining the minimum safe load specified with a safety factor not less than 1.65. The storage shelves shall consist of steel frame uprights, load beams with safety locks, wire mesh decking, and leveling shims. All components shall be galvanized and designed for use in refrigerated areas. Storage racks shall have the following salient features:

(1) Upright Frame: Galvanized upright frame shall be a combination of horizontal and diagonal braces, and floor bearing plates. Each upright frame shall have a minimum safe load capacity of 31,000 lbs. The steel braces shall be of angle channel or box channel. Each post shall have openings to readily accommodate the shelf beams at corresponding heights. The upright frames shall be 30 inches wide and 96 inches high.

(2) Shelf Unit: Galvanized shelf beams shall be one piece integral welded unit of two 96-inch length beams, as identified on drawings. Each shelf unit shall have a minimum safety load capacity of 6,000 lbs with a safety factor of not less than 1.65. Beams shall be 4-1/2 inches to 5 inches by 3 inches and shall be compatible with the width of the upright frame.

(3) Leveling Shims: The shims shall be hot or cold rolled steel with minimum thickness of 12 gage 0.1086 inch and of the same size as the floor bearing plate. The shim shall anchor or lock with the floor bearing plate in such a manner as not to separate during normal use of the rack.

(4) Wire Mesh Decking: Wire mesh decking shall be constructed of maximum 2-inch by 2-inch diamonds or squares, minimum 2 gage welded wire fabric with sufficient 14 gage 2-inch width by 1-3/8-inch depth minimum channel supports to meet minimum capacity. Wire mesh shall be readily removable and not welded nor permanently attached to the front to rear crossbars or load shelf beams.

(5) Back-to-Back Connectors: Shall be designed to join the backs of rack units together to form a double row arrangement. The size of the connectors shall be 12 inches long by 3 inches wide by 3 inches deep. Each end of the connector shall securely attach to any post of the upright frame, at not less than 2 locations within the lower and upper limits of the shelf unit attachment by bolts, washers and nuts or slip in connectors. Each end shall attach to the post at not less than 2 points of attachment.

(6) Wall Spacers: Shall be used to secure rack units to perimeter walls except walls of insulated cold storage rooms. Spacers shall be rigid type, 6 inches minimum length, bolted to the back column of each frame in two locations. Anchor bolts shall be installed to secure rack units to walls.

(7) Assembly: Assembled rack shall consist of two upright frames and three shelf units.

(8) Load beam spacing shall be as follows:

(a) Bottom load beam: 24 inches above floor.
(b) Second load beam: 60 inches above floor.
(c) Third load beam: 96 inches above floor.

(9) The upright frames and shelf units shall assemble and disassemble, throughout the height range of the post openings, easily and freely, without the use of bolts or tools other than a soft hammer, except for permanently fastening to the floor. Assembled rack shall support without permanent deformation or skewing, the stresses induced by capacity loads. The beam to post safety lock shall engage and disengage without the use of tools. Floor plates shall be permanently fastened to the floor.

b. Nominal dimensions in inches:

		Width	Depth	Height
(1)	Upright Frame	30	3	96
(2)	Load Beam	96	3	5
(3)	Wire Mesh Decking	48	30	1-3/8
(4)	Back-to-Back Connectors	12	3	3
(5)	Wall Spacers	6	3	3

c. Basis-of-Design Product: Ridg-U-Rak, Inc., "Ridg-U-Tier II". (814) 725-8751 or www.ridgurak.com.

2.3 ITEM 2R17: STORAGE RACK, PALLET, PAINTED

2.3.1. Painted Steel Storage Pallet Shelves

a. Loaded pallet steel storage racks shall be assembled side by side in a row. The design of all steel load bearing components, hot rolled to shape, shall be as specified for design fabrication, and erection of structural steel for buildings, or one of the suitable ASTM designations for structural quality sheet or strip referenced for the design of light gauge cold-formed steel structural members. The design and construction of each load bearing component shall assure that the component is capable of sustaining the minimum safe load specified with a safety factor of not less than 1.65. The racks shall consist of steel frame uprights, load beams, with safety locks, cross bars for front to rear supports, wall spacers and leveling shims. The racks are intended for storing palletized loads. Color shall be gray. Storage racks shall have the following salient features:

(1) Upright Frame: Upright frame shall be a combination of horizontal and diagonal braces, and floor bearing plates. Each upright frame shall have a minimum safe load capacity of 31,000 lbs. The steel braces shall be of angle channel or box channel with "X" design. Each post shall have openings to readily accommodate the shelf beams at corresponding heights. The upright frames shall be 42 inches wide. End upright frames shall be 96 inches high, and the intermediate frames 96 inches high.
(2) Shelf Unit: Shelf units shall consist of two 96-inch long beams with four removable slip-in front to rear crossbars. Each shelf unit shall have a minimum load capacity of 6,000 lbs with a safety factor of not less than 1.65. Beams shall be 4-1/2 inches to 5 inches by 3 inches and shall be compatible with the width of the upright frame.
(3) Crossbar Front-to-Rear Supports: Cross bars shall have minimum width of 3 inches, depth of 2 inches and length of 42 inches. The crossbars shall be designed so as to fit flush with the top of the beam. The crossbars shall attach and detach without the use of tools, other than a soft hammer. Crossbars shall be of the overlapping, locking type.

(4) Leveling Shims: The shims shall be hot or cold rolled steel with minimum thickness of 12 gage 0.1086 inch and of the same size as the floor bearing plate. The shim shall anchor or lock with the floor bearing plate in such a manner as not to separate during normal use of the rack.
(5) Wall Spacers: Shall be used to secure rack units to perimeter walls except walls of insulated cold storage rooms. Spacers shall be rigid type, 6 inches minimum length, bolted to the back column of each frame in two locations. Anchor bolts shall be installed to secure rack units to walls.
(6) Pallet Stops: Two pallet stops per pallet to be stored shall be provided on all racks adjacent to walls, or where columns or pipes are located between racks.
(7) Single Row Rack Assembly: Assembled rack shall consist of two upright frames and two shelf units.
(8) Load beam spacings shall be as follows:

(a) Bottom load beam: 12 inches above floor.
(b) Second load beam: 72 inches above floor.

(9) The upright frames and shelf units shall assemble and disassemble, throughout the height range of the post openings, easily and freely, without the use of bolts or tools other than a soft hammer, except for permanently fastening to the floor. Assembled rack shall support without permanent deformation or skewing, the stresses induced by capacity loads. The beam to post safety lock shall engage and disengage without the use of tools, and shall be effective at any position. Floor plates shall be permanently fastened to the floor.
(10) Nominal dimensions in inches

	Width	Depth	Height
(a) End Upright Frame	42	3	96
(b) Intermediate Upright Frame	42	3	96
(c) Crossbars	42	3	2
(d) Load Beams	96	3	5
(e) Wall Spacers	12	3	3

b. Basis-of-Design Product: Ridg-U-Rak, Inc., "Ridg-U-Tier II". (814) 725-8751 or www.ridgurak.com.

2.4 CORNER GUARDS

2.4.1. Floor Mounted Steel, Angle, Corner Guards

a. 3- by 3-inch legs by 1/4 inch thick, 36-inches high, with ¼ inch thick base plate anchored to floor with ¾ inch diameter double Keystone expansion anchors. Paint yellow. Install in close proximity to but separate from item protected.
b. Basis-of-Design Product Manufacturer: Ridg-U-Rak, Inc.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1. General

a. Check that surfaces to which work will be secured are sound and free of irregularities interfering with installation.
b. Do not begin installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Installation shall be in accordance with the manufacturer's erection instructions.
b. The manufacturer of racks or his qualified representative shall examine the installation and alignment of the rack system. Rack systems not installed according to requirements specified, and as approved by the manufacturer, are not acceptable.
c. Touch up scarred finishes with manufacturer's matching color material.
d. Replace damaged and defective items.
e. Provide corner guards at exposed corners of end upright fames subject to impact damage.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10671

SHOE STOCK SLIDING SHELVING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Shoe stock sliding shelving system consisting of shelf units supported on wheeled carriages rolling on tracks.

1.2 SUBMITTALS

1.2.1. Product Data:

a. Commercial warranty.
b. Installation and operating instructions.
c. Parts list.

1.2.2. Product Certificates: For conveyor, from manufacturer.

1.2.3. Field quality-control reports.

1.2.4. Closeout Submittals

a. Operation and Maintenance Data: For shelving to include in operation and maintenance manuals.

1.2.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Product Certificates	X	I
1.2.3	Field quality-control reports	X	I
1.2.4	Closeout Submittals	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1. PERFORMANCE REQUIREMENTS

a. Structural Performance: Install shoe stock sliding shelving capable of withstanding the structural loads indicated without exceeding the allowable design working stresses of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each applicable shoe stock sliding shelving system component.
b. Earthquake Loading: Install shoe stock sliding shelving system to resist the effects of earthquake motions.
c. Refer to Division 1 Section "Description of Work" for seismic-load design zone.
d. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data.

1.3.2. Storage, And Handling

a. Store and handle shelving in a manner to avoid significant or permanent damage to material and equipment.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Manufacturer's authorized representative who is trained and approved for installation of sliding shelving required for this Project.

PART 2 - PRODUCTS

2.1 MANUFACTURER

2.1.1. Basis-of-Design Product: Subject to compliance with requirements, provide the following.

a. PIPP Mobile Storage Systems, Inc. 800-234-7477, www.pippmobile.com

2.2 MATERIALS

2.2.1. Mobile Storage System

a. Mobile: Floor supported heavy duty manual floor carriages with non-adjustable heavy duty track, in track anti-tip, handles, brakes and track accessories in configuration as indicated on Drawings.

b. Shelving: Shelving is 7 feet high rivet style with wire grid shelf decking. Units to have 6 shelves / 5 openings. Configuration as indicated on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Install shelving in locations indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide brackets, anchors, trim, and accessories necessary for complete installation.

3.2 FIELD QUALITY CONTROL

3.2.1. Perform tests and inspections.

a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to test proper operation.

3.3 DEMONSTRATION

3.3.1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain shelving system according to manufacturer's requirements.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10810

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1 Section Includes

a. Toilet accessories.
b. Infant-care products.

1.1.2 Related Sections

a. Division 8 Section "Mirrors" for frameless mirrors.
b. Division 10 Section "Toilet Compartments" for compartment-door-mounted coat hooks.

1.2 SUBMITTALS

1.2.1 Product Data

a. Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

1.2.2 Product Schedule

a. Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet Accessory Schedule and room designations indicated on Drawings in product schedule.

1.2.3 Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Product Schedule	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

1.3.1 Regulatory Requirements

a. Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet accessories.

1.3.2 Electrical Components, Devices, and Accessories

a. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.4 COORDINATION

Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

2.2.1 Stainless Steel

a. ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.

2.2.2 Steel Sheet

a. ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.

2.2.3 Galvanized Steel Sheet

a. ASTM A 653/A 653M, with G60 hot-dip zinc coating.

2.2.4 Mirror Glass

a. ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.2.5 Galvanized Steel Mounting Devices

a. ASTM A 153/A 153M, hot-dip galvanized after fabrication.

2.2.6 Fasteners

a. Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

2.3.1 General

a. One, maximum 1-1/2-inch- diameter, unobtrusive stamped manufacturer logo is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

2.3.2 Surface-Mounted and Partition-Mounted Toilet Accessories

a. Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

2.3.3 Recessed Toilet Accessories

a. Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.

2.3.4 Framed Glass-Mirror Units

a. Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

(1) Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

2.3.5 Mirror-Unit Hangers

a. Provide one of the following mirror-unit mounting systems that permits rigid, tamper- and theft-resistant installation, as follows:

(1) One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
(2) Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

2.3.6 Keys

a. Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Government's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 General

a. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
b. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
c. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

3.2.1 General

a. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
b. Remove temporary labels and protective coatings.
c. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET ACCESSORY SCHEDULE

3.3.1 **Mark A** - Grab Bar Mounted Horizontally, Parallel to Side of Water Closet

a. Where this designation is indicated, provide stainless-steel grab bar complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-6806.
(2) Gripping Surfaces: Smooth.
(3) Length: 42 inches.
(4) Outside Diameter: 1-1/2 inches for heavy-duty applications.
(5) Nominal Wall Thickness: Minimum 0.05 inch.
(6) Clearance: 1-1/2 inches between wall surface and inside face of bar.
(7) Mounting: Concealed with manufacturer's standard flanges and anchors.

3.3.2 **Mark B** - Grab Bar Mounted Horizontally, Parallel to Back of Water Closet

a. Where this designation is indicated, provide stainless-steel grab bar complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-6806.
(2) Gripping Surfaces: Smooth.
(3) Length: 36 inches.
(4) Outside Diameter: 1-1/2 inches for heavy-duty applications.
(5) Nominal Wall Thickness: Minimum 0.05 inch.
(6) Clearance: 1-1/2 inches between wall surface and inside face of bar.
(7) Mounting: Concealed with manufacturer's standard flanges and anchors.

3.3.3 **Mark C** - Stainless-Steel, Angle-Framed Mirror

a. Where this designation is indicated, provide mirror unit complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-290.
(2) Size: As indicated.
(3) Fabricate frame from minimum nominal 0.0375-inch- thick stainless-steel angles, with square corners mitered, welded, and ground smooth.

3.3.4 **Mark D** - Liquid Soap Dispenser, Deck Mounted

a. Where this designation is indicated, provide soap dispenser complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-822.
(2) Piston-and-spout-type unit. Brightly polished stainless-steel piston and 4-inch-long spout; and chrome-plated deck escutcheon.
(3) Reservoir: Polyethylene, concealed below deck.
(4) Reservoir Capacity: Minimum 34-oz..
(5) Mounting: Designed for mounting on lavatory deck.
(6) Soap Valve: Designed for dispensing soap in liquid form.

3.3.5 **Mark E** - Waste Receptacle, Semi-Recessed

a. Where this designation is indicated, provide stainless-steel unit complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-3644
(2) Designed for 4-inch wall depth with continuous, seamless wall flange.
(3) Operation: Empty waste receptacle only after unlocking door.
(4) Material: 18-8 S, Type 304, 22 gage, stainless steel, satin finish.
(5) Waste Receptacle: Minimum 12-gal. Capacity, equipped with interior hooks for vinyl liner.

3.3.6 **Mark F** - Sanitary Napkin Disposal Unit, Partition-Mounted, Dual-Access Type

a. Where this designation is indicated, provide stainless-steel sanitary napkin disposal unit complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-354.
(2) With flanges for partition mounting to serve two toilet compartments; self-closing door; and reusable receptacle that is removable from one side; equipped with a keyed tumbler lock.
(3) Material: 18-8 S, Type 304, 22 gage, stainless steel, satin finish.
(4) Seamless exposed walls of all-welded construction.
(5) Napkin disposal with piano hinged door and removable leak-proof molded polyethylene receptacle.
(6) Napkin Disposal Capacity: 1.2 gal.

3.3.7 **Mark G** – Jumbo Roll Toilet Tissue Dispenser - Surface Mounted

a. Where this designation is indicated, provide stainless-steel sanitary napkin disposal unit complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-2890.
(2) Mounting Plate: 16-gauge steel with powder-coated finish.
(3) Door: Type 430, 22-gauge stainless steel with satin finish. Slot reveals toilet tissue supply inside cabinet. Equipped with a lock not keyed like other Bobrick accessories.
(4) Spindle: Removable plastic spindle adapter converts to smaller spindle. Fixed inner spindle, 20-gauge steel with powder-coated finish.
(5) Operation: Door unlocks with key provided and swings down for loading dispenser. Spindle adapter accommodates one toilet tissue roll up to 10-inches diameter with 3-inches core, or remove the plastic spindle adapter to accommodate a 1-5/8 inches diameter core roll. Two rubber o-rings (furnished by manufacturer) may be added to the steel inner spindle to accommodate a 2-1/8 inches diameter core roll. Wide viewing slot in door reveals the amount of toilet tissue on roll. Unit is designed for quick reloading.

3.3.8 **Mark H** - Item 3-2A20: Baby-Changing Station, Horizontal Type

a. General

(1) Wall-surface-mounted diaper-changing station, mildew-resistant, molded FDA approved injection molded polypropylene with Microban antimicrobial additive embedded into the bed surface, that folds horizontally against wall when not in use; projects not more than 4 inches from wall when closed. Unit shall conform to ANSI S117.1 Accessible and Usable Building and Facilities, ASTM F 2285 Standard Safety Performance Specification for Diaper Changing Tables for Commercial Use, ANSI Z535.4 Product Safety Signs and Labels, EN 12221-1: 2008, ASTM G 22 Antibacterial standards.

b. Salient Characteristics

(1) Hinges: Concealed steel-on-steel.
(2) Mounting plates.
(3) Operation: Concealed pneumatic cylinder and metal mounting chassis, for controlled, slow opening and closing of bed.
(4) Nylon safety strap and bag hooks.
(5) Built-in dispenser for sanitary liners.
(6) Two cases of 3-ply chemical free biodegradable sanitary liners (500 liners per case) to be provided with each baby changing station.
(7) Graphic instructions and safety messages in four languages.
(8) Identifying door plaque.
(9) Color: Cream.
(10) Approximate Dimensions: 22 inches high by 35 inches wide by 4 inches deep when closed and 22-1/8 inches deep when open.

c. Basis-of-Design Product: Koala Kare Products, a division of Bobrick Washroom Equipment, Inc.

(1) Baby Changing Station, Wall-Surface-Mounted Horizontal Design.
(2) Model: KB200-00.

3.3.9 **Mark J** - Stainless Steel Sanitary Napkin Disposal Unit, Partition Mounted

a. Where this designation is indicated, provide stainless-steel sanitary napkin disposal unit complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-254.
(2) Partition mounted with self-closing panel covering disposal opening; and reusable receptacle that is removable; equipped with a keyed tumbler lock.
(3) Material: 18-8 S, Type 304, 22 gage, stainless steel, satin finish.
(4) Seamless exposed walls of all-welded construction.
(5) Napkin disposal with piano hinged door and removable leak-proof molded polyethylene receptacle.
(6) Napkin Disposal Capacity: 1.2 gal.

3.3.10 **Mark K** - Child Protection Seat

a. Where this designation is indicated, provide infant-care product complying with the following:

(1) Basis-of-Design Product: Koala Kare Products, A Division of Bobrick, Model KB102-00.
(2) Description: Unit that opens by folding down from stored position and with child-protection strap.
(3) Engineered to support a minimum of 150-lb static load when opened.
(4) Mounting: Surface mounted, with unit projecting not more than 6 inches from wall when closed.
(5) Material and Finish: High-density polyethylene.
(6) Size: Nominal 12 inches wide by 19 inches high.
(7) Color: Cream.
(8) Provide two extra sets of safety straps.

3.3.11 **Mark L** - Recessed Toilet Tissue Dispenser with Sanitary Napkin Disposal

a. Where this designation is indicated, provide toilet tissue dispenser with sanitary napkin disposal complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-3094.
(2) Seamless exposed walls of all-welded construction.
(3) Hinged front secured with tumbler lockset.
(4) Material: Stainless steel.
(5) Designed for nominal 4-inch wall depth.
(6) Napkin Disposal Capacity: 3/4 gal.
(7) Toilet Tissue Dispenser Capacity: 2 standard 1800 sheet toilet tissue rolls.
(8) Non-control delivery with theft-resistant spindle.

3.3.12 **Mark M** – Dual Partition Stainless Steel Toilet Tissue Dispenser,

a. Where this designation is indicated, provide toilet tissue dispenser partition mounted serving two adjacent toilet compartments complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-386.
(2) Adjustable flanges for partition mounting to serve two toilet compartments. With seamless exposed walls of all-welded construction.
(3) Hinged front secured with tumbler lockset.
(4) Material: 18-8 S, Type 304, 22 gage, stainless steel.
(5) Toilet Tissue Dispenser Capacity: 2 standard 1500 sheet toilet tissue rolls in each compartment.
(6) Non-control delivery with theft-resistant spindles.

3.3.13 **Mark N** – Surface-Mounted Toilet Seat-Cover Dispenser

a. Where this designation is indicated, provide seat-cover dispenser complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-221.
(2) Seamless exposed walls of all-welded construction.
(3) Concealed opening in bottom of dispenser for filling.
(4) Material: 18-8 S, Type 304, 22 gage, stainless steel.
(5) Mounting: Surface mounted.
(6) 2-inch projection.
(7) Seat-Cover Dispenser Capacity: Minimum 250-seat-covers.

3.3.14 **Mark P -** Electric Hand Dryer, Surface Mounted

a. General

(1) Warm air, rapid drying, energy efficient electric hand dryer; entire dryer internally grounded; completely sealed control assembly and optics; automatic, activated by infrared optical sensor; operates while hands are under blower.

b. Salient Characteristics

(1) Basis-of-Design Product: Excel Dryer Inc., Model XL-SB.
(2) Warranty Period: 5 years; limited warranty.
(3) Mounting: Surface mounted.
(4) Operation: Electronic-sensor activated with timed power cut-off switch.

(a) Operation Time: Shut-off within 2 seconds when hands removed or 35 seconds if hands not removed.

(5) Cover Material and Finish: Stainless steel with brushed finish.
(6) Noise Reduction Nozzle: 1.1 noise reduction nozzle. Reduced air deflection noise and 9db decibel level.
(7) Nominal Size: 11-3/4 inches wide by 12-11/16 inches high by 6-11/16 inches deep.
(8) Weight: 15 pounds with stainless cover.
(9) Electrical Requirements: 110/120 V, 12.5 A, 60 hz, 1500 W.

c. Mount dryers at heights indicated on Drawings.

3.3.15 **Mark Q** – Mop Holder with Shelf

a. Where this designation is indicated, provide shelf unit with mop/broom holders and rag hooks complying with the following:

(1) Basis-of-Design Products: Bobrick Washroom Equipment, Inc., Model No. B-223.
(2) 30-inch-long mounting base fabricated of 18-8 S, Type 304, 22 gage, stainless steel.
(3) Mop/Broom Holders: Spring-loaded rubber cams with anti-slip coating. Powder coated steel retainers.

3.3.16 **Mark R** –Automatic Paper Towel Dispenser, Surface Mounted

a. Where this designation is indicated, provide automatic paper towel dispenser complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model B-2974.

(2) Cabinet: 18-8 S, Type 304, heavy-gauge stainless steel. All welded construction. Exposed surfaces have satin finish. Equipped with a tumbler lock.
(3) Door: 18-8 S, Type 304, 20-gauge stainless steel with satin finish. Drawn, one-piece, seamless construction. Secured to cabinet with a full-length stainless steel piano-hinge.
(4) Automatic Roll Towel Dispenser: Durable, high impact resin materials. Accepts universal standard-core, non-perforated rolls 8-inches wide, 8-inches diameter, 800 feet long. Dispenses one towel per dispense and can be set to dispense paper towels at three different lengths. Accommodates up to 3-1/2 inch diameter stub roll with automatic transfer to full roll.
(5) Mounting: Surface mounted.
(6) Dimensions: 15-3/16 inches wide by 18-1/4 inches high with 9-1/16 inches projection from wall.
(7) Operation: Electronic sensor automatically dispenses towel when hands are placed under the towel opening. Dispenses universal, 1-1/2 inches to 2-inches diameter core, up to 8-inches diameter, 8-inches wide, non-perforated, non-proprietary paper towel rolls. Towel length can be set to 9-inches, 12-inches, and 15-inches. Dispenser includes a 3-1/2 inches diameter stub roll feature. When the stub roll is depleted, main roll automatically starts dispensing without the need to open the dispenser.
(8) Power Requirements: Furnish each unit with 6-volt DC power supply (Bobrick Part No. 3974-57).

3.3.17 **Mark S** – Mirror (Unframed) Specified in Division 8 Section "Mirrors".

3.3.18 **Mark T** – Surface-Mounted Toilet Tissue Dispenser

a. Where this designation is indicated, provide surface-mounted toilet tissue dispenser complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-2888.
(2) With seamless exposed walls of all-welded construction.
(3) Pivoted front secured with tumbler lockset.
(4) Material: 18-8 S, Type 304, 22 gage, stainless steel.
(5) Capacity: 2 standard 1800 sheet toilet tissue rolls. Noncontrol delivery with theft-resistant spindles.

3.3.19 **Mark U** - Waste Receptacle, Surface Mounted

a. Where this designation is indicated, provide stainless-steel unit complying with the following:

(1) Basis-of-Design Product: Bobrick Washroom Equipment, Inc., Model No. B-275
(2) Designed for surface mounting.
(3) Operation: Empty waste receptacle by removal of liner attached to four interior hooks.
(4) Material: 18-8 S, Type 304, 22 gage, stainless steel, satin finish.
(5) Waste Receptacle: Minimum 20-gal. Capacity, equipped with interior hooks for vinyl liner.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 10910

DISPLAY SHELVING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 2RNEX Walk-In beer cooler display shelving.

1.2 SUBMITTALS

1.2.1. Product Data

a. Manufacturer's product description.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
R Review each submittal, mark to indicate action taken, and return.

PART 2 - PRODUCTS

2.1 WALL GONDOLA SHELVING

2.1.1. Salient Features:

a. 7-foot high by 4-foot wide by 2-foot deep.
b. Base shelf depth 24 inches.
c. Upper shelf depths 24 inches. 4 required.
d. Wall / half display: each upright column of an assembled wall section must be capable of safely supporting a minimum total unbalanced load of 1,250 pounds.
e. Caps will be furnished for the open top of each upright.
f. End covers to be provided on each exposed end of a run.
g. Equipped with one inch adjustable leveling devices on base supports.
h. Back and end panels constructed with solid white lucite panels.
i. Heavy duty standard upper shelf minimum balanced load 600 lb capacity, with 1.67 to 1 safety factor.
j. Base shelf / deck minimum balanced load 600 lb capacity, with 1.67 to 1 safety factor. Minimum 1000 lb capacity when equipped with additional base load leveler.
k. Base legs: legs will set base height 5 inches above the finished floor and be reinforced to withstand the above stated weight requirements.

l. Kickplates: provided to shield legs from bumping and abuse or to cover the exposed surface beneath the base shelf.
m. Base load supports: increase minimum base shelf capacity to 1000 pounds and provide structural support to prevent a sagging center area of the shelf or shelf structural failure.
n. Finish: White Spraylat powder coat.

2.1.2. Accessories

a. As required for complete installation.

2.1.3. Basis-of-Design:

a. Madix Store Fixtures.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine location, with Installer present, for compliance with requirements and other conditions affecting installation of shelving.
(1) Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General
a. Install units in locations and at mounting heights indicated and according to manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
b. Coordinate Project-site-assembled units with grounds, trim, and accessories. Join parts with a neat, precision fit.

3.3 ADJUSTING AND CLEANING

Verify that accessories required for each unit have been properly installed. Clean units according to manufacturer's written instructions.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11013

VACUUM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Central vacuum system.

1.2 SUBMITTALS

1.2.1. Product Data

a. For type of vacuum system specified.

1.2.2. Shop Drawings

a. Show layout and type of vacuum system. Include the following:

(1) Location of central vacuum system.
(2) Location of wiring connections.
(3) Location of receptacle hose plates.
(4) Location of exhaust system.
(5) Anchorage details.
(6) Accessories.
(7) Wiring diagrams.

1.2.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Shop Drawings	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

1.3.1. Source Limitations

a. Obtain central vacuum system through one source from a single manufacturer. Obtain central vacuum system as a complete unit, including necessary mounting hardware and accessories.

1.3.2. Coordination of Work

a. Coordinate layout and installation of central vacuum system with other construction supported by, or penetrating through, building construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Basis-of-Design Products

a. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 CENTRAL VACUUM SYSTEM

2.2.1. Description

2.2.1.1. The central vacuum system shall be for barbers to vacuum and cut hair while servicing patrons. Provide 2-inch diameter PVC piping system with long radius elbows, chrome plated inlets with flapper valves, and contacts for clipper hoses (clipper hoses provided by others), CP inlet flap valve activates vacuum, and including the following:

a. Inclusive Sound Suppression Rated: 69 dba.
b. Motor Starter: Class 10 motor overload protection with an IP 55 enclosure.
c. Motor Rating: TEFC, Inductive, 4.0 kW, 5.3 hp.
d. Vacuum Producer: 5 stage centrifugal turbine (1).
e. Voltage: 230/460 volts, 3-phase, 50/60 HZ. 24 volts required at each station.
f. Amps: 13.5/7.0.
g. Duty Cycle: 24/7 continuous duty.
h. Vacuum Rating: 6.2 Hg.
i. Volume Rating (CFM): 300 CFM.
j. Primary Filtration Efficiency: 99.9% @ 0.5 microns.
k. Primary Filter Area: 28 square feet.
l. Primary Filter Cleaning: Heavy duty manual shaker.
m. HEPA Filter: 99.97% @ 0.3 microns.
n. HEPA Filter Area: 40 square feet.
o. Inlet Connection: 2.75 inches (70 mm) with aluminum cast deflector.
p. Housing: Compression cast composite, carbon impregnated, anti-static.
q. Discharge Mechanism: 8-inch; stainless-steel sheet, ASTM A 240/A 240M, Type 304.. Provide exhaust duct and roof cap and shutter.
r. 55 gallon steel drum.
s. Stand: 2-inch by 2-inch tubular steel, oxide primed with a urethane topcoat.
t. Power Cable: 10 feet (3-phase plug required).
u. Approximate Weight: 300 pounds.

2.2.2. Basis-of-Design Product: Ruwac, Model No. DS1400B1-C SILO.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Install central vacuum system at locations indicated to comply with central vacuum system manufacturer's written instructions.
b. Install central vacuum system in position and relationship to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating central vacuum system.

(1) Test central vacuum system to verify that controls, limit switches, and other operating components are in optimum functioning condition.

3.2 PROTECTING AND CLEANING

Protect central vacuum system after installation from damage during construction. If damage occurs despite such protection, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11014

NEX SERVICES DISPLAY EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Personalized Services Area Work Cabinets / Counters

b. Optical Shop Work Cabinets / Counters

c. Barber/Beauty Shop Equipment

1.2 SUBMITTALS

1.2.1. Product Data

a. Manufacturer's product description.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
R Review each submittal, mark to indicate action taken, and return.

PART 2 - PRODUCTS

2.1 Personalized Services Cabinets and counters.

2.1.1. Sizes and Quantities as indicated on drawings

a. #009D1 Helium Cabinet with Lock.
b. #009D3 Curly Ribbon Cabinet with Top Feed Remote Regulator.
c. #009M1 Sink Cabinet with 30” x 24” x 16” Bowl SS Sink, Gooseneck Faucet with Spray.
d. #009Q Open Waste Cavity with Hinge Door.
e. #009J2 Storage Cabinet with Door.
f. #009E Wrap Station with Paper Cutters.
g. #009N Ribbon Drawer.
h. #009K2 Storage Cabinet
i. Finished Panel.
j. #009K2 Storage Cabinet.

k. #009J1 Storage Cabinet with Drawer.
l. #009O Multi Drawer Cabinet.
m. #009V Western Union Cabinet with Vented Doors.
n. #009K1 Western Union Storage Cabinet with Drawer.
o. #009T Register Cabinet
p. #009L1 Side Register Cabinet with Drawer.
q. #009A Perimeter Step with McCue Bumper.
r. #010K (Modified) ¼ Round Two Tier Radius Merchandising Step
s. Finish: HPL As Selected by NEXCOM

2.1.2. Accessories

a. As required for complete installation.

2.1.3. Basis-of-Design:

a. MEI Systems, LaGrange Park, IL 800-352-7220, www.mei-systems.com.

2.2 Optical Shop Cabinets and counters.

2.2.1. Sizes and Quantities as indicated on drawings

a. F26 EX-2 Exam Room Wall Cabinet Set.
b. G-27 EX-3R Exam Room Desk-Table.
c. H-28 Custom OPT06 Half Vision Showcase.
d. I29 Custom OPT07 Optical Cash Wrap.
e. J30 Custom Workstation.
f. K37 BC-405 Base Cabinet.
g. L36 Custom BC-402 Base Cabinet.
h. M35 Custom Base Cabinet.
i. N-31, 32, 33, 34 UC-402 Upper Cabinet.
j. Finish: HPL As Selected by NEXCOM

2.2.2. Accessories

a. As required for complete installation.

2.2.3. Basis-of-Design:

a. Fashion Optical Displays, Paradise, CA 800-824-4106, www.fashionoptical.com.

2.3 Barber/Beauty Shop Equipment.

2.3.1. Sizes and Quantities as indicated on drawings

a. Koken/NA-836FS + NA-836FS EXT Glass Display Shelves.
b. Koken/NA-310 Mirror with S.S. Shelf and Tray.
c. Koken/NA-500 Barber Station.

d. Koken/NA-500S Barber Station with Sink.
e. Venus #HD-608 Hair Dryer.
f. Takara Belmont #M-2035-48 Shampoo Cabinet and Bowl.
g. Finish: HPL As Selected by NEXCOM

2.3.2. Accessories

a. As required for complete installation.

2.3.3. Basis-of-Design:

a. Takara Belmont USA, Rockville, MD, 301-577-0212.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine location, with Installer present, for compliance with requirements and other conditions affecting installation of shelving.
(1) Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General
a. Install units in locations and at mounting heights indicated and according to manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
b. Coordinate Project-site-assembled units with grounds, trim, and accessories. Join parts with a neat, precision fit.

3.3 ADJUSTING AND CLEANING

Verify that accessories required for each unit have been properly installed. Clean units according to manufacturer's written instructions.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11025

KEY CONTROL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

1.1.1.1. Key Control Cabinets.

a. 1E12A Key control cabinet, 16 key sets.
b. 1E12B Key control cabinet, 32 key sets.

1.2 SUBMITTALS

1.2.1. Product Data:

a. Commercial warranty.
b. Installation and operating instructions.
c. Parts list.

1.2.2. Key Control System Instruction Program

a. Submit copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1.2.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Key Control System Instruction Program	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of

design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 1E12A: KEY CONTROL CABINET, 16 KEY SETS

2.2.1. General

a. Design key management system to control key access and accountability in store and warehouse operations:
b. Provide a stand-alone system with software and hardware for programming via built-in keypad and LCD display, and report generation via integrated printer with capability to generate management reports for audit trail, employee use, overdue keys, and keys in use.
c. Cabinet dimensions: 20-1/2 inches wide by 29-1/2 inches high by 9-3/4 inches deep.
d. Control Box dimensions: 20 inches wide by 4 inches high by 11 inches deep.

2.2.2. Operational

a. Construct of minimum 18 gauge steel cabinet and 13 gauge steel door. Locate mounting screws/bolts, electrical connections, and communication connections within the cabinet.
b. Equip with tamper alarms provided for keypad, door, and keys. Equip with internal relays that automatically activates remote alarms or intrusion detection system (IDS) for unauthorized key removal, non-returned keys, door left open, AC power outage, and keypad tampering.
c. Provide with integrated battery back-up for 24 hour operation in event of power outage.
d. System shall control a minimum of 2000 each 4-8 digit individual user codes/PINS that allow door and key access. Each user PIN can be assigned a minimum of four programmable time zones to control key use times.
e. Key control functions

(1) Door access PIN allows key removal for user without additional code entry.
(2) Minimum of four time zones per user per key. Programmable to release to users only within certain time zones.
(3) During entry of a user, key sets not authorized shall remain individually entrapped to deny user access.
(4) System shall have key control capability as specified below.

f. Internal memory shall be non-volatile and remain intact during a power outage. Internal memory shall retain the latest 4000 transactions at all times. Minimum data shall include all events by date, time, and user code, and all programmed functions.
g. Provide with RS-232 serial port and 150 feet of RS-232 serial cable with each unit. Management reports shall include: access audit trail (key movement by user, time, date), alarm events, employee use, overdue keys, and keys in use.
h. System shall be capable of upgrading to allow downloading data from a remote PC and on-line monitoring. Modem is not required, but shall be modem capable.
i. Provide with tamper proof individual key holder/ring assemblies. Key holders shall be one time sealable and not reusable if forced open. Tools necessary for key holder use shall be included. Key holder/ring assemblies quantity shall equal two times the key storage capacity.
j. Provide 20 tamper-proof key rings and 25 replacement hubs for key rings with each unit.
k. Electrical: 110 volts, 60 hertz, 1 phase.

2.2.3. Basis-of-Design Products: Morse Watchman, Inc., KeyWatcher Illuminated System. Telephone 203-264-4949 X532 or www.morsewatchman.com.

a. Model KW-8498 (16 key sets).
b. Tamper-proof Key Rings and Replacement Hubs for Key Rings – Model KR 15-20.

2.3 ITEM 1E12B: KEY CONTROL CABINET, 32 KEY SETS

2.3.1. General

a. Design key management system to control key access and accountability in store and warehouse operations:
b. Provide a stand-alone system with software and hardware for programming via built-in keypad and LCD display, and report generation via integrated printer with capability to generate management reports for audit trail, employee use, overdue keys, and keys in use.
c. Cabinet dimensions: 20-1/2 inches wide by 29-1/2 inches high by 9-3/4 inches deep.
d. Control Box dimensions: 20 inches wide by 4 inches high by 11 inches deep.

2.3.2. Operational

a. Construct of minimum 18 gauge steel cabinet and 13 gauge steel door. Locate mounting screws/bolts, electrical connections, and communication connections within the cabinet.
b. Equip with tamper alarms provided for keypad, door, and keys. Equip with internal relays that automatically activates remote alarms or intrusion detection system (IDS) for unauthorized key removal, non-returned keys, door left open, AC power outage, and keypad tampering.
c. Provide with integrated battery back-up for 24 hour operation in event of power outage.
d. System shall control a minimum of 2000 each 4-8 digit individual user codes/PINS that allow door and key access. Each user PIN can be assigned a minimum of four programmable time zones to control key use times.
e. Key control functions

(1) Door access PIN allows key removal for user without additional code entry.
(2) Minimum of four time zones per user per key. Programmable to release to users only within certain time zones.
(3) During entry of a user, key sets not authorized shall remain individually entrapped to deny user access.
(4) System shall have key control capability as specified below.

f. Internal memory shall be non-volatile and remain intact during a power outage. Internal memory shall retain the latest 4000 transactions at all times. Minimum data shall include all events by date, time, and user code, and all programmed functions.
g. Provide with RS-232 serial port and 150 feet of RS-232 serial cable with each unit. Management reports shall include: access audit trail (key movement by user, time, date), alarm events, employee use, overdue keys, and keys in use.
h. System shall be capable of upgrading to allow downloading data from a remote PC and on-line monitoring. Modem is not required, but shall be modem capable.
i. Provide with tamper proof individual key holder/ring assemblies. Key holders shall be one time sealable and not reusable if forced open. Tools necessary for key holder use shall be included. Key holder/ring assemblies quantity shall equal two times the key storage capacity.
j. Provide 30 tamper-proof key rings and 50 replacement hubs for key rings with each unit.
k. Electrical: 110 volts, 60 hertz, 1 phase.

2.3.3. Basis-of-Design Products: Morse Watchman, Inc., KeyWatcher Illuminated System. Telephone 203-264-4949 X 532 or www.morsewatchman.com.

a. Model KW 8499 (32 key sets).
b. Tamper-proof Key Rings and Replacement Hubs for Key Rings – Model KR 15-20.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine roughing-in for electrical systems to verify actual locations of connections before key control cabinet installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Comply with key control cabinet manufacturer's written installation instructions, unless more stringent requirements are indicated.
b. Install key control cabinet where indicated on Drawings and where not indicated install key control cabinet where directed by Contracting Officer.

3.2.2. Anchorage

a. Securely anchor key control cabinet to wall with concealed devices.

3.2.3. Clearances

a. Verify that clearances are adequate to properly and freely operate key control cabinet.

3.2.4. Connections

a. Connect key control cabinet to electrical systems, hardwired, not plugged-in to an outlet.

3.3 FIELD QUALITY CONTROL

3.3.1. Testing

a. Test, adjust, and verify operation of key control cabinet. Repair or replace any item found to be defective or operating below rated capacity.

3.4 CLEANING AND ADJUSTING

Adjust equipment for proper operation. After completion of installation, clean and polish all exposed surfaces.

3.5 KEY CONTROL CABINET SET-UP AND TRAINING

CONSTRUCTION ISSUE

Engage a factory-authorized service representative to train Government's personnel to set-up, adjust, operate, and maintain key control equipment. Conduct training at Project site. Training shall include both supervisory and general personnel.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11031

TELLER AND SERVICE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Cash tray window.

1.2 SUBMITTALS

1.2.1. Product Data

a. Include manufacturer's standard details and installation and maintenance instructions.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 TELLER AND SERVICE EQUIPMENT

2.2.1. Cash Tray Window.

a. Basis-of-Design Product: Nissen & Company, Inc.; Series C, custom size as indicated.
b. Frames and Glass Channels: Type 6063-T5 extruded aluminum.

c. Glass: Uncoated, clear, laminated float glass complying with ASTM C 1172, Kind LA, Type I (transparent glass, flat), Class 1 (clear), and Quality q3 (glazing select), fabricated of two 1/8 inch thick plies with 0.015 inch thick clear polyvinyl butyral interlayer.
d. Metal Finish: Anodized 204R-1 clear alumite.
e. Lock: Sliding bolt type.
f. Slide Stop: Provide factory installed slide stop on each jamb that will limit vertical opening height of operable lite to 4-inches.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Items shall be installed where indicated on the Drawings.
b. Install units and accessories according to Shop Drawings, manufacturer's data, and as specified.
c. Built-In Equipment: Securely anchor units to supporting substrate with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

3.2 ADJUST AND CLEAN

3.2.1. Testing

a. Test each item of equipment to verify proper operation. Make necessary adjustments.

3.2.2. Accessories

a. Verify that accessory items required have been furnished and installed.

3.2.3. Cleaning

a. Remove packing material from equipment items and leave units in clean condition, ready for operation.
b. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
c. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of final acceptance. Wash glass as recommended by glass manufacturer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11101

BAKERY EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 1B10-A Freezer, Reach-In, 52 Cubic Feet.
b. 1B12-B Oven, Rotary, Roll-In, Single Rack, Gas.
c. 1B15 Oven, Mini-Rotary with Proofing Cabinet
d. 1B29-A Self-Service Non-Refrigerated Bakery Display Case.
e. 1B30-A Self-Service Refrigerated Bakery Display Case.

1.1.2. Equipment Specified in Division 15 Section “Product Refrigeration System”.

a. 1B08-2 Remote, Case, Frozen Food, with Glass Doors.

1.1.3. Equipment Specified in Division 15 Section “Plumbing Fixtures” and as indicated on drawings.

a. 4S00 Hand Wash Sink.

1.2 SUBMITTALS

1.2.1. Product Data

For each item of equipment required, including the manufacturer's standard details and installation and maintenance instructions.

a. Manufacturer's standard commercial warranty.
b. Operating instructions.
c. Specifications and parts manual.
d. Underwriters Laboratories (UL), Inc., listing.
e. National Sanitation Foundation (NSF) approval or acceptance.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer to perform work of this Section who is an authorized representative of the bakery equipment manufacturer, who has specialized in installing bakery department equipment, who has completed installations similar in design and extent to that indicated for this Project, and who has a record of successful in-service performance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 1B10-A: FREEZER, REACH-IN, 52 CUBIC FEET

2.2.1. Salient Characteristics:

a. Cabinet exterior front, one piece sides, louver assembly, and doors constructed of heavy gauge stainless steel with #4 finish. Cabinet interior and door liners are constructed of anodized aluminum. Exterior cabinet top, back and bottom are constructed of heavy gauge aluminized steel.
b. Top mounted, self-contained, balanced refrigeration system located behind a one piece louver assembly.
c. Plenum effect blower coil, large, high humidity evaporator coil located outside the food zone and a top mounted non-electric condensate evaporator.
d. Automatic non-electric condensate evaporator. No plumbing required to dispose of condensation/defrost water.
e. Automatic preset time activated electric defrost.
f. Digital thermometer and temperature controls. Standard operating temperature: 0 to -5 degrees F.
g. Replaceable vinyl magnetic door gaskets with anti-condensate heaters located behind each door opening.
h. Insulation: Cabinet and doors contain high density, non-CFC, foamed-in-place polyurethane insulation.
i. Full length doors are equipped with removable plug cylinder locks and guaranteed for life cam-lift, gravity action, self-closing metal, glide hinges with stay open feature at 120 degrees. Door handle is mounted horizontally over recess in door which limits protrusion from door face into aisle ways.
j. Interior lighting controlled by opening and closing doors.
k. Adjustable 6-inch high stainless steel legs.
l. Capacity: 52 cubic feet.
m. Cabinet approximate overall dimensions:

(1) 58 inches long.
(2) 35 inches deep.
(3) 83 inches high on 6-inch legs.

n. Electrical:

(1) 3-wire 115 volts, 60 hertz, single phase.
(2) Full load amperes: 14.9.

(3) Equipped with one 9-foot cord and NEMA 5-20P plug.

o. Refrigeration Data:

(1) Refrigerant: R-404A.
(2) BTU/HR H.P.: 3790 (3/4 HP).

2.2.2. Accessories:

a. Provide one full door section with chrome plated steel rod type slide assemblies to support up to thirty-eight 18-inch by 26-inch sheet pans. This door section is the left door when facing the unit.
b. Provide other full door section with 18 gauge stainless steel adjustable angle type shelf brackets for full height of each door section on minimum 3-inch centers to support 18-inch by 26-inch sheet pans.
c. Provide 12 stainless steel wire shelves with shelf clips.

2.2.3. Basis-of-Design Product: Traulsen & Co., Inc. (800) 825-8220 or www.traulsen.com.

a. A Series 2-Section Full Length Door Model ALT232WUT-FHS. (Energy Star Listed)
b. No. 4.Tray Slide.
c. No. 2 Tray Slide.
d. Stainless steel shelves.

2.3 ITEM 1B12-B: OVEN, ROTARY, ROLL-IN, SINGLE RACK, GAS.

2.3.1. Salient Characteristics:

a. Gas operated.
b. Capacity: One single full-size baking rack.
c. Self-contained cast spherical steam system.
d. In-shot burner system with a heat exchanger consisting of 18 independent high-temperature, stainless steel tubes. In-shot burners will have no moving parts.
e. Stainless steel interior and exterior.
f. Flush stainless steel floor panel with extender kit.
g. Integral hood with single-point exhaust and grease filters complying with NFPA 96 for Type I (grease) installation. Hood is fully welded with grease trough, drain cup, and UL classified grease filters. Refer to Division 15 for duct and roof mounted exhaust fan. Interlock exhaust fan control signal to oven control.
h. Provide with a digital, programmable control system which incorporates: minimum of 99 menus.
i. Automatic Damper controls.
j. Rack lift rotation system.
k. Field reversible oven door with three panes of glass in the viewing window to ensure a safe-to-the-touch exterior.
l. Electrical (two supplies required):

(1) Control:

(a) 120 volts, 60 hertz, single phase.
(b) 20 amp dedicated circuit.

(2) Heating Element:

(a) 208-240 volts, 60 hertz, three phase.
(b) 2.2 - 2.4amps.

(3) Gas

(a) 1” NPT connection
(b) 180k BTU/hr @ 5-14” w.c.

(4) Hood Vent:

(a) 8-inch diameter connection collar.
(b) Minimum 690 cfm required with 0.6” w.c. static pressure drop through hood.
(c) Oven provided relay with 10.0 amp ½ H.P. at 120 volts output for fan operation.

m. Plumbing:

(1) Water- ½ inch NPT. Cold water at 30 psi minimum at 3.0 GPM flow rate.
(2) Drain – Choose either front or rear drain, and plug the drain connection that is not used. Route to air-gap drain as indicated on drawings.

n. Approximate Dimensions:

(1) 55 inches wide.
(2) 51 inches deep (without hood or drain fittings).
(3) 104 inches high.

2.3.2. Accessories:

a. Stainless steel floor extender kit.
b. Oven Racks: Aluminum side load type. Provide two single roll-in racks with oven ready casters.
c. Rack Capacity: Single rack holds twenty 18-inch by 26-inch sheet pans with 3-inch spacing.

2.3.3. Basis-of-Design Product: Baxter Manufacturing. (800) 333-7447 or www.baxterbakery.com.

a. Oven: OV500G1.
b. Single Oven Rack: BXSSA-20B2.

2.4 ITEM 1B15: OVEN, MINI-ROTARY WITH PROOFING CABINET

2.4.1. Salient Characteristics:

a. Combination unit: Oven mounted on an associated proofing cabinet. Oven designed for holding baking sheet pans on an integral rotary rack. Proofing cabinet designed for holding and simultaneously proofing sheet pans.
b. Stainless steel construction interior and exterior.
c. Electrically operated heating system; shall NOT use gas.
d. Oven accommodates 8 each 18- by 26-inch sheet pans with 4-inch spacing.
e. Proofer accommodates 16 each 18- by 26-inch sheet pans with 3-inch spacing.
f. Overall approximate dimensions with standard trim:

(1) Oven: 48 inches wide by 38 inches deep by 48 inches high

(2) Proofer: 48 inches wide by 35 inch deep by 34 inch high with casters.
(3) Combined height of 82 inches.

g. Oven cabinet.

(1) Provide glass doors allowing view of sheet pans during the cooking process.
(2) Self-contained steam injection system.
(3) Digital programmable control system which incorporates 99-recipe settings; 4-step baking, fan delay feature, automatic damper, temperature, time, steam, blower, and venting controls.
(4) Provide for two electrical supply circuits:

(a) Heating: 208V / 60 HZ / 3PH / 50A.
(b) Control: 120 V / 60 HZ / 1PH / 15A max dedicated circuit.

(5) Water connection point: ½-inch cold water @ 30 – 75 psi.
(6) Drain fitting: ½ inch to air-gap drain.

h. Proofer cabinet.

(1) Provide for one supply circuit, separate from oven circuits: 120 V / 60 HZ / 1 PH / 16A, 1/70 H.P.
(2) Provide with digital humidity and temperature controls.
(3) Water connection point 1/4-inch cold water @ 30 – 80 psi.
(4) Drain fitting: ½ inch to air-gap drain.
(5) Provide with four each 4-inch swivel casters (two locking) for mobility.
(6) Unit minimum operating temperature range of 80 to 120 degrees Fahrenheit for proofing.

2.4.2. Basis-of-Design Product: Baxter Mfg. (800) 777-2828 or www.baxtermfg.com.

a. Oven: Model OV300E.
b. Proofer Model MB300.

2.5 ITEM 1B29-A SELF-SERVICE NON-REFRIGERATED BAKERY DISPLAY CASE

2.5.1. Salient Characteristics:

a. Self-service non-refrigerated bakery merchandiser with clear acrylic lift-up doors.
b. Plastic laminate premium color indicated on drawings on all exposed exterior surfaces, with silver color trim.
c. Flat front panel with 1 inch bumper on front and exposed ends.
d. White color case interior with clear glass rear sliding doors.
e. Full end panels with mirror facing interior of case.
f. One 26-inch deep wire display shelf and one 20-inch deep wire display shelf, removable and adjustable vertically on 1 inch centers at zero-degree, 5-degree, and 10-degree angles.
g. Six clear acrylic lift-up self-service doors.
h. Nine 18-inch by 26-inch trays.
i. Fluorescent T-8 lighting with protective coating at top of case and beneath each wire shelf.
j. Recessed front storage area for packaging supplies.
k. Adjustable levelers.
l. Nominal Dimensions:

(1) 58 inches wide.

(2) 41 inches deep.
(3) 51 inches high.

m. Electrical:

(1) 120 volts, 60 hertz, single phase.
(2) 1.06 amps.
(3) Six-foot power cord with NEMA 5-15P plug configuration.

2.5.2. Basis-of-Design Product: Structural Concepts. (231) 798-8888 or www.structuralconcepts.com.

a. Model HVAD56SS.

2.6 ITEM 1B30-A SELF-SERVICE REFRIGERATED BAKERY DISPLAY CASE

2.6.1. Salient Characteristics:

a. Self-service refrigerated bakery merchandiser.
b. Self-contained refrigeration system designed to operate in ambient conditions of 75 degrees F and 55 percent relative humidity.
c. Integrated Product Temperature (IPT): 41 degrees F.
d. Digital thermometer (Fahrenheit).
e. Electric condensate evaporator pan.
f. Compressor air intake through rear of case and exhaust through front of case. Front panel cannot be blocked.
g. Plastic laminate premium color indicated on drawings on all exposed exterior surfaces, with silver color trim.
h. Flat front panel with 1 inch bumper on front and exposed ends.
i. White color case interior with solid back panel.
j. Full end panels with mirror facing interior of case.
k. One 24-inch deep clear glass display shelf, one 20-inch deep clear glass display shelf, and one 16-inch deep clear glass display shelf, removable and adjustable vertically on 1 inch centers at zero-degree, 5-degree, and 10-degree angles.
l. Fluorescent T-8 lighting with protective coating at top of case and beneath each glass shelf.
m. Adjustable levelers.
n. Nominal Dimensions:

(1) 50 inches wide.
(2) 42 inches deep.
(3) 51 inches high.

o. Electrical:

(1) 220 volts, 60 hertz, single phase (requires 3 wires + ground).
(2) 12.81 amps.
(3) Six-foot power cord (field installed) with NEMA 14-20P plug configuration.

2.6.2. Basis-of-Design Product: Structural Concepts. (231) 798-8888 or www.structuralconcepts.com.

a. Model HV48RSS

PART 3 - EXECUTION

3.1 INSPECTION

a. Check that surfaces to which work will be secured are sound and free of irregularities interfering with installation.
b. Do not begin installation until satisfactory conditions have been corrected.

3.2 PREPARATION

a. Obtain dimensions from the site affecting work of this Section.
b. Ensure that roughed-in openings, built-in anchorage, and reinforcing required for proper installation of work of this Section are correctly sized, installed and located.
c. Obtain electrical and mechanical service characteristics and rough-in locations from site.

3.3 INSTALLATION

a. Installation of equipment shall be in accordance with NSF Manual on Sanitation Aspects of Food Service Equipment, as applicable.
b. Install items in accordance with manufacturer's instructions and installation procedures. Supervision shall be performed by workers skilled and familiar with installation of the equipment specified.
c. Set units plumb, square and true, securely anchored to building structure.
d. Insulate items to prevent electrolysis between dissimilar metals.
e. Seal spaces between built-in equipment, walls and columns with preformed foam sealants specified in Division 7 Section “Joint Sealants”, shim level and rigid, use proper type anchoring devices for materials encountered and usage expected.
f. Cut, fit and patch; coordinate with work of other Sections involved.
g. Cut and drill tops, backs, sides and bottoms for service outlets and fixtures. Install fixtures and fittings. Make connections to services.
h. Sequence installation and erection to ensure that mechanical and electrical connections are effected.
i. Deliver instruction sheets to Contracting Officer and instruct Government's personnel in the proper use, adjustment, and maintenance of equipment.

3.4 ADJUSTING AND CLEANING

a. Adjust doors, drawers, hardware fixtures, and other moving and operating parts to function smoothly and correctly.
b. Replace damaged items with new material.
c. On completion of installation, touch up all marred or abraded finished surfaces.
d. Clean equipment cases, counters, shelves, glass, legs, hardware, fittings and fixtures. Wipe down surfaces to remove fingerprints and markings and leave in clean condition.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11102

DELI EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 1D04-A Refrigerator, Reach-In, 51.6 Cubic Feet.
b. 1D07-6 Sushi Preparation Table (Mobile Island, Refrigerated, Self-Contained).
c. 4SPPM Scale/Printer, Programmable, 30 lb, Stand-Alone or Master.
d. 4SMA Slicer, Meat, Automatic.
e. 1D09 Oven, Rotisserie, Counter Top Model, with Base Cabinet.
f. 1D14-A Case, Hot Foods, Heated, Self-Service Island, 3 Wells with Base.
g. 3-4HW1 Hand Wrapper, One Roll, Table Model.

1.1.2. Equipment specified in Division 10 Section “Queuing Systems.”

a. 3-2D04 Take-A-Number System, Digital.

1.1.3. Equipment specified in Division 15 Section “Product Refrigeration System.”

a. 1D00 Case, Deli, Refrigerated, Clerk Service.
b. 1D22-6 Case, Wide Island Display, Self-Contained
c. 1G24-6 Merchandiser, Grab N’ Go, Self-Contained, Multi-Deck

1.1.4. Equipment Specified in Division 15 Section “Plumbing Fixtures” and as indicated on drawings.

a. 4S00 Hand Wash Sink.
b. 4S03 Sink, 3-Compartment, Stainless Steel.
c. 2M06 Wall Mount Drench Hose.

1.2 SUBMITTALS

1.2.1. Product Data

For each item of equipment required, including the manufacturer's standard details and installation and maintenance instructions. In addition, submit the following, as applicable:

a. Manufacturer's standard commercial warranty.
b. Operating instructions.
c. Specifications and parts manual.
d. Underwriters Laboratories (UL), Inc., listing.
e. National Sanitation Foundation (NSF) approval or acceptance.
f. Approval of OSHA accredited safety testing laboratory.

g. Commercial Refrigeration Industry Standard CDS-S1-86.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer to perform work of this Section who is an authorized representative of the deli equipment manufacturer, who has specialized in installing deli department equipment, who has completed installations similar in design and extent to that indicated for this Project, and who has a record of successful in-service performance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 1D04-A: REFRIGERATOR, REACH-IN, 51.6 CUBIC FEET

2.2.1. Salient Characteristics:

a. Cabinet exterior, including front, one piece sides, louver assembly, and doors constructed of heavy gauge stainless steel. Cabinet interior and door liners are constructed of anodized aluminum. Exterior cabinet top, back and bottom are constructed of heavy gauge aluminized steel.
b. Top mounted, self-contained, balanced refrigeration system located behind a one piece louver assembly.
c. Plenum effect blower coil, large, high humidity evaporator coil located outside the food zone and a top mounted non-electric condensate evaporator.
d. Automatic non-electric condensate evaporator. No plumbing required to dispose of condensation/defrost water.
e. Digital thermometer and temperature controls. Standard operating temperature: 34 to 38 degrees F.
f. Replaceable vinyl magnetic door gaskets with anti-condensate heaters located behind each door opening.
g. Insulation: Cabinet and doors contain high density, non-CFC, foamed-in-place polyurethane insulation.
h. Full length doors are equipped with removable plug cylinder locks and guaranteed for life cam-lift, gravity action, self-closing metal, glide hinges with stay open feature at 120 degrees. Door handle is mounted horizontally over recess in door which limits protrusion from door face into aisle ways.
i. Interior lighting controlled by opening and closing doors.
j. Adjustable 6-inch high stainless steel legs.
k. Capacity: 51.6 cubic feet.

l. Cabinet approximate overall dimensions:

(1) 58 inches long.
(2) 35 inches deep.
(3) 83 inches high on 6-inch legs.

m. Electrical:

(1) 115 volts, 60 hertz, single phase.
(2) Full load amperes: 10.4.
(3) Equipped with one 9-foot cord and NEMA 5-15P plug.

n. Refrigeration Data:

(1) Refrigerant: R-134a.
(2) BTU/HR H.P.:4200 (1/2 HP).

2.2.2. Accessories:

a. Provide full door sections with 18 gauge stainless steel angle type shelf brackets for full height of each door section on minimum 3-inch centers to support 18-inch by 26-inch sheet pans.
b. Provide 18 stainless steel wire shelves with shelf clips.

2.2.3. Basis-of-Design Product: Traulsen & Co., Inc.. (800) 825-8220 or www.traulsen.com.

a. “A” Series 2-Section Full Length Door Model AHT232WUT-FHS.
b. No. 2 Tray Slide.
c. Stainless steel shelves.

2.3 ITEM 1D07-6: SUSHI PREPARATION TABLE (MOBILE ISLAND, REFRIGERATED, SELF-CONTAINED)

2.3.1. Salient Characteristics:

a. Approximate Dimensions: 72 inches long, 58 inches deep, 55 inches high.
b. Refer to Division 15 Section “Refrigeration Monitoring and Control System (RMCS)” for refrigeration monitoring sensors installed by that Section.
c. Self-contained refrigeration system with R-404A or R-134A refrigerant, and bottom mounted air-cooled condensing unit designed to maintain a product temperature of 30 – 34 degrees Fahrenheit. Designed for operation at maximum of 75 degrees Fahrenheit DB and 55 percent RH. Condensing unit shall be designed to slide out for ease of maintenance.
d. Compressor unit with minimum 1/3 horsepower.
e. Electrical: 120 volt, 60 hertz, 1 phase with (30 amp) NEMA L5-30 plug.
f. Electric condensate dissipater pan.
g. Electronic thermostat temperature controls.
h. Electronic temperature sensors.
i. One solar digital thermometer.
j. Energy efficient fans
k. Off-cycle defrost.
l. On/Off light switch for case lighting with T-8 fluorescent lamps and electronic ballasts.

m. Four casters, 5 inches diameter (NSF). Position locks shall be provided on the two rear casters as a minimum.
n. CFC free foamed-in-place insulation.
o. Seamless, non-corrosive tub.
p. Copper tube aluminum finned coils.
q. Case exterior color as indicated on drawings, with stainless steel interior.
r. Welded steel chassis.
s. Preparation Table Work Surface:

(1) Corian solid surfacing, white.
(2) Two step work surface consisting of 22 inches deep (f to b) upper surface for food storage pans and 18 inches deep (f to b) lower surface that steps down approximately 6 inches.
(3) Upper work surface equipped with refrigerated insert areas for food ingredient pans. Two insert areas on 1D05-4 case and three insert areas on 1D05-6 case, each approximately 21 inches wide x 13 inches length x 4 inches deep. Insert areas shall accommodate at least six each (total) smaller standard food ingredient pans.
(4) Stainless steel pans with clear lids: Provide two 1/3 size pans, six 1/6 size pans, and two 2/3 size pans per insert area.
(5) Fixed-mount front sneeze guard panel; clear tempered glass; straight profile.
(6) Two tempered glass end panels mounted on top of insulated end panels.

t. Self Service (Front):

(1) One adjustable (height and angle) 15-inch deep shelf with undershelf light, full length of case, stainless steel.
(2) Base deck (adjustable angle) lighted with continuous ledge light, full length of case, stainless steel.
(3) Canopy light (same profile as ledge light), full length of case, stainless steel.
(4) Air dam: 3/8 inch thick clear tempered glass at front of base deck.

u. Case front nosepiece: Painted aluminum extrusion to match exterior case color.
v. Molded bumper (1 inch wide) across front of display case, centered on nosepiece. Color as indicated on drawings.
w. Stainless steel kickplate.
x. Two insulated end panels: Laminated exterior to match case color with stainless steel interior and stainless steel edge molding; fabricate top to receive glass end panel.
y. Rear refrigerated storage, medium temperature, with see-through glass, NSF-7 certified sliding doors, base and adjustable height upper, lighted.
z. Narrow “U” channel chase at top rear of self-service case for wire service to optional electrical outlets.

2.3.2. Basis-of-Design Product: Southern Store Fixtures, Inc. (800)552-6282 or www.southernstorefixtures.com.

a. Model PSSC-H-SG-IP, Sushi Preparation Table (Mobile Island, Refrigerated, Self-Contained).

2.4 ITEM 4SPPM STAND-ALONE SCALE PRINTER

2.4.1. Salient Characteristics:

a. Integrated Scale/Printer:

(1) Controls all weighing and printing functions for manual applications.

(2) Programmable label formatting: Move, add, delete, select size and direction of printed data, and program label size (length/width).
(3) Unit price and total price computing value of from $0.01 - $999.99.
(4) Customer view screen displays price per pound, net weight, total price, and item description.
(5) Minimum of 16 fast look-up key items per screen for operator.
(6) Display: LCD Dot matrix 640x480.
(7) 350 presets with 10 category pages.
(8) Minimum 8MB RAM memory capacity.
(9) Stainless steel platter 17-3/4 inches by 11-5/8 inches.
(10) Keyboard: Touchscreen.
(11) RS485 telephone communications capable with satellite scales.
(12) TCP / IP (transmission control protocol / intranet protocol) communications capable. Not required to be installed for current use, but capable for future upgrade.
(13) 30 lb by 0.01 capacity.
(14) Automatically prints product name, unit price, total price, and weight on label, for hand application to wrapped packages. Capable of accommodating pre-printed labels with USDA statement and organization logo.
(15) Prints text, nutrition facts, and safe handling labels complying with FDA and USDA label requirements.
(16) Produces universal bar code.
(17) Prints label lengths from 1 inch to 6 inches and widths from 1.6 inches to 3.15 inches.
(18) Uses die cut or tear-off continuous stock labels.
(19) Prints a minimum of 2000 characters per label for ingredients and nutritional information.
(20) Prints up to 3240 characters of extra text per PLU (product look-up code) memory for item file, using 1-6 digit PLU codes.
(21) Prints up to 54 characters x 60 lines (portal) on 2-5/8-inch width stock.

b. Electrical

(1) 110 volt, 60 hertz, single phase.
(2) 8- to 10-foot length power cord, with grounded type plug.

2.4.2. Basis-of-Design Product: Mettler-Toledo Inc. (804) 513-2610, (804) 794-4177, or www.mt.com.

a. Model UC-ST Smart Touch.

2.5 ITEM 4SMA SLICER, MEAT, AUTOMATIC

2.5.1. Salient Characteristics:

a. Angle gravity feed type table top slicer with a 11-3/4-inch knife diameter.
b. Positive angle carriage design enabling operator to slice without manual feed..
c. Tilt back and removable carriage system for cleaning and sanitation procedures. Lift lever for raising and propping slicer to tilted position for cleaning underneath slicer.
d. 12-1/2-inch manual carriage travel.
e. Adjustable variable speed capability: 28, 33, 38, 42, 47, 52 strokes per minute. Speed may be changed with slicer motor on or off. Slicer may be turned off with a quick turn of index knob to the closed position after slicing or by toggle type switch, operated by a push-pull rod.
f. Gauge plate adjustable to cut any thickness up to 1 inch.
g. Carriage shall take food up to 12 inches in width or 7- ½ inches in diameter.
h. Carriage can be disengaged from power whether slicer is in operation or not.
i. Automatic engagement and speed selector controls located in front of machine.

j. Home-start position of carriage to ensure it is in a convenient position before starting slicer.
k. Automatically turns off slicer after slicing.
l. Gauge plate interlock protects knife edge when indicator is at zero.
m. Carriage system interlock shall not allow tilt away or removal if gauge plate indicator is not closed.
n. In the event of power loss, slicer must be restarted before operation can continue.
o. A permanently mounted ring guard with integrated product deflector protects knife. No tools shall be required for removal of deflector to clean slicer.
p. One-piece 12 gauge knife cover; spring loaded for quick removal and replacement.
q. Gauge plate protects knife edge when indicator is closed.
r. Knife cover shall be quickly removed with a quarter turn of spring loaded locking knob.
s. One lever operation with two Borazon stones to sharpen and hone knife in five seconds. Removable and top mounted. Knife edge is shielded when sharpener is removed for cleaning. Borazon stones have lifetime guarantee.
t. Drive system: Hobart Poly V belt.; 400 rpm.
u. One-piece base:
v. Indexing Cam:

(1) Double action setting: First revolution of index cam for precision slicing; second revolution for thicker slicing selection.
(2) Indexing cam holds true to setting during slicing operation.

w. Electroless nickel plated transport single slide rod with an oil reservoir/oil wick for slide rod bearings.
x. Finish: Stainless steel carriage, knife, and knife cover; anodized aluminum base; aluminum with ribbed laminated stainless steel face gauge plate.
y. Meat Grip: Thermoplastic front mounted grip swings out of way when not in use.
z. Electrical:

(1) 120 volts, 60 hertz, single phase.
(2) ½ HP knife motor.
(3) 6-foot long power cord with grounded type plug.

2.5.2. Basis-of-Design Product: Hobart Corporation. (800) 666-1418 or www.hobartcorp.com.

a. Model 2912 Slicer.

2.6 ITEM 1D09: OVEN, ROTISSERIE, COUNTER TOP MODEL, WITH BASE CABINET

2.6.1. Salient Characteristics:

a. Stainless steel construction, both interior and exterior, tempered clear glass door, lighted cabinet interior for point-of-sale visibility, and fully insulated cabinet with solid back.
b. Electronic controls to permit programmable cooking cycles plus manual entry mode and digital display to show temperature and cook/hold times.
c. Food probe provided to connect directly to control panel to display internal temperature of food product.
d. Door sensor automatically stops/starts rotation, heaters and blowers when cabinet door is opened.
e. Cooking process to include infrared heating with cross flow convection.
f. Spit rotation switch for easy loading.
g. Eight (8) removable angled spits.
h. Drive assembly, drip trays and drain pans easily disassembled for quick clean-up.
i. Rotisserie parts to have coated surfaces for easier clean-up.

2.6.2. Approximate dimensions:

a. 41 inches wide.
b. 30 inches deep.
c. 44 inches high with legs

2.6.3. Utility Requirements

a. Electrical:

(1) 208 volts, 3 phase, 60 hertz.
(2) 33.6 amps
(3) Power cord with NEMA Plug Configuration: 15-50P.

2.6.4. Accessories:

a. Complete second set of angled spits for use as spares.
b. Adjustable legs.
c. Work Table: Stainless steel construction with four heavy-duty casters (two locking) and lower storage shelf. Approximate dimensions are 36 inches high, 40 inches wide, and 34 inches deep.

2.6.5. Basis-of-Design Product: Henny Penny Corporation. (800) 417-8417 or www.hennypenny.com.

a. Rotisserie: Model No. SCR-8 “Eight Spit Countertop.”
b. Work Table: Model SCT-800 “Rotisserie Table.”

2.7 ITEM 1D14-A: CASE, HOT FOODS, HEATED, SELF-SERVICE ISLAND, 3 WELLS

2.7.1. Salient Characteristics:

a. The heated island merchandiser/display case is designed to hold precooked hot food at the precise temperature levels to meet health code requirements and to meet maximum shelf-life requirements.
b. Three-well heated island merchandiser with 2-inch depth self-service insert
c. Constructed of stainless steel and clear tempered glass on both sides.
d. Tall profile curved glass case tor maximum product visibility.
e. Designed to use upper and lower heating elements to maintain food temperature ranges consistent with UL Sanitation standards.
f. Self service from both sides.
g. Cooled landing shelf on both sides.
h. Dual black bumpers to prevent scratching and denting.
i. Provided with a control panel with power switch, light control, thermometer, and temperature control.
j. Electrical - 120/208V; 3PH.; 8 Amp; 60Hz; with cord and plug.
k. Provided with food temperature probe with digital readout.
l. Electronic controls provide food probe temperature, air temperature, individual on/off displays for lower heat, radiant heat, and water pan heat.
m. Individual controlled radiant heaters over each well.
n. Incandescent lighting for food presentation.
o. Heated water pan for humidified environment.
p. Island Merchandiser Approximate Dimensions:. 45 inches wide by 41 inches deep by 30 inches high.
q. Island Merchandiser Base: Two island pedestals comprise the base. Each pedestal is approximately 18 inches wide by 37 inches deep by 28 inches high. Provide connector kit.

2.7.2. Basis-of-Design Product: Henny Penny Corporation. (800) 417-8417 or www.hennypenny.com.

a. Model No. HMI-103 merchandiser with PBI-280 base.

2.8 ITEM 3-4HW1 HAND WRAPPER, ONE ROLL, TABLE MODEL

2.8.1. Salient Characteristics:

a. Manually operated for stretch film advance and placement.
b. One roll capacity; accommodates stretch film up to 18 inches in width.
c. Base and frame constructed of heavy gauge aluminum.
d. Stainless steel wrapping surface.
e. Solid state controlled hot rod cut-off bar.
f. Sealing hot plate approximately 6 inches wide by 15 inches in length, covered with non-stick Teflon surface.
g. Provide with four large rubber feet.
h. Overall approximate dimensions

(1) 22-1/2 inches wide.
(2) 26 inches long.
(3) 8-3/4 inches high.

i. Electrical

(1) 115 volt, 60 hertz, single phase, 6.5 amps.
(2) 6-foot length power cord, with grounded type plug.

2.8.2. Basis-of-Design Product: Hobart Corporation. (800) 333-7447 or www.hobartcorp.com.

a. Model 625A Table Top Wrapper.

PART 3 - EXECUTION

3.1 INSPECTION

Check that surfaces to which work will be secured are sound and free of irregularities interfering with installation. Do not begin installation until satisfactory conditions have been corrected.

3.2 PREPARATION

a. Obtain dimensions from the site affecting work of this Section.
b. Ensure that roughed-in openings, built-in anchorage, and reinforcing required for proper installation of work of this Section are correctly sized, installed and located.
c. Obtain electrical and mechanical service characteristics and rough-in locations from site.

3.3 INSTALLATION

a. Installation of equipment shall be in accordance with NSF Manual On Sanitation Aspects of Food Service Equipment, as applicable.
b. Install items in accordance with manufacturer's instructions and installation procedures. Supervision shall be performed by workers skilled and familiar with installation of the equipment specified.
c. Set units plumb, square and true, securely anchored to building structure.
d. Insulate items to prevent electrolysis between dissimilar metals.
e. Seal spaces between built-in equipment, walls and columns with preformed foam sealants specified in Section 07901, shim level and rigid, use proper type anchoring devices for materials encountered and usage expected.
f. Cut, fit and patch; coordinate with work of other Sections involved.
g. Cut and drill tops, backs, sides and bottoms for service outlets and fixtures. Install fixtures and fittings. Make connections to services.
h. Sequence installation and erection to ensure that mechanical and electrical connections are effected.
i. Deliver instruction sheets to Contracting Officer and instruct Government's personnel in the proper use, adjustment, and maintenance of equipment.

3.4 ADJUSTING AND CLEANING

a. Adjust doors, drawers, hardware fixtures, and other moving and operating parts to function smoothly and correctly.
b. Replace damaged items with new material.
c. On completion of installation, touch up all marred or abraded finished surfaces.
d. Clean equipment cases, counters, shelves, glass, legs, hardware, fittings and fixtures. Wipe down surfaces to remove fingerprints and markings and leave in clean condition.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11103

GROCERY EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Closure panels for grocery equipment.

1.1.2. Government Furnished/ Government Installed (GF/GI) Grocery Equipment.

a. 2G14-A Shelving, Adjustable, Gondola, Cantilever, Island Type.
b. 2G14-C Contoured End Display Unit.
c. 2G14-D Shelving, Adjustable, Half-Gondola, Cantilever, Wall Type.
d. 2G14-I End Platform Display Deck, Free Standing Sloped Display.

1.1.3. Equipment specified in Division 13 Section “Cold Storage Rooms”.

a. 1G11 Remote, Dairy, Reach-In Doors, Milk/Eggs/Juice.

1.1.4. Equipment specified in Division 15 Section “Product Refrigeration System.”

a. 1G02 Case, Dairy, Multi-Deck.
b. 1G06 Case, Frozen Food, Wide Island, End Cap.
c. 1G07 Case, Frozen Food, Wide Island.
d. 1G10 Case, Frozen Food, w/Glass Doors.
e. 1G12 Case, Ice Cream, Frozen Foods, and Frozen Juice w/Glass Doors.

1.1.5. Equipment Specified in Division 15 Section “Plumbing Fixtures” and as indicated on drawings.

a. 4S01 Sink, 1 Compartment, Stainless Steel.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1. Sheet Metal Closure Panel

a. Stainless steel sheet, 0.0428 inch.

2.1.2. Fasteners

a. Conceal fasteners where possible; otherwise, locate where they will be as inconspicuous as possible. Size fasteners to support closure panels, with fasteners spaced to prevent buckling or waviness in finished surfaces.
b. Drill and tap holes needed for securing closure panels to other surfaces.

2.1.3. Flexible Cellular Neoprene Gaskets

a. ASTM D 1056, Type 1, Class A, grade as recommended by gasket manufacturer to obtain airtight seal for application indicated.

2.1.4. Joint Sealants for Concealed Joints

a. One-part, nonsag, solvent-release-curing, polymerized butyl sealant complying with ASTM C 1085 and formulated with minimum of 75 percent solids.

2.2 FABRICATION

2.2.1. General

a. Miter or cope trim members at corners and reinforce with bent metal splice plates to form tight joints.
b. Coordinate dimensions and attachment methods of closure panels with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned, unless otherwise indicated.
c. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch- wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.
d. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness specified for stretcher-leveled sheet metal and sufficient strength for indicated use.
e. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
f. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction.
g. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install closure panels.

2.3 FINISHES

2.3.1. General

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Complete mechanical finishes of flat sheet metal surfaces before fabrication where possible. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match sheet finish.
c. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.3.2. Stainless-Steel Closure Panel Finish

a. Remove tool and die marks and stretch lines or blend into finish.
b. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
c. Bright, Directional Polish: No. 4 finish.
d. When polishing is completed rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSPECTION

Check that surfaces to which work will be secured are sound and free of irregularities interfering with installation. Do not begin installation until satisfactory conditions have been corrected.

3.2 PREPARATION

Obtain dimensions from the site affecting work of this Section. Ensure that roughed-in openings, built-in anchorage, and reinforcing required for proper installation of work of this Section are correctly sized, installed and located.

3.3 CLOSURE PANEL INSTALLATION

3.3.1. General

a. Locate and place closure panel fabrications level, plumb, and in alignment with adjacent construction.
b. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces.
c. Form tight joints with exposed connections accurately fitted together.

3.3.2. Air Plenums

a. Install closure panels with airtight connections to plenums using sealant or gaskets, and to allow for service and maintenance.

3.4 PROTECTION

Protect finishes of closure panels from damage during construction period. Remove temporary protective coverings at time of final acceptance.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11104

MEAT DEPARTMENT EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 1M00 Scale, Platform, Mobile.
b. 4SPPM Scale/Printer, Programmable, 30 lb, Stand-Alone or Master.

1.1.2. Equipment Specified in Division 15 Section “Product Refrigeration System”.

a. 1M04 Case, Prepackaged Deli, Multi-Deck.
b. 1M07 Case, Fresh Meat or Deli, Multi-Deck.

1.1.3. Equipment Specified in Division 15 Section “Plumbing Fixtures” and as indicated on drawings.

a. 4S00 Hand Wash Sink.
b. 4S03-D Sink, 3-Compartment, Stainless Steel.
c. 2M06 Wall Mount Drench Hose.

1.2 SUBMITTALS

1.2.1. Product data for each item of equipment required, including the manufacturer's standard details and installation and maintenance instructions.

a. Manufacturer's standard commercial warranty.
b. Operating instructions.
c. Specifications and parts manual.
d. Underwriters Laboratories (UL), Inc., listing.
e. National Sanitation Foundation (NSF) approval or acceptance.

1.2.2. Submittal List:

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer to perform work of this Section who is an authorized representative of the meat department equipment manufacturer, who has specialized in installing meat department equipment, who has completed installations similar in design and extent to that indicated for this Project, and who has a record of successful in-service performance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 1M00: SCALE, PLATFORM, MOBILE

2.2.1. Salient Characteristics:

a. Electronic digital scale and mobile stand, designed for weighing boxes of product during the receiving process.
b. Electronic digital scale:

(1) Weighing capacity from 0 to 300 pounds at 0.1 pound increments.
(2) Provided with a stainless steel platter or platform surface for placing and weighing of product, approximately 14 inches wide by 20 inches deep, two-inch variance each dimension, and 2.7 inches high..
(3) LCD display screen for operator.
(4) Overall approximate dimensions:

(a) 17 inches wide.
(b) 25 inches deep.
(c) 30 inches high.
(d) Two-inch variance each dimension, bench style.
(e) Approximately 44 inches high with scale mounted on the stand.

(5) Electrical:

(a) 120 volts, 60 hertz, single phase.
(b) 6-foot length power cord, with grounded type plug.
(c) Battery holder with six “D” cell batteries.

c. Mobile stand.

(1) Designed to allow for mobility of the scale and safe weighing of product while the scale is on the mobile stand.
(2) All steel construction, capable of supporting 500 pounds while mobile.
(3) Push handle bar approximately 35 inches above floor, five inch variance.
(4) Platform height 14 inches, two-inch variance.
(5) Four 5-inch diameter casters (one-inch variance) or wheels, two locking.

2.2.2. Basis-of-Design Product: Hobart Corporation. (800) 666-1418 or www.hobartcorp.com.

a. Scale: Model HBR300-1.
b. Mobile Stand: Model HBR300-STAND.

2.3 ITEM 4SPPM: STAND-ALONE SCALE PRINTER

2.3.1. Salient Characteristics:

a. Integrated Scale/Printer:

(1) Controls all weighing and printing functions for manual applications.
(2) Programmable label formatting: Move, add, delete, select size and direction of printed data, and program label size (length/width).
(3) Unit price and total price computing value of from $0.01 - $999.99.
(4) Customer view screen displays price per pound, net weight, total price, and item description.
(5) Minimum of 16 fast look-up key items per screen for operator.
(6) Display: LCD Dot matrix 640x480.
(7) 350 presets with 10 category pages.
(8) Minimum 8MB RAM memory capacity.
(9) Stainless steel platter 17-3/4 inches by 11-5/8 inches.
(10) Keyboard: Touchscreen.
(11) RS485 telephone communications capable with satellite scales.
(12) TCP / IP (transmission control protocol / intranet protocol) communications capable. Not required to be installed for current use, but capable for future upgrade.
(13) 30 lb by 0.01 capacity.
(14) Automatically prints product name, unit price, total price, and weight on label, for hand application to wrapped packages. Capable of accommodating pre-printed labels with USDA statement and organization logo.
(15) Prints text, nutrition facts, and safe handling labels complying with FDA and USDA label requirements.
(16) Produces universal bar code.
(17) Prints label lengths from 1 inch to 6 inches and widths from 1.6 inches to 3.15 inches.
(18) Uses die cut or tear-off continuous stock labels.
(19) Prints a minimum of 2000 characters per label for ingredients and nutritional information.
(20) Prints up to 3240 characters of extra text per PLU (product look-up code) memory for item file, using 1-6 digit PLU codes.
(21) Prints up to 54 characters x 60 lines (portal) on 2-5/8-inch width stock.

b. Electrical

(1) 110 volt, 60 hertz, single phase.
(2) 8- to 10-foot length power cord, with grounded type plug.

2.3.2. Basis-of-Design Product: Mettler-Toledo Inc. (804) 513-2610, (804) 794-4177, or www.mt.com.

a. Model UC-ST Smart Touch.

PART 3 - EXECUTION

3.1 INSPECTION

Rough-In Work: Examine roughed-in mechanical and electrical services, installation of floors, walls, columns, and ceilings, and other conditions under which meat department equipment work is to be installed; verify dimensions of services and substrates before fabricating work. Notify Contractor of unsatisfactory locations and dimensions of other work and of unsatisfactory conditions for proper installation of meat department equipment. Do not proceed with fabrication and installation until unsatisfactory dimensions and conditions have been corrected in manner satisfactory to Installer.

3.2 EQUIPMENT INSTALLATION

3.2.1. General

Set each item of non-mobile and non-portable equipment securely in place, level, and adjust to correct height. Anchor to supporting substrate where indicated and where required for sustained operation and use without shifting or dislocation. Conceal anchorages where possible. Adjust countertops and other work surfaces to level tolerance of 1/16-inch maximum offset, and maximum variation from level or indicated slope of 1/16-inch per ft.

a. Where indicated or required for safety of equipment operator, anchor equipment to floor or wall. Where equipment is indicated to be anchored to floor, provide legs with adjustable flanged foot. Install 2 anchors on each foot.

3.2.2. Field Joints

Complete field-assembly joints in work (joints cannot be completed in shop) by welding, bolting-and-gasketing, or similar methods as indicated. Grind welds smooth and restore finish. Set or trim gaskets flush.

3.2.3. Enclosed Spaces

Treat spaces that are inaccessible after equipment installation by covering horizontal surfaces with powdered borax at rate of 4 oz. per sq. ft.

3.2.4. Closure Plates and Strips

Install where required, with joints coordinated with units of equipment.

3.2.5. Cutouts

Provide cutouts in meat department equipment where required to run plumbing or electric lines through equipment items for final connections.

3.2.6. Sealants and Gaskets

Install all around each unit to make joints airtight, watertight, vermin-proof, and sanitary for cleaning purposes. In general, make sealed joints not less than 1/8-inch wide, and stuff backer rod to shape sealant bead properly, at 1/4-inch depth. Shape exposed surfaces of sealant slightly concave, with edges flush with faces of materials at joint. At internal-corner joints, apply sealant or gaskets to form a sanitary cove, of not less than 3/8-inch radius. Provide

sealant-filled or gasketed joints up to 3/4-inch joint width; metal closure strips for wider joints, with sealant application each side of strips. Anchor gaskets mechanically or with adhesives to prevent displacement.

3.3 FIELD QUALITY CONTROL

3.3.1. Testing

Coordinate start-up of meat department equipment when service lines have been tested, balanced, and adjusted for pressure, voltage, and similar considerations. Before testing, lubricate each equipment item in accordance with manufacturer's recommendations.

a. Test each item of operational equipment to demonstrate that it is operating properly and that controls and safety devices are functioning. Repair or replace equipment found to be defective in its operation, including units that are below capacity or operating with excessive noise or vibration.

3.4 CLEANING

After completion of installation and other major work in meat department areas, remove protective coverings, if any, and clean meat department equipment, internally and externally. Restore exposed and semiexposed finishes to remove abrasions and other damages; polish exposed-metal surfaces and touch-up painted surfaces. Replace work that cannot be successfully restored.

a. Prior to date of acceptance on meat department equipment work, buff exposed stainless steel finishes lightly, using power buffer and polishing rouge or grit of No. 400 or finer.

3.5 CLOSEOUT PROCEDURES

Provide services of Installer's technical representative, and manufacturer's technical representative where required, to instruct Contracting Officer's personnel in operation and maintenance of meat department equipment.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11105

PRODUCE DEPARTMENT EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 4IFWT1 Ice Flaker with Ice Transport System and One Portable Storage Cart.
b. 1P18 Scale Platform, Mobile.
c. 1P19 Scale and Printer with 3-Roll Wrapper System.

1.1.2. Equipment specified in Division 15 Section “Product Refrigeration System.”

a. 1P03 Case, Produce, Refrigerated Single-Deck
b. 1P07 Case, Produce, Pre-Cut Vegetables, Refrigerated.
c. 2P07-B Produce Misting System.

1.1.3. Equipment Specified in Division 15 Section “Plumbing Fixtures” and as indicated on drawings.

a. 4S00 Hand Wash Sink.
b. 4S03-D Sink, 3-Compartment, Stainless Steel.
c. 2M06 Wall Mount Drench Hose.

1.2 SUBMITTALS

1.2.1. Product Data

For each item of equipment required, including the manufacturer's standard details and installation and maintenance instructions.

a. Manufacturer's standard commercial warranty.
b. Operating instructions.
c. Specifications and parts manual.
d. Underwriters Laboratories (UL), Inc., listing.
e. National Sanitation Foundation (NSF) approval or acceptance.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer to perform work of this Section who is an authorized representative of the produce department equipment manufacturer, who has specialized in installing produce department equipment, who has completed installations similar in design and extent to that indicated for this Project, and who has a record of successful in-service performance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 4IFWT1 ICE FLAKER WITH ICE TRANSPORT SYSTEM AND ONE PORTABLE STORAGE CART

2.2.1. Salient Characteristics:

a. Modular ice flaker with storage bin and removable cart for transporting ice to sales floor/display areas.
b. Ice Flaker Machine.

(1) Self-contained refrigeration.
(2) Non-ozone depleting refrigerant R-404A.
(3) Air cooled condenser.
(4) Volume production of ice per 24 hour period based on air/water temperatures:

(a) 70E air/50E W production, minimum 1430 lbs.
(b) ARI 90E air/70E W production, minimum 1110 lbs.

(5) Exterior cabinet finish: Stainless steel.
(6) Provide electrical conductivity water sensor to eliminate low or no water failures.
(7) Electrical:

(a) 208/230 volts, 60 hertz, 1 phase.
(b) Number of wires: 2.
(c) Minimum circuit amps: 15.0.
(d) Maximum fuse size: 20.
(e) KWH/100 lbs.: 3.4.

(8) Approximate dimensions:

(a) 30 inches wide.
(b) 24 inches deep.
(c) 27 inches high.

(9) Compressor: 1¾ HP.
(10) Potable water/100 lbs.: 12.

c. In-Line Water Filter

(1) In-line water filtration system for ice flaker machines with volume up to 1,500 lbs/day.
(2) Unit equipped with one replaceable water filter.
(3) Plumbing:

(a) Inlet Connection: 3/8 inch.
(b) Outlet Connection: 3/8 inch.
(c) Service Flow Rate: Maximum 1.67 gpm.
(d) Pressure Requirements: 10-125 psi, non-shock.

(4) Approximate Dimensions:

(a) 7 inches wide.
(b) 7 inches deep.
(c) 29 inches high.

(5) Provide one additional replacement filter cartridge.

d. Storage Bin with Portable Cart and Ice Tote Accessories

(1) Elevated ice flaker storage bin and base designed to support ice flaker machine and with mobile cart beneath to receive flaked ice.
(2) Each unit standard with bin, base, cart with lid, and ice paddle.
(3) Stainless steel frame base and exterior of ice storage bin.
(4) Storage bin and chute adapter designed to receive flaked ice from top-mounted ice flaker machine. Custom fabricate top of storage bin to form fit ice flaker machine.
(5) Provide ice storage bin with one polyethylene snout and lift door for frontal access to the ice product.
(6) Capacity: 740 lbs.

(a) 500 lbs in upper storage bin.
(b) One portable cart with capacity of 240 lbs.

(7) Provide stationary ice cabinet and mobile cart with built-in drains.
(8) Equip mobile cart with casters (two swivel locking) and push/pull bar.
(9) Equip cart with 6 polyethylene ice tote accessory inserts, with capacity of 25 lbs of ice per insert.
(10) Approximate cart dimensions:

(a) 25 inches wide.
(b) 42 inches deep.
(c) 35 inches high.

(11) Approximate overall dimensions:

(a) 31 inches wide.
(b) 40 inches deep.
(c) 60 inches high with legs.

2.2.2. Basis-of-Design Product: Scotsman. 1-800-SCOTSMAN or www.scotsman-ice.com.

a. Ice Flaker Machine Model FME1504AS–32B.

2.2.3. Basis-of-Design Product: Everpure, Inc. 1-800-323-7873 or www.everpure.com.

a. In-Line Water Filter, Model EV9324-01, Insurice Single-I 2000 System.
b. Filter Cartridge, Model EV9612-21.

2.2.4. Basis-of-Design Product: Follett Corporation; 1-800-523-9361 or www.follettice.com.

a. Storage Bin with Base and Portable Cart Model ITS700SG

2.3 ITEM 1P18 SCALE, PLATFORM, MOBILE

2.3.1. Salient Characteristics:

a. Electronic digital scale and mobile stand, designed for weighing boxes of product during the receiving process.
b. Electronic digital scale:

(1) Weighing capacity from 0 to 300 pounds at 0.1 pound increments.
(2) Provided with a stainless steel platter or platform surface for placing and weighing of product, approximately 14 inches wide by 20 inches deep, two-inch variance each dimension, and 2.7 inches high..
(3) LCD display screen for operator.
(4) Overall approximate dimensions:

(a) 17 inches wide.
(b) 25 inches deep.
(c) 30 inches high.
(d) Two-inch variance each dimension, bench style.
(e) Approximately 44 inches high with scale mounted on the stand.

(5) Electrical:

(a) 120 volts, 60 hertz, single phase.
(b) 6-foot length power cord, with grounded type plug.
(c) Battery holder with six “D” cell batteries.

c. Mobile stand.

(1) Designed to allow for mobility of the scale and safe weighing of product while the scale is on the mobile stand.
(2) All steel construction, capable of supporting 500 pounds while mobile.
(3) Push handle bar approximately 35 inches above floor, five inch variance.
(4) Platform height 14 inches, two-inch variance.
(5) Four 5-inch diameter casters (one-inch variance) or wheels, two locking.

2.3.2. Basis-of-Design Product: Hobart Corporation. (800) 666-1418 or www.hobartcorp.com.

a. Scale: Model HBR300-1.

b. Mobile Stand: Model HBR300-STAND.

2.4 ITEM 1P19: SCALE, LABELER, AND WRAPPER STATION

2.4.1. Salient Characteristics:

a. Designed to operate in refrigerated rooms with temperature range of 41 to 104 degrees Fahrenheit and 10 to 90 percent relative humidity, non-condensing.

b. Controller

(1) Controls all weighing and printing functions for manual applications.
(2) Unit price and total price computing value of from $0.01 - $999.99.
(3) Display: LCD Dot matrix 640x480.
(4) 350 presets with 10 category pages.
(5) Minimum 8MB RAM memory capacity (1200 item).
(6) Construction: Metal chassis with pressure formed plastic case.
(7) Keyboard: Touchscreen.
(8) Networked with Master Scale Management System within meat department.

(a) RS485 telephone communications capable with satellite scales.
(b) TCP / IP (transmission control protocol / intranet protocol) communications capable. Not required to be installed for current use, but capable for future upgrade.

c. Electronic Scale/Wrapping Platter:

(1) Scale Base: Die cast aluminum base with stainless steel weighing platter/wrapping surface approximately 13.2 inches wide by 11.4 inches deep, one inch variance.
(2) 50 lb by 0.01 capacity.
(3) Power provided by connection to controller.
(4) Heat seal wrapper:

(a) Sealing hot plate surface covered with non-stick Teflon, 15 inches wide by 6 inches deep.
(b) Solid state electronics controlled hot rod cut-off bar.

(5) Stainless steel stand:

(a) Open type table constructed of stainless steel.
(b) Legs capable of one inch adjustment for leveling.
(c) Provided with two each (one left and one right) stainless steel folding platter shelves approximately 14 inches wide by 24 inches deep, two inch variance.
(d) Accommodates three rolls of film up to 20 inches wide with a 3 inch core.

d. Printer

(1) Automatically prints product name, unit price, total price, and weight on label, for hand application to wrapped packages. Capable of accommodating pre-printed labels with USDA statement and organization logo.
(2) Prints a minimum of 2000 characters per label for ingredients and nutritional information.
(3) Minimum of 4000 PLU (product look-up code) memory for item file, using 1-6 digit PLU codes.
(4) Prints standard label stock widths of 1.5 inch and 2.25 inch, with label lengths from 1-6 inch minimum.
(5) Digital clock automatically updates shelf life.

(6) Printer Construction: Stainless steel enclosure.
(7) Prints 5 label formats: 2.1, 2.4, 3.3, 3.7, 4.2.
(8) Prints 30 custom formats.
(9) Produces universal bar code.
(10) Label capacity: 4,500.

e. Overall approximate dimensions

(a) 48.5 inches wide.
(b) 37.5 inches deep.
(c) 60 inches high.
(d) Six-inch variance each dimension, stand-mounted system.

f. Electrical

(1) Controller: 115 volt, 60 hertz, single phase.
(2) Printer: 115 volt, 60 hertz, single phase.
(3) 8- to 10-foot length power cord, with grounded type plug.
(4) Battery backup for memory retention with minimum 100 hours capability.

2.4.2. Basis-of-Design Product: Mettler-Toledo Inc. (804) 513-2610, (804) 794-4177, or www.mt.com.

a. Controller: Model 8361 Smart Touch Controller with mounting post.
b. Hand Wrapper and Scale: Model 0662-0301 Step-Saver Single Station Wrap & Weigh with 8270 Scale Base.
c. Platter Shelf: Model 0925-0137.
d. Printer: Model 317 Thermal Printer 0317-0001

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1. General

a. Check that surfaces to which work will be secured are sound and free of irregularities interfering with installation.
b. Do not begin installation until satisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Obtain dimensions from the site affecting work of this Section.
b. Ensure that roughed-in openings, built-in anchorage, and reinforcing required for proper installation of work of this Section are correctly sized, installed and located.
c. Obtain electrical and mechanical service characteristics and rough-in locations from site.

3.3 EQUIPMENT INSTALLATION

3.3.1. General

a. Installation of equipment shall be in accordance with NSF Manual On Sanitation Aspects of Food Service Equipment, as applicable.
b. Install items in accordance with manufacturer's instructions and installation procedures. Supervision shall be performed by workers skilled and familiar with installation of the equipment specified.
c. Where unit locations coincide with structural building elements such as columns, install unit to shape of element. Anchor unit directly to building element using manufacturer's recommended method to support shelving capacity of unit.
d. Set units plumb, square and true, securely anchored to building structure.
e. Insulate items to prevent electrolysis between dissimilar metals.
f. Seal spaces between built-in equipment, walls and columns with preformed foam sealants specified in Division 7 Section "Joint Sealants," shim level and rigid, use proper type anchoring devices for materials encountered and usage expected.
g. Cut, fit and patch; coordinate with work of other Sections involved.
h. Cut and drill tops, backs, sides and bottoms for service outlets and fixtures. Install fixtures and fittings. Make connections to services.
i. Sequence installation and erection to ensure that mechanical and electrical connections are effected.
j. Deliver instruction sheets to Contracting Officer and instruct Government's personnel in the proper use, adjustment, and maintenance of equipment.

3.4 ADJUSTING AND CLEANING

3.4.1. General

a. Adjust doors, drawers, hardware fixtures, and other moving and operating parts to function smoothly and correctly.
b. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.
c. On completion of installation, touch up all marred or abraded finished surfaces.
d. Clean equipment cases, counters, shelves, glass, legs, hardware, fittings and fixtures. Wipe down surfaces to remove fingerprints and markings and leave in clean condition.

END OF SECTION

SECTION 11108

ROTATING MODULAR SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 1R09 Damaged Merchandise Unit.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Seismic

a. Provide rotating modular system, including anchorage, capable of withstanding, without failure, the effects of operational and seismic loads:
b. Refer to Division 1 Section "Description of Work" for seismic-load design criteria.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each item of equipment required, including the manufacturer's standard details and installation and maintenance instructions.

(1) Manufacturer's standard commercial warranty.
(2) Operating instructions.
(3) Specifications and parts manual.

1.3.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

1.4.2. Source Limitations

a. Obtain rotating modular system through one source from a single manufacturer.

1.5 WARRANTY

1.5.1. Special Warranty for Rotating Modular System

a. Manufacturer's standard form in which manufacturer agrees to repair or replace rotating modular system components that fail in materials or workmanship within specified warranty period.

(1) Warranty Period for Base Assembly: 10 years from date of Substantial Completion.
(2) Warranty Period for Balance of Unit: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 1R09: DAMAGED MERCHANDISE UNIT (ROTATING MODULAR SYSTEM)

2.2.1. General

a. Rotating modular system installed through wall between salvage room and damaged merchandise sales niche. System shall consist of one standard starter unit and standard add-on unit(s) placed side-by-side. Each individual unit capable of being rotated manually by use of foot pedal and locked from inside salvage room. When unlocked and rotated 180 degrees, each unit displays merchandise to the sales area while the back side is being restocked.

2.2.2. Salient Characteristics:

a. Standard Unit Includes:

(1) Adjustable reversible metal shelves: R-W No. 902 legal size. Five shelves per side (10 shelves total) each unit.
(2) 1-3/4–inch shelf height increment adjustment.
(3) Closing strips to cover rotation space between unit and wall, panel and another unit. Match unit finish.
(4) Extended canopy tops over rotor top to cover the rotation space behind the unit.
(5) Full length center panel between back-to-back shelves.
(6) Foot pedal activated positive position control for rotating units.
(7) Base and Rotor Bottom Assembly

(a) 12 gage steel.
(b) Connect base and rotor bottom with ½ inch, minimum, diameter carriage bolt.
(c) Secure assembly with locknut.

(d) Fabricate with an oil impregnated bronze bushing for permanent lubrication to carriage bolt rotation.
(e) Install raceways in both base and rotor bottom to capture ball bearings and protect rotating components from excessive and unusual wear, burnishment, and fatigue.
(f) 28-inch diameter, minimum, press formed raceways for legal size units. Smaller diameter raceways are not acceptable because they will not control or maintain the cabinet center of gravity during unbalanced loading and rotation.

(8) Color coordinated, shrinkage controlled, two-ply vinyl door strips mounted on a reverse beveled post.
(9) Powder coat finish in color indicated.

b. Dimensions:

(1) Starter unit: 45-1/4 inches wide, 31 inches deep, 82 inches high.
(2) Add-on unit: 38-1/8 inches wide, 31 inches deep, 82 inches high.

2.2.3. Basis-of-Design Product: Richards-Wilcox, Inc., High Density, Multi Media Rotary Filing System. (800) 277-1699 or www.timestwo.com.

a. Model: "Times-2 Speed Files."

PART 3 - EXECUTION

3.1 EXAMINATION

Examine openings and surfaces in and on which rotating modular systems are to be installed. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

Install items where indicated in accordance with manufacturer’s assembly and installation drawings.

3.3 CLEANING AND ADJUSTING

Adjust rotating modular systems for proper operation. After completion of installation, clean and polish all exposed surfaces.

3.4 TRAINING

Engage a factory-authorized service representative to train Government's personnel to adjust, operate, and maintain rotating modular system equipment. Conduct training at Project site.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11110

GARMENT CONVEYOR

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Electric garment storage and retrieval conveyor.

1.2 SUBMITTALS

1.2.1. Product Data:

a. Commercial warranty.
b. Installation and operating instructions.
c. Parts list.

1.2.2. Product Certificates: For conveyor, from manufacturer.

1.2.3. Field quality-control reports.

1.2.4. Closeout Submittals

a. Operation and Maintenance Data: For conveyors to include in operation and maintenance manuals.

1.2.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Product Certificates	X	I
1.2.3	Field quality-control reports	X	I
1.2.4	Closeout Submittals	X	I

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1. Storage, And Handling

a. Store and handle garment conveyor in a manner to avoid significant or permanent damage to material and equipment.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Manufacturer's authorized representative who is trained and approved for installation of conveyors required for this Project.

PART 2 - PRODUCTS

2.1 MANUFACTURER

2.1.1. Basis-of-Design Product: Subject to compliance with requirements, provide the following.

a. White Conveyors, Inc., Kenilworth, NJ, Store-U-Veyor, Model W580, (800) 524-0273 www.white-conveyors.com.

2.2 MATERIALS

2.2.1. Electric rack activated manually by hand switch, bi-directional with the following features:

a. Floor supported rigid frame with two foundation angles; horizontal bends reinforced with flat bars.
b. Conveyer track: 1-5/16-inch O.D. by 13-gage welded steel tubing, zinc plated; 3-inch steel channel cross members.
c. Conveyor Chain:

(1) Single tier chain configuration.
(2) Conveyor chain frames: Steel
(3) Hardened hinge pins and low friction spacers to minimize wear.
(4) 3, 5, and 10 slots for each 12-inch conveyor chain frame to separate orders.
(5) Die cast aluminum yokes with load bearing wheels, 1-3/8 inches in diameter, with nylon tires on steel cores. Stabilizing rollers mounted on underside of yokes to provide positive tracking of chain.

d. Drive Configuration:

(1) 180 degree end drive.
(2) Integral flame cut steel sprocket with 1-1/4-inch shaft diameter.

e. Conveyor Drive:

(1) Fractional horsepower conveyor drive, low noise direct drive (integrated motor-reducer assembly with inverter).
(2) Totally enclosed fan cooled motor.
(3) Permanently lubricated reducer.

f. Electrical:

(1) 208 volt, 3 phase, 60 cycle, 1 hp motor.
(2) Speed: 75 ft/min.
(3) Pre-wired for primary supply connection.
(4) Soft start/start.

(5) Variable speed.
(6) Electrical circuit: Approved and listed by ETL(UL)CE.

g. Operating Controls:

(1) Bi-directional hand switch: Three position switch, mounted on arm extending from conveyor, for clockwise and counter-clockwise movement, with stop in center position..

h. Number of slots: 580.
i. Hanging capacity length: 58 feet.
j. Overall length with garments: 30 feet.
k. Color: Black.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Install conveyor in locations indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide brackets, anchors, trim, and accessories necessary for complete installation.

3.2 FIELD QUALITY CONTROL

3.2.1. Perform tests and inspections.

a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

3.2.2. Tests and Inspections:

a. Perform installation and startup checks according to manufacturer's written instructions.
b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
c. Certify compliance with test parameters.

3.2.3. A conveyor will be considered defective if it does not pass tests and inspections.

3.2.4. Prepare test and inspection reports.

3.3 DEMONSTRATION

3.3.1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain conveyors according to manufacturer's requirements.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11160

LOADING DOCK EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Dock bumpers.
b. Dock levelers.
c. Truck restraints.
d. Dock seals.
e. Metal hoods.

1.1.2 Related Sections

a. Division 3 Section “Cast-In-Place Concrete” for concrete work for recessed loading dock equipment.

1.2 DEFINITIONS

a. Operating Range: Maximum amount of travel above and below the loading dock level.

1.3 SUBMITTALS

1.3.1. Product Data

a. Include construction details, material descriptions, rated capacities, operating characteristics, furnished specialties, accessories, dimensions of individual components and profiles, and finishes.

1.3.2. Shop Drawings

a. Show fabrication and installation details. Include plans, elevations, sections, details, and attachments to other work.

1.3.3. Maintenance Data

a. For loading dock equipment to include in maintenance manuals.

1.3.4. Warranties

a. Special warranties specified in this Section.

1.3.5. Guarantees

a. Special guarantees specified in this Section.

1.3.6. Submittal List:

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Maintenance Data	X	I
1.3.4	Warranties	X	I
1.3.5	Guarantees	X	I

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
b. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

1.4.2. Source Limitations

a. Obtain all loading dock equipment through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. Storage, And Handling

a. Store and handle dock seals in a manner to avoid significant or permanent damage to fabric or frame.
b. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

1.6 PROJECT CONDITIONS

Field Measurements: Indicate measurements on Shop Drawings.

1.7 COORDINATION

1.7.1. Coordinate Installation Of Anchorages For Loading Dock Equipment

a. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.7.2. Recessed Loading Dock Equipment

a. Coordinate size and location of pits to ensure proper clearances and operation of equipment.

1.7.3. Electrical Requirements

a. Coordinate wiring requirements and current characteristics of loading dock equipment with building electrical system. See Division 16 Sections.

1.8 WARRANTY

1.8.1. Special Warranty for Dock Levelers

a. Manufacturer agrees, in writing, to repair or replace dock-leveler components that fail in materials or workmanship within specified warranty period.
b. Failures include, but are not limited to, the following:

(1) Structural failures including cracked or broken structural support members and load-bearing welds.
(2) Deck plate failures including cracked plate or permanent deformation in excess of 1/4 inch between deck supports.
(3) Hydraulic system failures including failure of hydraulic seals and cylinders.

c. Warranty Period: 10 years from date of Substantial Completion.
d. Warranty shall be for unlimited usage of the leveler for the specified rated capacity at an average rate of 8 trucks per day over the term of the warranty.

1.8.2. Special Warranty for Truck Restraints

a. Manufacturer agrees, in writing, to repair or replace truck restraints that fail in materials or workmanship, including all material, labor, tax, and freight for period of 7 years from date of shipment.

1.9 GUARANTEE

Special Guarantee for Truck Restraints: Manufacturer agrees, in writing, to a 24-month money back guarantee of satisfactory truck restraint performance as determined by the Contracting Officer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

2.2.1. Steel Plates, Shapes, and Bars

a. ASTM 36/A 36M.

2.2.2. Rolled-Steel Floor Plate

a. ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade 55.

2.2.3. Steel Tubing

a. ASTM A 500, cold formed.

2.2.4. Welding Rods and Bare Electrodes

a. Select according to AWS specifications for metal alloy welded.

2.3 DOCK BUMPERS

2.3.1. Laminated-Tread Bumpers

a. Fabricated from multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two 3/4-inch- diameter, steel supporting rods that are welded at one end to 1/4-inch- thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than 1 inch of tread plies extending beyond the face of closure angles.
b. Basis-of-Design Products: Rite-Hite Corporation, Milwaukee, WI, Rite-Hite RH Series.
c. Thickness: 6 inches.
d. Horizontal Style:

(1) 12 inches high by 14 inches long at dock levelers. (RH 612-14)
(2) 12 inches high by 24 inches long at trash platform. (RH 612-24)

2.3.2. Anchorage Devices

a. Hot-dip galvanized steel anchor bolts, nuts, washers, bolts, sleeves, cast-in-place plates, and other anchorage devices as required to fasten bumpers securely in place and to suit installation type indicated.

2.4 RECESSED DOCK LEVELERS

2.4.1. General

a. Recessed, hinged-lip-type dock levelers designed for permanent installation in concrete pits preformed in the edge of loading dock; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.
b. Basis-of-Design Products: Rite-Hite Corporation, Rite-Hite RHH Series.
c. Standard: Comply with MH 30.1.
d. Rated Capacity: 25,000 pounds, minimum.
e. Nominal Platform Size: 72 inches wide by 96 inches deep.
f. Platform: Not less than 1/4-inch- thick, nonskid steel plate.
g. Hinged Lip: Not less than 1/2-inch- thick, nonskid steel plate.
h. Frame: Manufacturer's standard type.
i. Finish: Galvanized.

2.4.2. Function

a. Dock levelers shall compensate for differences in height between truck bed and loading platform surface in the following manner:

(1) Vertical Travel: Provide operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact.

(a) Minimum working range of 12 inches above and 12 inches below adjoining platform.

(2) Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.

(3) Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to 4 inches over width of ramp.

(4) Lip Operation: Manufacturer's standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.

(5) Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs.

2.4.3. Hydraulic Operating System

a. Electric-powered hydraulic raising and hydraulic lowering of ramp, controlled from a remotely located master control panel. Equip leveler with a packaged unit including a unitized, totally enclosed, non-ventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Include means for lowering ramp below platform level with lip retracted behind dock bumpers. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than 3 inches

2.4.4. Construction

a. Fabricate dock-leveler frame, platform supports, and lip supports from structural- or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.

(1) Hinged Lip: Full width, piano-type hinge with heavy-wall hinge tube and greased fittings, with gussets on lip and ramp for support.

(a) Length of Lip Extension: Not less than 18 inches from ramp edge and not less than 14 inches in front of dock bumpers.

(2) Toe Guards: Equip open sides of rising ramp over range indicated with metal toe guards mounted flush with ramp edges and projecting below ramp.

(a) Toe-Guard Range: Entire upper operating range.

(b) Finish: Factory finish dock levelers after assembly and testing. Paint toe guards yellow or with yellow and black stripes to comply with ANSI Z535.1.

b. Cross-Traffic Support: Manufacturer's standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.

c. Maintenance Strut: Integral strut to positively support ramp in up position during maintenance of dock leveler.

(1) Provide lockout-tagout capability during maintenance. Locate disconnect with other controls on master panel.

2.4.5. Accessories

a. Pit Frame: 3-by-3-by-1/4-inch galvanized steel curb angles for edge of recessed leveler pit, with 1/2-inch-diameter by 6-inch- long concrete anchors welded to angle at 6 inches o.c. Paint pit frame angles safety yellow.
b. Night Locks: Manufacturer's standard means to prevent extending lip and lowering ramp when overhead doors are locked.
c. Side and rear seals or closures to provide rodent and weather containment.
d. Interlock: Leveler will not operate while overhead door is in closed position and truck restraint is not engaged.

2.5 TRUCK RESTRAINTS

2.5.1. General

a. Manufacturer's standard device designed to engage truck's rear-impact guard and hold truck at loading dock. Restraint shall consist of an iron or steel restraining arm that raises until contacting rear-impact guard. Arm shall move vertically, automatically adjusting to varying height of truck due to loading and unloading operations.
b. Basis-of-Design Products: Rite-Hite Corporation, RHR-1000.
c. Provide a truck restraint at each recessed dock leveler.
d. Truck restraining device shall be manufactured by the same manufacturer as the dock levelers.
e. No motors shall be required to position the restraint to reach proper engagement level for variable rear impact guard heights. Position of rotating hook shall therefore be in the same position in relation to variable rear impact guard heights prior to activation.
f. Large, rotating or level vertical-rising, yellow zinc dichromate steel hook for visibility.
g. Hook arrangement shall be maintained throughout every phase of loading/unloading process, including below dock endloading.
h. Finish: Galvanized.

2.5.2. Restraining Capacity

a. Capable of restraining total gross load of 32,000 lbs without permanent deflection or distortion.

2.5.3. Operating Range

a. Capable of restraining rear-impact guards within a range from 9 to 30 inches vertically above driveway, and from 0 to 10 inches horizontally in front of dock bumpers.

2.5.4. Power Operating System

a. Manufacturer's standard wall mounted electromechanical exterior off-ground mounting position, non-hydraulic unit that does not require pit mounting that could cause a collection area for dirt and debris.
b. Restraint operates upon impact of rear impact guard of backing trailer and moves restraint carriage into correct position.
c. Restraining arm is controlled from a remotely located master control panel.
d. Interlock: Leveler will not operate while truck restraint is not engaged.

2.5.5. Caution Signs

a. Surface mounted; with black text on yellow background, and with sign copy as follows. Provide one sign each at each truck-restraint location.

(1) Exterior Sign: Copy in Forward and Reverse Text: "BACK IN OR PULL OUT ON GREEN ONLY."
(2) Interior Sign: Copy in Forward Text: "ENTER ON GREEN ONLY."

2.5.6. Light Communication System

a. Red and green illuminated signal-light sets, with lens approximately 4 inches in diameter, designed to indicate status to both dock attendant and truck driver. Equip system with connection to master control panel that includes illuminated lights indicating status of exterior signal lights. Provide signal-light set and connection to master control panel at each truck restraint location. Enclose exterior signal-light sets in steel or plastic housing with sunshade.
b. Manual Operation: System is activated by push button or switch located on interior master control panel.
c. Light box shall have maximum projection from wall of no more than 4 inches.

2.5.7. Alarm

a. Audible and visual system located on master control panel indicating that rear-impact guard is not engaged, with manual reset.
b. Alarm Override: Alarm override allows communication via the lighting system and an audible alarm when abnormal hooking position exists or no rear impact guard is present. Override turns off audible alarm and leaves outside light red with inside lights simultaneously red and green, indicating abnormal condition. Remote-control shall not function until code is re-entered or key used to turn override off.

2.6 MASTER CONTROL PANEL

2.6.1. General

a. Provide a control panel enclosed in NEMA ICS 6, Type 12 box, at each truck dock door, with integral fused disconnecting means for operating dock leveler and truck restraints and with lockout-tagout.
b. Basis-of-Design Products: Rite-Hite Corporation, Doc-Commander.
c. Dock leveler multibutton controls:

(1) UP button of the constant-pressure type and an emergency STOP button of the momentary-contact type. Ramp raises by depressing and holding UP button; ramp lowers at a controlled rate by releasing UP button. All ramp movement stops, regardless of position of ramp or lip, by depressing STOP button. Normal operation resumes by engaging a manual reset button or by pulling out STOP button
(2) Electric-powered hydraulic raising and hydraulic lowering of lip, controlled independently of raising and lowering of ramp.

d. Truck restraint:

(1) Restraint engaged by depressing lock button; restraint released by depressing unlock button.
(2) Light Communication System: Activated by push button or switch.
(3) Alarm: Visual system with coded or keyed override control.

2.7 FOAM-PAD DOCK SEALS

2.7.1. General

a. Dock seals consisting of fabric-covered foam pads designed to compress 4 to 5 inches under pressure of truck body to form an airtight seal at jambs and head of loading dock openings; of type, size, and construction indicated.
b. Basis-of-Design Products: Kelley Company, DSA Series Adjustable Head Pad Dock Seal.
c. Beveled Side Pads: 12 inches wide face and 8 inches wide back.
d. Projection of Tapered Side Pads: 10 inches at bottom; projection at top shall be such that pad bevel matches incline of drive.

2.7.2. Adjustable Head Pad

a. Manufacturer's standard hardware and tension spring or counterweight mechanism for adjusting height of pad.
b. 18 inches high face, 18 inches high back, and same depth as top projection of jamb pads.

2.7.3. Construction

a. Consisting of single- or double-ply, coated, fabric-covered, urethane-foam core with supporting frame. Fabricate jamb and head pads of same depth and sized for opening width.
b. Steel Support Frame: Galvanized steel channel frame of manufacturer's standard weight, shape, and finish, with steel mounting hardware.
c. Side Pad Mounting Brackets: 1-1/2-inch offset flats and angles.
d. Cover Fabric: Vinyl-coated nylon or polyester with minimum total weight of 40 oz./sq. yd.

(1) Color: Black.
(2) Pleated Protectors: Protectors on face of jamb pads of overlapping layers of black vinyl-coated nylon or polyester with minimum total weight of 40 oz./sq. yd fabric attached to base fabric and with 4-inch- wide full length, coated, nylon yellow guide stripes stitched to pleats. Wear exposure same width as side pad face.

2.8 METAL HOODS

2.8.1. General

a. Dock hood designed to project over top of truck's rear opening; of type, size, and construction indicated.
b. Basis-of-Design Product: 4 Front Engineering Solutions, W183 S8253 Racine Avenue, Muskego, WI 53150.
c. Type: Surface mounted projected metal hood with integral gutter.
d. Projection: 18 inches.
e. Material: 18 gage galvanized steel.
f. Brackets: In addition to standard brackets, provide 1/4 inch thick by 2-inch wide galvanized steel brackets on underside of hood extending from gutter to wall, secured to hood and anchored to wall. Space brackets 12 inches on center.

2.9 FINISHES

2.9.1. General

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Finish loading dock equipment after assembly and testing.
c. Galvanizing

(1) Hot-dip galvanize items as indicated to comply with applicable standard listed below:

(a) ASTM A 123/A 123M for iron and steel loading dock equipment.
(b) ASTM A 153/A 153M for iron and steel hardware for loading dock equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of loading dock equipment.
b. Examine roughing-in for electrical systems for loading dock equipment to verify actual locations of connections before equipment installation.
c. Examine walls and floors of pits for suitable conditions where recessed loading dock equipment is to be installed. Pits shall be plumb and square and properly sloped for drainage from back to front of loading dock.
d. Truck Restraint Installer: Examine substrate and conditions under which truck restraints are to be installed and notify Contractor and Contracting Officer in writing of conditions detrimental to the proper and timely completion of work. Proceed with installation only after unsatisfactory conditions have been corrected in a manner acceptable to the installer.
e. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General

a. Coordinate size and location of loading dock equipment indicated to be attached to or recessed into concrete or masonry, and furnish anchoring devices with templates, diagrams, and instructions for their installation.
b. Set pit frame angles in concrete edges of dock-leveler recessed pits with tops flush with loading dock surface. Fit exposed connections together to form hairline joints.
c. Clean recessed pits of debris.

3.3 INSTALLATION

3.3.1. General

a. Install loading dock equipment, including motors control stations wiring safety devices and accessories as required for a complete installation.
b. Rough-in electrical connections according to requirements specified in Division 16.

3.3.2. Dock Bumpers

a. Attach dock bumpers to face of loading dock and trash platform in a manner that complies with requirements indicated for spacing, arrangement, and position relative to top of platform and anchorage.
b. Welded Attachment: Plug-weld anchor holes in contact with steel inserts and fillet weld at other locations.

c. Bolted Attachment: Attach dock bumpers to preset anchor bolts embedded in concrete or to cast-in-place inserts or threaded studs welded to embedded-steel plates or angles. If preset anchor bolts, cast-in-place inserts, or threaded studs welded to embedded-steel plates or angles are not provided, attach dock bumpers by drilling and anchoring with expansion anchors and bolts.

3.3.3. Recessed Dock Levelers

a. Attach dock levelers securely to loading dock, flush with adjacent loading dock surfaces and square to recessed pit.

3.3.4. Truck Restraints

a. Attach truck restraints in a manner that complies with requirements for arrangement and height required for device to engage vehicle rear-impact guard. Interconnect control panel and signals with dock leveler.
b. Wall-Mounted Units: Weld truck restraints to an embedded steel plate per manufacturer's specifications or anchor to dock face by a combination of up to 15 anchor bolts plus 22 inches of weld to the dock curb angle.
c. Truck restraining device manufacturer's representative shall install the truck restraining device in accordance with approved shop drawings and manufacturer's recommendations. Exact locations of signs, lights and control boxes for the truck restraining devices shall be approved by the Contracting Officer.

3.3.5. Dock Seals

a. Attach dock-seal support frames securely to building structure in proper relation to openings, dock bumpers, and dock levelers to ensure compression of dock seals when trucks are positioned against dock bumpers.

3.4 Metal Hoods

a. Mount metal hoods by securing to wall above dock seals at dock door openings. Install in accordance with manufacturer's printed instructions.

3.5 ADJUSTING AND CLEANING

3.5.1. Adjusting

a. Adjust loading dock equipment for proper, safe, efficient operation and to operate smoothly.

(1) After truck restraining device installation is completed, a representative of the manufacturer shall examine the installation and require that all connections and adjustments necessary to assure proper operation of truck restraining devices be made.

3.5.2. Testing

a. Test dock levelers for vertical travel within operating range indicated.

3.5.3. Cleaning

a. Restore marred, abraded surfaces to their original condition.

3.6 DEMONSTRATION

CONSTRUCTION ISSUE

Engage a factory-authorized service representative to train Government's personnel to adjust, operate, and maintain loading dock equipment. In addition, detailed “how to operate” books shall be provided as well as user training sessions at a time and place agreed upon by the facility manager.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11170

BALER

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 1R00-B Baler, Cardboard, Vertical, Medium.

1.2 SUBMITTALS

1.2.1. Product Data

a. Manufacturer's product description.
b. Operating instructions.
c. Specifications and parts manual.

1.2.2. Warranty

a. Manufacturer's standard commercial warranty.

1.2.3. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Warranty	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 1R00-B: BALER, CARDBOARD, VERTICAL, MEDIUM

2.2.1. General Characteristics

a. Designed for compressing and baling of scrap cardboard in a supermarket application.
b. Provide with a top or side mounted hydraulic system and a bale ejection mechanism.

2.2.2. Operational Characteristics
a. A vertical style baler with top or side mounted hydraulic system.
b. Baling press shall be of all steel construction.
c. Top loading baler, with the loading door opening on the upper front face of the baler
d. Safety features:

(1) Unit shall have interlocks to prevent operation with doors open and to ensure correct sequence of operation.
(2) Moving parts during baling process shall be fully enclosed.
(3) Provide with a safety hydraulic relief valve.
(4) All electrical circuits, including the control panel, shall be weather proofed to permit outdoor installation.
(5) Provide with a key operated start switch.

e. Provide with plug-in relays.
f. Provide with automatic bale ejection.
g. Provide with automatic start-compress-stop action.
h. Baler shall have easy tie wire platens which comply with ANSI Z245.5-1997 standard, with 6 slots for wire insertion. Wire insertion slots should be no less than ½ inch wide and no more than 1-½ inches wide and 2-½ inches deep.
i. All operations except for loading and tying of cardboard shall be fully automatic.
j. Electrical: 208V / 60 HZ / 3 PH.
k. Average cycle time 40 seconds, acceptable range 35 – 45 seconds.
l. Motor horsepower, minimum, 15 HP at 1750 RPM.
m. Door mounted with right-hand hinged or left-hand hinged as selected by Contracting Officer.
n. Pump capacity, minimum, 12 G.P.M. (gallons per minute).
o. Hydraulic cylinder shall be no less than 7-inch diameter providing a minimum total platen force of 25 - 30 P.S.I. (pounds per square inch) with a minimum system pressure of 2000 – 2400 pounds.
p. Load opening not less than 22 inches high by 72 inches wide.
q. Designed to produce a bale with the following minimum characteristics:

(1) 72 inches wide by 42 inches deep by 48 inches high, weighing between 1400 – 1600 pounds.

r. Provide 18-foot long by 12 gage baling wire, 125 count/bundle.
s. Baler dimensions : 86 inches wide by 50 inches deep by 145 inch high (with cylinder at upstroke position). Designed length and width may vary as long as the minimum bale is produced. Operating height cannot exceed 150 inches.

2.2.3. Basis-of-Design Product: J.V. Manufacturing, Inc.

a. Model DC-72-LU.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Items shall be installed where indicated on the Drawings and in absence of dimension, items shall be installed where directed by Contracting Officer.
b. Installation shall be in full accordance with approved assembly and installation drawings.
c. Deliver instruction sheets to Contracting Officer and instruct Government's personnel in the proper use, adjustment, and maintenance of equipment.

3.2 CLEANING AND ADJUSTING

Adjust equipment for proper operation. After completion of installation, clean and polish all exposed surfaces. Deliver keys and instruction sheets to the Contracting Officer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 11997

COMMISSIONING EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
1. Division 11 responsibilities in the commissioning process.
2. Commissioning of Loading Dock Equipment.
3. Commissioning of Food Service Equipment.
4. Commissioning of Produce Equipment.
5. Commissioning of Safes.
6. Commissioning of Key Control Cabinet.
7. Commissioning of Baler.

B. Related Sections
1. Section 01810 - Commissioning Requirements.

1.2 DEFINITIONS

A. CA: Commissioning Agent.

B. CO: Contracting Officer.

C. GC: Contractor; General Contractor, not a Subcontractor.

D. O&M: Operations and Maintenance.

E. QC: Contractor's Quality Control Manager.

F. TI: Technical Inspector

1.3 DESCRIPTION

A. This Section describes commissioning requirements applicable to commissioned items and systems specified in Division 11 to ensure that all items and systems are operating in a manner consistent with the Contract Documents.

B. Conform to commissioning requirements and the commissioning plan.

1.4 RESPONSIBILITIES

A. Construction and Acceptance Phases
1. Include the cost of commissioning in the contract price.
2. In each purchase order or subcontract written, include requirements for submittal data, O&M data and training.
3. Conduct a commissioning scoping meeting and other meetings necessary to facilitate the Commissioning process.

4. Provide requested documentation to the TI developed for functional testing procedures.
5. Provide functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
6. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the prefunctional checklists for all commissioned equipment. Submit to QC for review prior to startup. TI will verify plan for compliance. Refer to Section 01810 for further details related to start-up.
7. During the startup and initial checkout process, execute the prefunctional checklists for all commissioned equipment.
8. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the QC and TI.
9. Correct system deficiencies before functional testing.
10. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
11. Provide all test equipment necessary to fulfill specified testing requirements.
12. Assist the CA and TI in interpreting the monitoring data, as necessary.
13. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, TI and A/E and retest the equipment.
14. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
15. During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).
16. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

B. Operation Manuals shall include:
1. A table of all setpoints and implications when changing them.
2. Schedules.
3. Instructions for operation of each piece of equipment for emergencies.
4. Seasonal adjustment.
5. Startup and shutdown.
6. Instructions for energy savings operations and descriptions of the energy savings strategies in the facility (from O&M Manuals).
7. Recommendations for recommissioning frequency by equipment type.
8. Energy tracking recommendations.

C. Warranty Period
1. Execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
2. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 STARTUP

A. Contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section and in 01810. Division 11 has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the Commissioning Agent, Technical Inspector, or Government.

B. Functional testing will generally begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CO. Beginning system testing before full completion does not relieve the Contractor from fully completing the system, including all prefunctional checklists.

3.2 OPERATION AND MAINTENANCE (O&M) MANUALS

A. The following O&M manual requirements are in addition to O&M manual documentation requirements elsewhere in these specifications.

B. Division 11 shall compile and prepare documentation for all commissioned items and systems covered in Division 11 and deliver this documentation to the GC for inclusion in the O&M manuals prior to the training of Government personnel.

3.3 TRAINING OF GOVERNMENT PERSONNEL

A. The GC shall be responsible for training coordination and scheduling to ensure that training is completed.

B. The QC shall be responsible for reviewing the content and adequacy of the training of Government personnel for commissioned equipment or systems. TI will verify compliance.

C. The Subcontractor shall have the following training responsibilities for the commissioned systems:
1. Provide the TI with a training plan four weeks before the planned training.
2. Provide designated Government personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of commissioned equipment.
3. Training shall start with classroom sessions followed by hands-on training on each piece of equipment.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
6. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
7. Training shall include:
   a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
   b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
   c. Discussion of relevant health and safety issues and concerns.
   d. Discussion of warranties and guarantees.

e. Common troubleshooting problems and solutions.
f. Explanation of information included in the O&M manuals.
g. Discussion of any peculiarities of equipment installation or operation.
h. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.

8. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
9. Fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
10. Training shall occur after functional testing is complete, unless approved otherwise by the Project Manager.
11. Minimum Duration of Training. Subcontractor shall provide 8 hours of training.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 12485

FOOT GRILLES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Recessed foot grilles and frames.

1.1.2. Related Sections

a. Division 3 Section "Cast-in-Place Concrete" for slab depression for recessed foot grilles and frames.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Structural Performance

a. Provide foot grilles and frames capable of withstanding the following loads and stresses:

(1) Standard rolling load performance is 500 lb. wheel (load applied to a solid 5” x 2” wide polyurethane wheel, 1000 passes without damage.

1.3 SUBMITTALS

1.3.1. Product Data

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for foot grilles and frames.

1.3.2. Shop Drawings

a. Show the following:

(1) Divisions between grille sections.
(2) Perimeter floor moldings.
(3) Indicate blocked-out opening floor measurements.

1.3.3. Samples for Verification

a. For each type of product indicated.

(1) Foot Grille: 12-inch- square assembled sections.
(2) Frame Members: 12-inch- long Sample of each type and color.

1.3.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Samples for Verification	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements”.
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

1.4.1. Source Limitations

a. Obtain foot grilles and frames through one source from a single manufacturer.

1.4.2. Accessibility Requirements

a. Provide installed foot grilles that comply with Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

b. Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for assessable routes.

1.5 PROJECT CONDITIONS

Field Measurements: Indicate measurements on Shop Drawings.

1.6 COORDINATION

Coordinate size and location of recesses in concrete to receive foot grilles and frames.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

2.2.1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars

a. ASTM A 666, Type 304.

2.2.2. Stainless-Steel Angles

a. ASTM A 276 or ASTM A 479/A 479M, corrosion resistant, Type 304.

2.3 FOOT GRILLES

2.3.1. Basis-of-Design Product

a. C/S Group, model G6 Grid Line SSA-DP Stainless Steel Angle Frame with Drain Pan.

2.3.2. General

a. Provide manufacturer's standard foot-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and with support legs and other components needed to produce a complete installation.

2.3.3. Stainless-Steel Foot Grille

a. Manufactured from type 304 stainless steel in 1-1/8-inch depth. Wires to be .090 x 0.150 inch electronically welded and spaced 0.235 inches center-to-center with 0.145 inch clear opening between wires

b. Grille Size: 72-inches width by 48-inches length.

2.3.4. Frames

a. Stainless steel angle level base frame with drain pan shall be Type 304 stainless steel with 1/8-inch wide exposed surface. Drain pan to be 18-gauge stainless steel, with general purpose floor drain that is furnished and installed by contractor, and stainless steel strainer that is furnished and installed as part of floor grille system.

2.3.5. Lock Down

a. Lock down shall be manufacturer's standard concealed hold down.

2.4 FABRICATION

2.4.1. General

a. Shop fabricate foot grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.

b. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

2.5 STAINLESS-STEEL FINISHES

2.5.1. Directional Satin Finish: No. 4.

a. When polishing is completed rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates and floor conditions for compliance with requirements for location, size, minimum recess depth, and other conditions affecting installation of foot grilles and frames.
b. Examine roughing-in for drainage piping systems to verify actual locations of piping connections before foot grille and frame and drain pan installation.
c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

Install recessed foot grilles and frames and drain pans to comply with manufacturer's written instructions at locations indicated and with top of foot grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set foot-grille tops at height for most effective cleaning action. Coordinate top of foot-grille surfaces with doors that swing across grilles to provide clearance under door.

3.3 PROTECTION

After completing frame installations, provide temporary filler of plywood or fiberboard in foot-grille recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near final acceptance. Defer installation of foot grilles until Project is near final acceptance.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 12491

HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Horizontal louver blinds with aluminum slats.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of product indicated.

1.2.2. Samples for Verification

a. For each type and color of horizontal louver blind indicated.
b. Slat: Not less than 12 inches long.

1.2.3. Window Treatment Schedule

a. For horizontal louver blinds. Use same room designations indicated on Drawings.

1.2.4. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R
1.2.2	Samples for Verification	X	R
1.2.3	Window Treatment Schedule	X	R

X Submit quantity specified in Division 1 Section "Administrative Requirements."
R Review each submittal, mark to indicate action taken, and return.

1.3 QUALITY ASSURANCE

1.3.1. Source Limitations

a. Obtain horizontal louver blinds through one source from a single manufacturer.

1.3.2. Product Standard

a. Provide horizontal louver blinds complying with WCSC A 100.1.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver horizontal louver blinds in factory packages, marked with manufacturer and product name, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.5 PROJECT CONDITIONS

1.5.1. Environmental Limitations

a. Do not install horizontal louver blinds until construction and wet and dirty finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.5.2. Field Measurements

a. Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Contracting Officer of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

2.1.1. Slats

a. Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.

(1) Width: 1 inch.
(2) Thickness: Manufacturer's standard. Not less than 0.008 inch.
(3) Spacing: Manufacturer's standard
(4) Finish: As indicated.

2.1.2. Headrail

a. Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and end plugs and the following:

(1) Capacity: One blind per headrail.
(2) Ends: Capped or plugged.
(3) Manual Lift Mechanism:

(a) Lift-Cord Lock: Variable; stops lift cord at user-selected position within blind full operating range.
(b) Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.

(4) Integrated Headrail/Valance: Curved face.

2.1.3. Bottom Rail

a. Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic- or metal-capped ends.

b. Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic or metal capped ends.

2.1.4. Ladders

a. Evenly spaced across headrail at spacing that prevents long-term slat sag.

(1) For Blinds with Nominal Slat Width 1 Inch or Less: Braided string.

2.1.5. Lift Cords

a. Manufacturer's standard braided cord.

2.1.6. Tilt Control

a. Enclosed worm-gear mechanism and linkage rod that adjusts ladders, and the following:

(1) Tilt Operation: Manual with clear plastic wand.
(2) Length of Tilt Control: Length required to extend to 48 inches (1219 mm) above floor level when blind is fully closed.
(3) Tilt: Full.
(4) Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.
(5) Tilt-Operator Location: Manufacturer's standard.

2.1.7. Lift Operation

a. Manual, cord lock; locks pull cord to stop blind at any position in ascending or descending travel.
b. Manual Lift-Operator: Length required to extend to 48 inches (1219 mm) above floor level when blind is fully closed.
c. Lift-Operator Location: Manufacturer's standard.

2.1.8. Mounting

a. Wall mounting, permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.

(1) Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind.
(2) Hold-Down Brackets and Hooks or Pins: Manufacturer's standard..

(a) Provide hold-down brackets and hooks or pins on doors.

2.1.9. Colors, Textures, Patterns, and Gloss

a. Slats: As indicated.

b. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

2.2 HORIZONTAL LOUVER BLIND FABRICATION

2.2.1. Concealed Components

a. Noncorrodible or corrosion-resistant-coated materials.

(1) Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.

2.2.2. Unit Sizes

a. Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:

(1) Blind Units Installed between (inside) Jambs: Width equal to 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch, less than jamb-to-jamb dimension of opening in which each blind is installed. Length equal to 1/4 inch, plus or minus 1/8 inch, less than head-to-sill dimension of opening in which each blind is installed.

2.2.3. Installation Brackets

a. Designed for easy removal and reinstallation of blind, for supporting headrail, valance, and operating hardware, and for hardware position and blind mounting method indicated.

2.2.4. Installation Fasteners

a. No fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

2.2.5. Color-Coated Finish:

a. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

2.2.6. Component Color

a. Provide rails, cords, ladders, and exposed-to-view metal and plastic matching or coordinating with slat color, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. General

a. Install horizontal louver blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior slat edges in any position are not closer than 2 inches to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware if any.

3.2.2. Jamb Mounted

a. Install headrail flush with face of opening jamb and head.

3.3 ADJUSTING

Adjust horizontal louver blinds to operate smoothly, easily, safely, and free of binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

3.4.1. Cleaning

a. Clean horizontal louver blind surfaces after installation, according to manufacturer's written instructions.

3.4.2. Protection

a. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.

3.4.3. Replacement

a. Replace damaged horizontal louver blinds that cannot be repaired, in a manner approved by Contracting Officer, before time of final acceptance.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 12600

FURNITURE

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. 1A03-N Workstation General Office, Low Profile.
b. 1A03-R Workstation General Office, Stand Alone.
c. 1A03-NEX1 Workstation General Office, Stand Alone.
d. 1A03-NEX2 Workstation General Office, Stand Alone.
e. Food Court chairs and stools.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each furniture item specified, including details of construction relative to materials, dimensions, and finishes.

1.2.2. Submittal List

Reference	Submittal Item	Quantity	Action
1.2.1	Product Data	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

1.3.1. General

a. Deliver items in manufacturer's original unopened packaging.
b. Store materials in original protective packaging to prevent soiling, physical damage, or wetting.
c. Handle so as to prevent damage to finished material.
d. Maintain protective covers on all items until installation is complete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable

products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ITEM 1A03-N: WORKSTATION GENERAL OFFICE, LOW PROFILE

2.2.1. Basis-of-Design Product

a. Hon Company, Simplicity II Series. Provide modular work stations, nominal 74- by 99-inches, as indicated on drawings. Provide panels with raceway bases to allow for routing of computer, telephone, and electrical systems. Provide wire management ports on all work surfaces with multi-outlet, pop-up receptacles. Provide one adjustable pull-out computer keyboard drawer at each corner work surface. Each work station shall comprise the following components.

(1) Three fabric covered raceway acoustical wall panels, 30 inches high by 37 inches wide, with connectors as necessary. Hon SR3037.
(2) One fabric covered raceway acoustical wall panel, 30 inches high by 62 inches wide, with connectors as necessary. Hon SR3062.
(3) Two fabric covered raceway acoustical end wall panels, 30 inches high by 25-1/2 inches wide, with connectors as necessary. Hon SR3025.
(4) One standard plastic-laminate work surface, 24 inches wide by 62 inches long, with brackets as necessary. Hon WS2462.
(5) One standard plastic-laminate work surface, 24 inches wide by 37 inches long, with brackets as necessary. Hon WS2437.
(6) One corner plastic-laminate work surface, 37 inches wide by 24 inches deep, with brackets as necessary. Hon WS3724.
(7) One mobile prefinished painted ped box/box/file, 26-7/8 inches high by 22-7/8 inches deep by 15 inches wide. Hon 23723.
(8) One plastic-laminate wood center drawer, 22 inches wide by 15-3/8 inches deep, installed under work surface WS2437. Hon 1522.
(9) Two cantilever bracket SC/FS units. Hon CB1.
(10) One articulating/swiveling keyboard platform. Hon 850500.
(11) One data and electrical receptacle, 6 pin RJ11, of color selected. Hon H61011E6.
(12) One pull-up receptacle, Hon H870300.
(13) One electrical pass-thru cable 36W 3-1 & 2-2 systems, Hon H871136.
(14) Two Electrical power harness 36W, 3-1 and 2-2 systems. Hon H871236.
(15) One Electrical power harness 60W, 3-1 and 2-2 systems. Hon H871260.
(16) One duplex receptacle circuit 1, 3-1 and 2-2 systems, of color selected. Hon H871501.
(17) One duplex receptacle circuit 2, 3-1 and 2-2 systems, of color selected. Hon H871502.
(18) One duplex receptacle circuit 4, 3-1 and 2-2 systems, of color selected. Hon H871504.
(19) One power in-feed cable, base, 3-1 and 2-2 systems. Hon H879072.
(20) Raceway 90 degree corner panel connectors. Hon PB090R. (As required).
(21) Raceway 180 degree straight panel connectors. Hon PB180R.. (As required).
(22) Raceway end-of-run panel kits. Hon PB1R.. (As required).
(23) Raceway tee (3-way) panel connectors. Hon PB3R.. (As required).
(24) Two work surface support legs 20/24 inches deep by 28 inches high of color selected. Hon SP2824.
(25) One swivel/tilt task chair with height and back adjustment and adjustable arms, five star base, duel wheel casters, and fabric cover. Hon 6603 (chair) and Hon 6693 (chair arms).

2.3 ITEM 1A03-R: WORKSTATION GENERAL OFFICE, STAND ALONE

2.3.1. Basis-of-Design Product

a. Hon Company, Simplicity II Series. Provide modular work stations, nominal 74- by 99-inches, as indicated on drawings. Provide panels with raceway bases to allow for routing of computer, telephone, and electrical systems. Provide wire management ports on all work surfaces with multi-outlet, pop-up receptacles. Provide one adjustable pull-out computer keyboard drawer at each corner work surface. Provide task lighting under each overhead storage unit for the full length of the unit. Each work station shall comprise the following components (adjacent work stations may share acoustical wall panels).

(1) Three fabric covered raceway acoustical wall panels, 65 inches high by 37 inches wide, with connectors as necessary. Hon SR6537.
(2) One fabric covered raceway acoustical wall panel, 65 inches high by 62 inches wide, with connectors as necessary. Hon SR6562.
(3) Two fabric covered raceway acoustical end wall panels, 65 inches high by 25-1/2 inches wide, with connectors as necessary. Hon SR6525.
(4) One 61-inch lockable prefinished painted overhead storage unit, with connectors as necessary. Hon SC62L.
(5) One 36-inch lockable prefinished painted overhead storage unit, with connectors as necessary. Hon SC37L.
(6) One connector block SC/FS units. Hon SD3137C.
(7) One 36-inch prefinished painted full height open bookshelf unit, with connectors as necessary. Hon FS37.
(8) One standard plastic-laminate work surface, 24 inches wide by 62 inches long, with brackets as necessary. Hon WS2462.
(9) One standard plastic-laminate work surface, 24 inches wide by 37 inches long, with brackets as necessary. Hon WS2437.
(10) One corner plastic-laminate work surface, 37 inches wide by 24 inches deep, with brackets as necessary. Hon WS3724.
(11) Two cantilever bracket SC/FS units. Hon CB1.
(12) One mobile prefinished painted ped box/box/file, 26-7/8 inches high by 22-7/8 inches deep by 15 inches wide. Hon 23723.
(13) One plastic-laminate wood center drawer 22 inches wide by 15-3/8 inches deep (installed under work surface WS2437). Hon 1522.
(14) One articulating/swiveling keyboard platform. Hon 850500.
(15) One data and electrical receptacle, 6 pin RJ11 of color selected. Hon H61011E6.
(16) One pull-up receptacle, Hon H870300.
(17) One electrical pass-thru cable 36W 3-1 & 2-2 systems, Hon H871136.
(18) Three task lights 30W, Hon H870930.
(19) Two Electrical power harness 36W, 3-1 and 2-2 systems. Hon H871236.
(20) One Electrical power harness 60W, 3-1 and 2-2 systems. Hon H871260.
(21) One duplex receptacle circuit 1, 3-1 and 2-2 systems, of color selected. Hon H871501.
(22) One duplex receptacle circuit 2, 3-1 and 2-2 systems, of color selected. Hon H871502.
(23) One duplex receptacle circuit 3, 3-1 system only, of color selected. Hon H871503.
(24) One duplex receptacle circuit 4, 3-1 and 2-2 systems, of color selected. Hon H871504.
(25) One power in-feed cable, base, 3-1 and 2-2 systems. Hon H879072.
(26) Raceway 90 degree corner panel connectors. Hon PB090R. (As required)
(27) Raceway 180 degree straight panel connectors. Hon PB180R. (As required)
(28) Raceway end-of-run panel kits. Hon PB1R. (As required)
(29) Raceway tee (3-way) panel connectors. Hon PB3R. (As required)
(30) Two work surface support legs 20/24 inches deep by 28 inches high of color selected. Hon SP2824.
(31) One swivel/tilt task chair with height and back adjustment and adjustable arms, five star base, duel wheel casters, and fabric cover. Hon 6603 (chair) and Hon 6693 (chair arms).

2.4 ITEM 1A03-NEX1: WORKSTATION GENERAL OFFICE, STAND ALONE

2.4.1. Basis-of-Design Product

a. Hon Company, Simplicity II Series. Provide modular work stations, nominal 99- by 99-inches, as indicated on drawings. Provide panels with raceway bases to allow for routing of computer, telephone, and electrical systems. Provide wire management ports on all work surfaces with multi-outlet, pop-up receptacles. Provide one adjustable pull-out computer keyboard drawer at each corner work surface. Provide task lighting under each overhead storage unit for the full length of the unit. Each work station shall comprise the following components (adjacent work stations may share acoustical wall panels).

(1) Three fabric covered raceway acoustical wall panels, 65 inches high by 37 inches wide, with connectors as necessary. Hon SR6537.
(2) Three fabric covered raceway acoustical wall panel, 65 inches high by 62 inches wide, with connectors as necessary. Hon SR6562.
(3) Two fabric covered raceway acoustical end wall panels, 65 inches high by 25-1/2 inches wide, with connectors as necessary. Hon SR6525.
(4) Two 61-inch lockable prefinished painted overhead storage unit, with connectors as necessary. Hon SC62L.
(5) One 36-inch lockable prefinished painted overhead storage unit, with connectors as necessary. Hon SC37L.
(6) One connector block SC/FS units. Hon SD3137C.
(7) One 36-inch prefinished painted full height open bookshelf unit, with connectors as necessary. Hon FS37.
(8) Two standard plastic-laminate work surface, 24 inches wide by 62 inches long, with brackets as necessary. Hon WS2462.
(9) One corner plastic-laminate work surface, 37 inches wide by 24 inches deep, with brackets as necessary. Hon WS3724.
(10) Two cantilever bracket SC/FS units. Hon CB1.
(11) One mobile prefinished painted ped box/box/file, 26-7/8 inches high by 22-7/8 inches deep by 15 inches wide. Hon 23723.
(12) One plastic-laminate wood center drawer 22 inches wide by 15-3/8 inches deep (installed under work surface WS2437). Hon 1522.
(13) One articulating/swiveling keyboard platform. Hon 850500.
(14) One data and electrical receptacle, 6 pin RJ11 of color selected. Hon H61011E6.
(15) One pull-up receptacle, Hon H870300.
(16) One electrical pass-thru cable 36W 3-1 & 2-2 systems, Hon H871136.
(17) Three task lights 30W, Hon H870930.
(18) Two Electrical power harness 36W, 3-1 and 2-2 systems. Hon H871236.
(19) One Electrical power harness 60W, 3-1 and 2-2 systems. Hon H871260.
(20) One duplex receptacle circuit 1, 3-1 and 2-2 systems, of color selected. Hon H871501.
(21) One duplex receptacle circuit 2, 3-1 and 2-2 systems, of color selected. Hon H871502.
(22) One duplex receptacle circuit 3, 3-1 system only, of color selected. Hon H871503.
(23) One duplex receptacle circuit 4, 3-1 and 2-2 systems, of color selected. Hon H871504.
(24) One power in-feed cable, base, 3-1 and 2-2 systems. Hon H879072.
(25) Raceway 90 degree corner panel connectors. Hon PB090R. (As required)
(26) Raceway 180 degree straight panel connectors. Hon PB180R. (As required)
(27) Raceway end-of-run panel kits. Hon PB1R. (As required)
(28) Raceway tee (3-way) panel connectors. Hon PB3R. (As required)
(29) Two work surface support legs 20/24 inches deep by 28 inches high of color selected. Hon SP2824.
(30) One swivel/tilt task chair with height and back adjustment and adjustable arms, five star base, duel wheel casters, and fabric cover. Hon 6603 (chair) and Hon 6693 (chair arms).

2.5 ITEM 1A03-NEX2: WORKSTATION GENERAL OFFICE, STAND ALONE

2.5.1. Basis-of-Design Product

a. Hon Company, Simplicity II Series. Provide modular work stations, nominal 74- by 99-inches, as indicated on drawings. Provide panels with raceway bases to allow for routing of computer, telephone, and electrical systems. Provide wire management ports on all work surfaces with multi-outlet, pop-up

receptacles. Provide one adjustable pull-out computer keyboard drawer at each corner work surface. Provide task lighting under each overhead storage unit for the full length of the unit. Each work station shall comprise the following components (adjacent work stations may share acoustical wall panels).

(1) Five fabric covered raceway acoustical wall panels, 65 inches high by 37 inches wide, with connectors as necessary. Hon SR6537.
(2) One fabric covered raceway acoustical wall panel, 65 inches high by 62 inches wide, with connectors as necessary. Hon SR6562.
(3) Two fabric covered raceway acoustical end wall panels, 65 inches high by 25-1/2 inches wide, with connectors as necessary. Hon SR6525.
(4) One 61-inch lockable prefinished painted overhead storage unit, with connectors as necessary. Hon SC62L.
(5) One 36-inch lockable prefinished painted overhead storage unit, with connectors as necessary. Hon SC37L.
(6) One connector block SC/FS units. Hon SD3137C.
(7) One 36-inch prefinished painted full height open bookshelf unit, with connectors as necessary. Hon FS37.
(8) One standard plastic-laminate work surface, 24 inches wide by 62 inches long, with brackets as necessary. Hon WS2462.
(9) One standard plastic-laminate work surface, 24 inches wide by 37 inches long, with brackets as necessary. Hon WS2437.
(10) One corner plastic-laminate work surface, 37 inches wide by 24 inches deep, with brackets as necessary. Hon WS3724.
(11) Two cantilever bracket SC/FS units. Hon CB1.
(12) One mobile prefinished painted ped box/box/file, 26-7/8 inches high by 22-7/8 inches deep by 15 inches wide. Hon 23723.
(13) One plastic-laminate wood center drawer 22 inches wide by 15-3/8 inches deep (installed under work surface WS2437). Hon 1522.
(14) One articulating/swiveling keyboard platform. Hon 850500.
(15) One data and electrical receptacle, 6 pin RJ11 of color selected. Hon H61011E6.
(16) One pull-up receptacle, Hon H870300.
(17) One electrical pass-thru cable 36W 3-1 & 2-2 systems, Hon H871136.
(18) Three task lights 30W, Hon H870930.
(19) Two Electrical power harness 36W, 3-1 and 2-2 systems. Hon H871236.
(20) One Electrical power harness 60W, 3-1 and 2-2 systems. Hon H871260.
(21) One duplex receptacle circuit 1, 3-1 and 2-2 systems, of color selected. Hon H871501.
(22) One duplex receptacle circuit 2, 3-1 and 2-2 systems, of color selected. Hon H871502.
(23) One duplex receptacle circuit 3, 3-1 system only, of color selected. Hon H871503.
(24) One duplex receptacle circuit 4, 3-1 and 2-2 systems, of color selected. Hon H871504.
(25) One power in-feed cable, base, 3-1 and 2-2 systems. Hon H879072.
(26) Raceway 90 degree corner panel connectors. Hon PB090R. (As required)
(27) Raceway 180 degree straight panel connectors. Hon PB180R. (As required)
(28) Raceway end-of-run panel kits. Hon PB1R. (As required)
(29) Raceway tee (3-way) panel connectors. Hon PB3R. (As required)
(30) Two work surface support legs 20/24 inches deep by 28 inches high of color selected. Hon SP2824.
(31) One swivel/tilt task chair with height and back adjustment and adjustable arms, five star base, duel wheel casters, and fabric cover. Hon 6603 (chair) and Hon 6693 (chair arms).

2.6 FOOD COURT CHAIRS AND STOOLS

2.6.1. Basis-of-Design Product

a. Industry West, 800-382-9303 www.industry-west.com, Flanders Chair, welded steel, stackable with rubber feet and wood seat. Color: Gunmetal.

b. Industry West, 800-382-9303 www.industry-west.com, Marais High Back Stool, welded steel, bar height 30” with rubber feet and wood seat. Color: Gunmetal.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Verify that materials are those specified before installing.
b. Install furniture after other finishing operations, including painting, have been completed.
c. Install furniture in scheduled locations.
d. Clean and polish exposed surfaces, using materials and methods recommended by the manufacturer.

3.2 PROTECTION

Protect furniture against damage during remainder of construction period, complying with manufacturer's directions.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 13033

COLD STORAGE ROOMS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Shop fabricated, site assembled, walk-in, cold storage rooms including:

(1) Cooler rooms.
(2) Freezer rooms.
(3) Ceiling panel supports.
(4) Sliding cold storage room doors.
(5) Swinging cold storage room doors.
(6) Windows.
(7) 1G11 Remote, Dairy, Reach-In Doors, Milk/Eggs/Juice.

1.1.2. Related Sections

a. Division 3 Section “Insulating Concrete Freezer Floors” for cast-in-place insulating concrete floors.
b. Division 8 Section “Traffic Doors” for flexible vertical strip barrier doors.
c. Division 8 Section “Traffic Doors” for double action, self-closing, lightweight, impact resistant traffic doors.
d. Division 15 Section “Product Refrigeration System” for refrigeration system.
e. Division 15 Section “Refrigeration Monitoring and Control System (RMCS)” for monitoring and control system.
f. Division 16 Section for lighting, electrical wiring, and connections.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Structural Performance

a. Provide cold storage room ceilings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

(1) Live load: Uniform load of 10 psf or a concentrated load of 300 lbf on an area of 144 sq. in., whichever produces the greater stress. Concentrated and uniform loads need not be assumed to act concurrently.
(2) Dead load: 4 psf or actual weight of panels, fixtures, and equipment supported, whichever is greater.
(3) Deflection: L/180.

1.2.2. Seismic Performance

a. Design, engineer, and provide cold storage rooms capable of withstanding the effects of earthquake motions.
b. Refer to Division 1 Section "Description of Work" for seismic-load design performance criteria.

1.3 SUBMITTALS

1.3.1. Product Data

a. Submit complete catalog data. Submit catalog cuts of each type of unit, as well as cuts of hardware and accessories proposed for use.

1.3.2. Shop Drawings

a. Provide overall layout drawing indicating location and exact dimensions of cold storage rooms.
b. Show construction and fabrication details of each item.
c. Provide details for structural supports to be used.

(1) For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3.3. Installation Drawings

a. Submit complete drawings showing details of anchorage and connection, location and method of attachment of installed equipment, method of assembling sections and relationship to adjoining work.
b. Show complete layout of panels, connection details, setting diagrams. Number each panel and show panel numbers on installation drawings.

1.3.4. Installation Instructions

a. Provide complete written installation instructions for cold storage rooms.

1.3.5. Ceiling Suspension Structural Calculations

a. Indicate location and magnitude of loads imposed on building structure.

1.3.6. Field Test Reports

a. Submit cold storage rooms operating and performance tests.

1.3.7. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Installation Drawings	X	I
1.3.4	Installation Instructions	X	I
1.3.5	Ceiling Suspension Structural Calculations	X	I
1.3.6	Field Test Reports	X	R

X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

Deliver store and handle material to prevent damage and marring of finish. Protect finished surfaces from damage. Store units on pallets or other approved devices. Store materials inside building, under protective covering, and protect from weather, moisture, open flames and sparks.

1.5 WARRANTY

Provide written warranty covering materials and workmanship of all work of this Section for a period of 2 years and repair or replace all material which becomes defective during warrantee period. The Government shall have continued use of defective equipment until replacement equipment is delivered.

1.6 QUALITY ASSURANCE

1.6.1. General

a. Contract drawings indicate the extent and general arrangement of the construction. No departures from the Contract Drawings, these Specifications or the approved shop drawings may be made without prior written approval of the Contracting Officer. Units shall be factory prefabricated, job assembled, commercial, walk-in, room type, complete with doors and accessory items as specified.

1.6.2. Supervision

a. Install work of this Section, and related work specified in other sections, under the supervision of trained and experienced personnel.

1.6.3. Plumbing and Mechanical Work

a. Where not specified elsewhere, furnish and install equipment, parts, and fittings necessary for the proper operation of the equipment as part of the work of this Section. Conform to applicable requirements of Division 15.

1.6.4. Electrical Work

a. Where not specified elsewhere, furnish and install manual and automatic controls and protective or signal devices required for the operation of the equipment as part of the work of this Section. Conform to applicable requirements of Division 16.

1.6.5. Rough-in of Utilities

a. Install water, waste, vent, gas, electric and other mechanical and electrical work, not included as part of the cold storage room units, in accordance with Divisions 15 and 16. Provide rough-in information, including templates, drawings to scale, and brochures to enable work of other sections to proceed. Contract drawings are diagrammatic. As part of this work, provide adjustments required for the various parts and the work of the various sections to fit together for a complete and operable system.

1.6.6. Operating Temperatures

a. Provide overall internal operating temperatures of cold storage rooms as indicated in Division 15 Sections “Product Refrigeration System” and “Refrigeration Monitoring and Control System (RMCS)”.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 PREFABRICATED PANELS

2.2.1. Aluminum Panel Construction

a. Panels, General

(1) Interior and exterior metal panels uniformly formed with metal dies, insulation, and panel fasteners.
(2) Wood frame panels are not acceptable.
(3) UL approved, or provided with certificate of test from independent testing laboratory, certifying to fire retardant properties of the insulation.

b. Panels Size

(1) Length: 144 inches, maximum.
(2) Width: 48 inches, maximum.
(3) Thickness, minimum, including insulation and panel skins:

(a) Medium temperature panels: 4 inches.
(b) Low temperature panels: 5 inches.

c. Panel Joints: Interlocking design.
d. Panel Fasteners: Cam action type operable from inside the space and shall not protrude from the panels when in the retracted position.
e. Provide vapor seal at panel joints when joints are assembled. Form seal by compressing closed cell gaskets in the joint. Panel gaskets shall be of synthetic rubber or other suitable material. Refer to Part 3 for additional caulking required at freezer wall and ceiling panels.
f. Panel skins: 0.032 inch thick stucco embossed aluminum. Provide factory applied USDA acceptable white baked or acrylic enamel finish.

(1) The under side of ceiling panels shall have sufficient strength to support conduit and light fixtures riveted directly to the skin. Light fixture weight is approximately 50 pounds per 8 feet of strip light.
(2) Panel skins shall adhere to the insulation.

g. Door And Window Opening Framing: Structural steel channel around perimeter of opening, foamed-in-place with insulation. Width of steel channel shall match width of prefabricated panel.

2.2.2. Insulation:

a. Insulation shall be foamed-in-place polyurethane, 2 pcf minimum density, bonded to inner and outer metal panels.

b. Thermal conductivity (K) shall not exceed 0.14 (BTU) (IN) / (HR.) (FT^2) (DEGREE F).

(1) Low Temperature Panels: 5-inch thickness with a minimum "R" factor of 36.
(2) Medium Temperature Panels: 4-inch thickness with a minimum "R" factor of 28.

c. Insulation shall be Factory Mutual System classified Class I (per ASTM E-84) having a flame spread of no more than 25, fuel contributed of 0, and smoke developed rating not greater than 400 when tested in a 4-inch cross section.

2.3 CEILING PANEL SUPPORTS

2.3.1. General

a. Do not use vertical support columns or posts on interior or exterior of cold storage rooms. Interior of cold storage rooms shall be free and clear of any attachments or penetrations from supporting members.

2.3.2. Overhead-Supported Panels

a. Where ceiling panels cannot be self-supporting on cold storage room wall panels, provide ceiling panel support system, including fasteners and attachments, suspended from building overhead structural system. Do not support panels from metal decking.

(1) Provide supporting members, including fasteners and attachments, required to support ceiling panels from underside of overhead building structural members.
(2) Provide suspension system of structural steel materials complying with Division 5 Section "Metal Fabrications."
(3) Provide manufacturer's supports and attachments hangers conforming to panel joint configuration.
(4) Design support system in accordance with performance requirements and AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

b. Design ceiling panel support system in accordance with performance requirements.

2.3.3. Self-Supporting Panels

a. Where ceiling panels are self-supporting, provide ceiling panels that bear on cold storage wall panels and span from wall to wall.
b. Design ceiling panels in accordance with performance requirements.

2.4 COLD STORAGE ROOM DOORS

2.4.1. Sliding Doors:

a. Provide horizontal sliding cold storage doors where indicated.
b. Door Frame Assembly: Structurally designed, extruded, insulated, white aluminum header and casings, of dimension required for the proper support of the door. Aluminum clad wood framing is not acceptable. Refer to Part 3 for caulking required around perimeter of cold storage room door frames.
c. Door Panels:

(1) Door Panel Cladding: 0.032 inch thick stucco embossed aluminum with factory applied white baked or acrylic enamel finish matching prefabricated wall panels.

(2) Door Panel Assembly: Internal extruded aluminum frame reinforced with heavy gage "L" brackets, vapor sealed, and insulated with foamed-in-place polyurethane insulation.
(3) Door Overall Thickness, including insulation and panel skins:

(a) Medium temperature panels: 4 inches.
(b) Low temperature panels: 5 inches.

d. Door Hardware:

(1) Tamper-proof, with cylinder lock and provisions, when locked, of being opened from the inside without damage to the door assembly.
(2) Drop track guide system, with closed hood tracking system, providing immediate gasket clearance as door opens. Track fabricated of extruded aircraft grade aluminum throughout profile. Support sliding door panel with twin trolley roller assembly comprised of four nylon wheels and a solid aluminum tie bar.
(3) Attached track and hardware shall have a corrosion resistant coating.
(4) Provide manufacturer's standard ¼-inch thick steel door hook to engage door guide, and black color polymer sliding floor door guide system to provide positive seal when door is in closed position.
(5) Provide stainless steel breaker bar handle, mounted on leading edge of door jamb, to break seal and assist door opening.
(6) Gaskets: Provide dual wiper perimeter gasket seals on door panel that are resistant to oil, water, fats, and sunlight. Gasket material shall be santoprene which remains pliable to minus 40 degrees F. Mount gaskets in an extrusion on back of door panel. Door frame mounted gaskets are not acceptable. Door bottom gasket shall be twin sweep gasket design. The first gasket shall be located under door panel in an extruded track. The second gasket is an adjustable gasket mounted on interior side of door panel and easily moved up or down with contour of floor.
(7) Provide 18 ga stainless steel wrap at both jambs and head of door opening. Width of stainless steel wrap shall match overall depth of door frame assembly and return 2-inches on both faces.
(8) Provide 48-inch high 0.100 inch thick (measured through the body of plate, not including the raised portion) polished aluminum diamond tread protection plates on both faces of door panel, including 3-1/2 inches wide return on edges of door panel.

e. Basis-of-Design Product: Frank Door Company, (252) 885-6145 or www.frankdoor.com.

2.4.2. Swing Doors:

a. Provide cold storage swing doors where indicated.
b. Door Frame Assembly: Structurally designed, extruded, insulated, white aluminum header and casings, of dimension required for the proper support of the door. Aluminum clad wood framing is not acceptable.
c. Door Panels:

(1) Door Panel Cladding: 0.032 inch thick stucco embossed aluminum with factory applied white baked or acrylic enamel finish matching prefabricated wall panels.
(2) Door Panel Assembly: Internal extruded aluminum frame reinforced with heavy gage "L" brackets, vapor sealed, and insulated with foamed-in-place polyurethane insulation. Provide additional reinforcing around perimeter of the door to prevent twisting. Refer to Part 3 for caulking required around perimeter of cold storage room door frames.
(3) Door Overall Thickness, including insulation and panel skins:

(a) Medium temperature panels: 4 inches.
(b) Low temperature panels: 5 inches.

d. Door Hardware:

(1) Stainless steel with satin or polished finish.
(2) Provide on each door: Two door hinges of the automatic self-closing cam-lift or spring assisted cam-lift type, with stainless pin and nylon cam type bearing.

(a) Provide on each door that is not wider than 3 feet 9 inches nor taller than 7 feet a spring action or hydraulic door closer that firmly close doors that have been closed to within 1 inch of full closure.

(3) Design door latch to open door by breaking the seal or force on the door gasket.
(4) Provide latch with provision for a padlock and provisions, when locked, of being opened from the inside without damage to the door latch assembly.
(5) Provide door stops for doors and an assist wheel to ensure proper closure and seal.
(6) Install door mechanism and exterior hinges with tamper-proof fasteners in doors.
(7) Gaskets: Provide dual wiper perimeter gasket seals on door panel that are resistant to oil, water, fats, and sunlight. Gasket material shall be santoprene which remains pliable to minus 40 degrees F. Mount gaskets in an extrusion on back of door panel. Door frame mounted gaskets are not acceptable. Door bottom gasket shall be twin sweep gasket design. The first gasket shall be located under door panel in an extruded track. The second gasket is an adjustable gasket mounted on interior side of door panel and easily moved up or down with contour of floor.
(8) Provide 18 ga. stainless steel wrap at both jambs and head of door opening. Width of stainless steel wrap shall match overall depth of door frame assembly and return 2-inches on both faces.
(9) Provide 48-inch high, 0.10 inch thick (measured through the body of plate, not including the raised portion) polished aluminum diamond tread protection plates on both faces of door panel, including 3-1/2 inches wide return on edges of door panel.

e. Basis-of-Design Product: Frank Door Company, (252) 885-6145 or www.frankdoor.com.

2.4.3. Freezer Doors (both sliding and swinging):

a. Equip freezer doors with an automatically self-regulating heater cable in an aluminum frame.
b. Install cable in a manner that allows replacement without removing the door panel from the header assembly or swing door hinge assembly, as applicable.
c. Doors shall be both NSF compliant and UL approved, complete with all components required for complete and operational installation.
d. Provide heated stainless steel threshold across width of door opening, to cover freezer floor thermal break, as indicated on drawings.
e. Electrical requirements: 120 V, 60 Hz, single phase.
f. Completely wire heater cables to controls and door switches and terminated them in a junction box adjacent to the door.

2.5 FLEXIBLE VERTICAL STRIP BARRIER DOORS

Flexible vertical strip barrier doors are specified in Division 8 Section “Traffic Doors.

2.6 DOUBLE ACTION, SELF-CLOSING, LIGHTWEIGHT, IMPACT RESISTANT TRAFFIC DOORS

Double action, self-closing, lightweight, impact resistant traffic doors are specified in Division 8 Section “Traffic Doors.”

a. Provide 18 ga. stainless steel wrap at both jambs and head of door opening. Width of stainless steel frame shall match overall depth of door frame assembly and return 2 inches on both faces.

2.7 ITEM 1G11: REMOTE, DAIRY, REACH-IN DOORS, MILK/EGGS/JUICE.

2.7.1. Salient Characteristics:

a. Doors:

(1) Self-closing, lift-in/lift-out type for easy cleaning, and containing magnetic gaskets for a positive tight seal.
(2) Hardware: Concealed hinges capable of hinging on either side and an attractive modern-styled handle.
(3) Heated door and frame with humidity sensing heater controllers.

(a) Antisweat heater with antisweat heat controls: Total door rail, glass, and frame heater power draw of 3.0 watts per square foot of door opening. The antisweat heat controls shall reduce the energy use of the antisweat heater in a quantity corresponding to the relative humidity in the air outside the door or to the condensation on the inner glass pane.

(4) Nominal Door Opening Size: 28-3/4 inches wide by 75 inches high.
(5) Actual Door Size: 27-3/8 inches wide by 72 inches high.
(6) Assemble glass doors using individual doors or pre-assembled multiple sectional glass door assemblies.

(a) If pre-assembled multiple sectional glass door assemblies are used, provide spacers on cart corrals to assure that milk and egg carts are centered on 1G11 door openings.

(7) Mount doors in cold storage room wall panel as indicated, at height above floor indicated.
(8) Back light doors with fluorescent T8 lamps on the interior at each mullion to properly illuminate the display area. Provide electronic ballast lights and junction box for 120 volts, 60 cycle, 1 phase, A.C. electrical service.
(9) NSF and UL listed.
(10) Full vision, hermetically sealed, triple pane, reflective coated, insulating tempered float-glass units encased in polished aluminum frame.
(11) Basis-of-Design Product: Anthony International Model 1001 Series. (800) 772-0900 or www.anthonydoors.com.

b. Milk And Egg Carts

(1) Milk Cart: Rigid stainless steel milk bully cart (80 one gallon capacity / 180 half-gallon capacity) – Cannon Equipment, model no. 10841-902 (26 7/8” wide x 26 5/16” deep x 65 11/16” high). Five (5) upper shelves constructed of formed wire. One bottom shelf constructed of formed sheet metal channels and square tubing. Sides constructed of square tubing. Ladder constructed of square tubing zinc plated. Two (2) rigid and two (2) swivel casters with 6” x 2” phenolic wheels and roller bearings, with threadguards (dairy grade casters). ½” diameter solid rear shelf support rod penetrates side frame tubes for extra shelf reinforcement. Side tube frames pass into base for extra strength. Chemically cleaned finish.

(a) Provide six carts for each four (4) glass display doors. Any fraction shall be rounded to the next higher number.

(2) Egg Cart: Bright zinc electroplated with lacquer dip finish (240 dozen capacity) – Cannon Equipment, model no. 83-9922-000 (26" wide x 24 ¾" deep x 66 ¼" high). Side and rear frames constructed of square steel tubing. Base and two (2) folding shelves constructed of square steel tubing and sheet , tilted back for product retention. Two (2) swivel casters with 5" x 2" phenolic wheels. Two (2) rigid casters with 5" x 2" phenolic wheels. Shelves and sides fold for compact storage. Top shelf locks in an intermediate position to allow easy access to 2nd shelf, yet not interfere with top of cooler.

(a) Provide two carts for each four (4) glass display doors. Any fraction shall be rounded to the next higher number.

c. Cart Corral

(1) Provide cart corral at each 1G11 glass display door as follows:

(a) Cart Corral with Add-On Units: Zinc electroplated with white powder coat finish – Cannon Equipment, model 10113-901 Cart Corral (28.56" wide x 23.38" deep x 65.69" high) with model no. 10114-901 Add-On units. Provide individual cart corral with add-on units fastened together to match quantity of 1G11 glass disply doors. Assemble cart corrals with stainless steel washers as required to maintain alignment (28 ¾" on-center spacing) with 1G11 glass doors. 1" x 1.5" steel tube side frames. Provide movable ID channels; milk cart requires four (4) per door and egg cart requires two (2) per door. Stainless steel side frame straps and stainless steel floor anchor plates. Fasten to floor with manufacturer's standard hardware.

2.8 WINDOWS

2.8.1. General

a. Triple-pane, hermetically sealed, non-heated reflective coated, tempered float glass encased in polished aluminum or stainless steel frame; stationary panels designed for viewing in refrigerated walls. Size frame for thickness of cold storage room wall opening.

b. Provide 18 ga. stainless steel wrap at head, jambs, and sill of window opening. Width of stainless steel wrap shall match overall depth of window frame assembly and return 2 inches on both sides.

2.8.2. Basis-of-Design Product: Anthony International, Model 1950 Series; (800)772-0900 or www.anthonydoors.com.

2.9 ACCESSORIES

2.9.1. Pressure Relief Ports

a. Provide a pressure relief port for cold storage rooms operating at temperatures below 20EF. The relief port shall equalize the difference in pressure on the exterior of the cold storage room and the pressure on the interior caused by sudden temperature changes due to opening of doors, loading products and the defrosting of coils. Locate the relief port in a side panel located away from the direct air stream flowing from the evaporator coils, or other approved location. Design the relief port so that air can move into the cold storage room or out of it. Electrically heat the relief port.

2.9.2. Lighting

a. Provide each room with a 3-way light switch mounted near the door, one on the interior of the room and one on the exterior of the room. Provide at additional locations as indicated on drawings.
b. Light switches shall include a red jewel pilot light and cover plate.
c. Lights shall be vapor proof.

2.9.3. Thermometers

a. Provide a thermometer adjacent to entrance door of each cold storage room.
b. 4-inch flange dial thermometer with 6-foot remote reading capillary tube; dial range minus 40 degrees F to 120 degrees F.
c. Locate capillary tube at least 5 feet away from door opening.
d. Basis-of-Design Product: Marsh Instrument Company, Model K5515.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

3.1.1. Equipment

a. Installation of equipment shall be in accordance with NSF Manual on Sanitation Aspects of Installation of Food Service Equipment.

3.1.2. Materials

a. All items shall be installed plumb, square, level and at proper elevation, and in alignment with other work. All work shall be arranged to suit field conditions, fitted with proper jointing and intersections. Adjust doors to operate smoothly. At completion of work, thoroughly clean materials and equipment, remove debris from the site, and leave work in condition acceptable to the Contracting Officer.

3.1.3. Caulking:

a. Install silicone sealant around entire perimeter of cold storage room door frame, where frame abuts cold storage room wall panel, to assure airtight seal.

3.1.4. Additional Caulking

a. After tests have been completed and approved, all exterior freezer ceiling panel joints and exterior freezer wall panel joints (not sharing common wall with medium temperature cold storage room) shall be sealed with silicone sealant.

3.1.5. Closures

a. Where cold storage rooms abut building walls and partitions, seal-off spaces with stainless steel sheet metal closures.

3.1.6. Thermometers

a. Locate thermometers adjacent to cold storage room door openings with capillary tube at least 5 feet away from door opening.

3.2 PENETRATIONS

3.2.1. General

a. Minimize required penetrations through ceilings, floors, and walls of cold storage rooms.
b. Provide PVC conduit sleeves and resilient gaskets for penetrations.
c. Seal penetrations tightly with silicone sealant.
d. Internally seal electrical and communication conduits to prevent moisture migration through conduit. Conduits shall be sealed on the warm side of the penetration to prevent air movement via convection currents. Do not seal a single conduit at multiple locations as this will trap condensation and result in corrosion.

3.3 FIELD QUALITY CONTROL

3.3.1. Tests, General

a. Perform operating and performance tests on each cold storage room. Submit a written test procedure for approval prior to performance of tests. Furnish instruments, test equipment and personnel required for tests. The Government will furnish necessary water and electricity for the installed equipment to perform tests. Engage and pay for an approved independent testing laboratory to properly calibrate the test instruments immediately prior to performing tests. Prepare written report of tests.

3.3.2. Operating Tests

a. Perform operating tests on each cold storage room after complete adjustment and installation of the refrigeration systems. Operate the refrigerating system long enough at the required control settings to determine that refrigeration, defrost, and control systems operate and cycle properly. Operating failures include component operating failures, system leaks, and inability of the refrigeration system to maintain walk-in cooler and freezer temperatures. Correct failures and rerun tests.

3.3.3. Performance Tests

a. Maintain temperatures inside cold storage rooms for a period of 24 hours. Record temperatures and submit with test report.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 13126

SUNSCREEN

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Structural framing.
b. Shade panels.
c. Irrigation system.
d. Sunscreen Mounted Light Fixtures.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

1.2.1. General

1.2.1.1. Provide a complete integrated sunscreen structure system of manufacturer's standard mutually dependent components and assemblies that form a sunscreen system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure. Include primary framing, shade panels, irrigation system, and accessories complying with requirements indicated, including those in this Article.

1.2.2. Sunscreen Structure System Design: Of size, spacing, and spans indicated, and as follows:

1.2.2.1. Primary Frame Type: Provide the following:

a. Warren Truss-Frame: Truss-member structural-framing system with perimeter columns.

1.2.3. Structural Performance: Provide sunscreen structure systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1.2.3.1. Engineer sunscreen structure systems in accordance with the following:

a. Shade Panel Snow Loads: Determine design snow loads applicable to Project systems according to requirements of the building code indicated in Division 1 Section "Description of Work." Include vertical loads induced by the weight of snow, as determined by 50-year mean-recurrence-interval ground snow load at Project site. Allow for unbalanced and drift loads.
b. Wind Loads:

(1) Provide sunscreen structure systems, including anchorage, capable of withstanding wind pressures acting inward and outward normal to the plane of the structure.
(2) Refer to Division 1 Section "Description of Work" for wind-load design pressures.
(3) Determine design loads using the appropriate coefficients for the sunscreen structure system configurations indicated.

c. Seismic Loads:

(1) Provide sunscreen structure systems capable of resisting the effects of earthquake motions.
(2) Refer to Division 1 Section "Description of Work" for seismic-load design zone.
(3) Determine seismic loads using the appropriate exposure coefficient for the sunscreen structure systems.

d. Collateral Loads: Include additional dead loads other than the weight of sunscreen structure system for permanent items such as irrigation systems and electrical systems.
e. Load Combinations: Design sunscreen structure systems to withstand the most critical effects of load factors and load combinations.
f. Foundations: Confirm foundation design and construction as indicated is acceptable and meets the load requirements of the structure.

1.2.4. Thermal Movements: Provide sunscreen structure systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1.2.4.1. Temperature Change (Range): 120 º F, ambient; 180 º F, material surfaces.

1.2.5. Irrigation System:

1.2.5.1. Minimum Water Coverage: 100 percent of sunscreen areas.

1.2.5.2. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties, unless otherwise indicated:

a. Pressure Piping: 200 psig.
b. Circuit Piping: 150 psig.
c. Drain Piping: 100 psig.

1.2.6. Lighting System:

1.2.6.1. Minimum Coverage: 100 percent of sunscreen areas.
a. Light fixtures shall be LED type, damp rated and installed in a sealed housing, Length 48 inches or 96 inches long, depending upon space and lighting requirements. Provide vendor’s standard LED light fixture.

(1) Coordinate voltage requirements with Division 16.

b. Install light fixtures. Include wiring and main conduit to a main connection box in awning.
c. Provide final electrical coupling and on/off switch in accordance with Division 16.

1.3 SUBMITTALS

1.3.1. Product Data

1.3.1.1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following sunscreen structure system components:

a. Structural-framing system.
b. Shade panels.

c. Irrigation system: Include pressure rating, rated capacity, settings, and electrical data for the following:

(1) Water regulators.
(2) Water hammer arresters.
(3) Valves. Include aboveground and underground; general-duty, manual and automatic control, and quick-coupler types.
(4) Valve boxes.
(5) Sprinklers.
(6) Controllers. Include wiring diagrams.

1.3.2. Shop Drawings

1.3.2.1. For the following sunscreen structure system components. Include plans, elevations, sections, details, and attachments to other Work.

a. For installed components indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
b. Foundation Drawings: Provide confirmation of location and size. Coordinate any adjustments required.
c. Anchor-Bolt Plans: Include location, diameter, and projection of anchor bolts required to attach sunscreen structure to foundation. Indicate column reactions at each location.
d. Structural-Framing Drawings: Show complete fabrication of primary framing.
e. Shade Panel Layout Drawings: Show layouts of panels on support framing, details of edge conditions, joints, and special details. Distinguish between factory- and field-assembled work.
f. Irrigation system: Indicate appropriate sprinklers as determined by the size and shape of the areas to be watered, working pressure of water and the amount available.

1.3.3. Samples for Verification

1.3.3.1. For the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected, in the style indicated. Prepare Samples from the same material to be used for the Work.

a. Shade Panels: 12 inches square.

1.3.4. Product Certificates

1.3.4.1. Signed by manufacturers of sunscreen structure systems certifying that products furnished comply with requirements.

a. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:

(1) Name and location of Project.
(2) Order number.
(3) Name of manufacturer.
(4) Name of Contractor.
(5) Structure dimensions, including width, length, and height.
(6) Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
(7) Governing building code and year of edition.
(8) Design Loads: Include dead load, shade panel live load, collateral loads, shade panel snow load, wind loads/speeds and exposure, and seismic zone or effective peak velocity-related acceleration/peak acceleration.

(9) Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.

1.3.5. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Samples for Verification	X	R
1.3.4	Product Certificates	X	I

X Submit quantity specified in Division 1 Section “Submittals”.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Professional Engineer Qualifications

a. A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of sunscreen structure systems that are similar to those indicated for this Project in material, design, and extent.

1.4.2. Manufacturer Qualifications

a. A firm experienced in manufacturing sunscreen structure systems similar to those indicated for this Project and with a record of successful in-service performance.

1.4.2.2. Engineering Responsibility

a. Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1.4.3. Product Options

a. Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

1.4.4. Structural Steel

a. Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design”, or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings” for design requirements and allowable stresses.

1.4.5. Cold-Formed Steel

a. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members", or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members," for design requirements and allowable stresses.

1.4.6. Cast-In-Place Concrete

a. Comply with quality assurance provisions of Division 3 Section "Cast-In-Place Concrete".

1.5 COORDINATION

1.5.1. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Basis-of-Design Products

2.1.1.1. Subject to compliance with requirements, provide either the named products or equal products. Refer to Division 1 Section "Reference Standards and Definitions".

a. Basis-of-Design Product: Hendee Enterprises, Inc., Warren Truss - Shade Structure and Irrigation System

2.2 STRUCTURAL FRAMING

2.2.1. Primary Framing

2.2.1.1. Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements.

a. Warren truss design: Aluminum members fabricated using 2- by 2- by 0.125-inch wall T-5 tubing for chord members and 2- by 2- by 0.065-inch wall T-5 tubing for web members, unless larger sizes are required by system performance requirements.
b. Provide framing with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.

2.2.2. Bracing

2.2.2.1. Provide adjustable wind bracing.

2.3 SHADE PANEL MATERIALS

2.3.1. Manufacturer's standard Enduro shade panels.

a. Enduro 63 percent custom shade panels with 2-inch webbing for edge reinforcement and No. 2, 3/8 -inch, brass spur grommets at 12-inch centers.
b. Shade panels shall be attached using 1/8 inch black/white diamond braid polyester lacing cord.

2.4 MISCELLANEOUS MATERIALS

2.4.1. Bituminous Coating

2.4.1.1. Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4.2. Nonmetallic, Shrinkage-Resistant Grout

2.4.2.1. Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and with a 30-minute working time.

2.4.3. Shop Primer for Galvanized Metal Surfaces

2.4.3.1. Zinc dust, zinc-oxide primer selected by manufacturer for compatibility with substrate. Comply with FS TT-P-641.

2.4.4. Finish Painting

2.4.4.1. Refer to Division 9 Section "Painting".

2.5 FABRICATION, GENERAL

2.5.1. General

2.5.1.1. Design components and field connections required for erection to permit easy assembly and disassembly.

a. Fabricate components in a manner that once assembled in the shop, they may be disassembled, repackaged, and reassembled in the field.
b. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
c. Fabricate framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.

2.5.2. Factory Priming for Field-Painted Finish

2.5.2.1. Apply the specified air-dried primer immediately after cleaning and pretreating.

2.6 IRRIGATION SYSTEM

Provide sunscreen structure manufacturer's standard irrigation system including piping, valves, sprinklers, controls, and wiring.

2.7 ACCESSORIES

General: Provide accessories as standard with sunscreen structure system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of sunscreen structure system.

3.2 PREPARATION

3.2.1. Substrates

3.2.1.1. Clean substrates of substances, including oil, grease, rolling compounds, incompatible primers, and loose mill scale that impair bond of erection materials.

3.2.2. Surface Preparation

3.2.2.1. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

3.3 ERECTION

3.3.1. General

3.3.1.1. Erect sunscreen structure system according to manufacturer's written instructions and erection drawings.

3.3.1.2. Do not field cut, drill, or alter structural members without written approval from sunscreen structure system manufacturer's professional engineer.

3.3.1.3. Set structural framing in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

3.3.1.4. Baseplates: Clean concrete bearing surfaces of bond-reducing materials and roughen surfaces before setting baseplates. Clean bottom surface of baseplates.

a. Set baseplates for structural members on wedges, shims, or setting nuts.
b. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of baseplate before packing with grout.
c. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

(1) Comply with manufacturer's written instructions for proprietary grout materials.

3.3.1.5. Align and adjust framing members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Make adjustments to compensate for discrepancies in elevations and alignment.

a. Level and plumb individual members of structure.

3.3.1.6. Primary Framing: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.

3.3.1.7. Bracing: Install bracing where indicated on erection drawings.

3.4 SHADE PANEL INSTALLATION

Attach shade panels to trusses using lace cord provided by sunscreen structure system manufacturer.

3.5 IRRIGATION SYSTEM INSTALLATION

3.5.1. General

3.5.1.1. Locations and Arrangements: Install irrigation system as indicated on Shop Drawings, unless deviations are approved on Coordination Drawings.

3.5.1.2. Install piping at uniform slope of 0.5 percent minimum, down toward drain valves.

3.5.1.3. Install piping free of sags and bends.

3.5.1.4. Install groups of pipes parallel to each other, spaced to permit valve servicing.

3.5.1.5. Install fittings for changes in direction and branch connections.

3.5.1.6. Install unions adjacent to valves and final connections to other components with 2-inch NPS or smaller pipe connection.

3.5.1.7. Install flanges adjacent to valves and final connections to other components with 2-1/2-inch NPS or larger pipe connection.

3.5.1.8. Install dielectric fittings to connect piping of dissimilar metals.

3.5.1.9. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet.

3.5.1.10. Water Hammer Arresters: Install between connection to building main and circuit valves in valve box.

3.5.1.11. Install controllers according to manufacturer's written instructions and as indicated.

3.5.1.12. Install controllers according to manufacturer's written instructions and as indicated.

3.5.1.13. Connect water supplies to sprinkler piping with backflow preventers at connections to potable-water supplies.

3.5.1.14. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

3.5.1.15. Ground electric-powered controllers, valves, and devices.

a. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5.1.16. Arrange for electric-power connections to controllers, control valves, and devices that require power. Electric power, wiring, and disconnect switches are specified in Division 16 Sections.

3.5.1.17. Testing: Hydrostatically test piping and valves. Piping may be tested in sections.

a. Cap and test piping with static water pressure of 50 psig above system operating pressure and without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours.

b. Repair leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.

3.5.1.18. Flush dirt and debris from piping before installing sprinklers and other devices.

3.5.1.19. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

3.5.1.20. Adjust settings of controllers and automatic control valves.

3.5.1.21. Starting Procedures: Follow manufacturer's written procedures.

3.5.1.22. Operational Tests: Measure and record water flow rate and area coverage at each sprinkler. Adjust to achieve indicated values.

3.5.1.23. Demonstrate to Owner's maintenance personnel operation of equipment, sprinklers, specialties, and accessories. Review maintenance information.

3.5.1.24. Provide seven days' advance written notice of demonstration.

3.6 FIELD QUALITY CONTROL

3.6.1. Quality Control Compliance

3.6.1.1. Field quality control shall be in accordance with the Quality Control Plan.

3.6.2. Testing and Inspecting

3.6.2.1. The Contractor shall engage a testing agency to perform tests and inspections.

3.6.2.2. The Contractor shall employ a special inspector to perform special inspections.

3.6.3. Provide field quality control tests and inspections in accordance with requirements of the following

3.6.3.1. Division 3 Section "Cast-In-Place Concrete".

3.6.3.2. Division 5 Section "Structural Steel".

3.6.3.3. Division 5 Section "Steel Joists".

3.7 CLEANING AND PROTECTION

3.7.1. Touchup Painting

3.7.1.1. Immediately after erection, clean, prepare, and prime or re-prime welds, bolted connections, and abraded surfaces of prime-painted primary and secondary framing, accessories, and bearing plates.

a. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
b. Apply compatible primer of same type as shop primer used on adjacent surfaces.

3.7.2. Shade Panels

3.7.2.1. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

a. Replace panels that have been damaged or have deteriorated beyond successful repair.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 13128

RIGID ROOF SHADE HOUSE CANOPY

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Factory fabricated shade house canopy system
b. Foundations.
c. Structural framing.
d. Shade panels.
e. Backlit gable awning.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

1.2.1. General

1.2.1.1. Provide a complete integrated shade house canopy structure system of manufacturer's standard mutually dependent components and assemblies that form a shade house canopy system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure. Include foundations, primary framing, tensioned fabric membrane roof, sheet metal gutters, gutter drops, and accessories complying with requirements indicated, including those in this Article. Bottom of gutters shall be approximately 13 feet above finished floor.

1.2.2. Structural Performance: Provide shade house canopy structure systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1.2.2.1. Engineer shade house canopy structure systems in accordance with the following:

a. Shade House Canopy Snow Loads: Determine design snow loads applicable to Project systems according to requirements of the building code indicated in Division 1 Section "Description of Work". Include vertical loads induced by the weight of snow, as determined by 50-year mean-recurrence-interval ground snow load at Project site. Allow for unbalanced and drift loads.
b. Wind Loads:

(1) Provide shade house canopy structure systems, including anchorage, capable of withstanding wind pressures acting inward and outward normal to the plane of the structure.
(2) Refer to Division 1 Section "Description of Work" for wind-load design pressures.
(3) Determine design loads using the appropriate coefficients for the shade house canopy structure system configurations indicated.

c. Seismic Loads:

(1) Provide shade house canopy structure systems capable of resisting the effects of earthquake motions.
(2) Refer to Division 1 Section "Description of Work" for seismic-load design zone.

(3) Determine seismic loads using the appropriate exposure coefficient for the shade house canopy structure systems.

d. Collateral Loads: Include additional dead loads other than the weight of shade house canopy structure system for permanent items such as electrical systems.
e. Load Combinations: Design shade house canopy structure systems to withstand the most critical effects of load factors and load combinations.

1.2.3. Thermal Movements: Provide shade house canopy structure systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1.2.3.1. Temperature Change (Range): 120 º F, ambient; 180 º F, material surfaces.

1.3 SUBMITTALS

1.3.1. Product Data

1.3.1.1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following shade house canopy structure system components:

a. Structural-framing system.
b. Shade panels.

1.3.2. Shop Drawings

1.3.2.1. For the following shade house canopy structure system components. Include plans, elevations, sections, details, and attachments to other Work.

a. For installed components indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
b. Foundation Drawings: Include location and size.
c. Anchor-Bolt Plans: Include location, diameter, and projection of anchor bolts required to attach shade house canopy structure to foundation. Indicate column reactions at each location.
d. Structural-Framing Drawings: Show complete fabrication of primary framing.
e. Shade House Canopy Layout Drawings: Show layouts of panels on support framing, details of edge conditions, joints, and special details. Distinguish between factory- and field-assembled work.

1.3.3. Samples for Verification

1.3.3.1. For the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected, in the style indicated. Prepare Samples from the same material to be used for the Work.

a. Shade House Canopy Panels: 12 inches square.

1.3.4. Product Certificates

1.3.4.1. Signed by manufacturers of shade house canopy structure systems certifying that products furnished comply with requirements.

a. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:

(1) Name and location of Project.
(2) Order number.
(3) Name of manufacturer.
(4) Name of Contractor.
(5) Structure dimensions, including width, length, and height.
(6) Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
(7) Governing building code and year of edition.
(8) Design Loads: Include dead load, shade house canopy panel live load, collateral loads, shade house canopy panel snow load, wind loads/speeds and exposure, and seismic zone or effective peak velocity-related acceleration/peak acceleration.

(9) Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.

1.3.5. Special Inspection reports on shop and field bolted connections, and welded connections.

1.3.6. Submittal List

Reference	Submittal Item	Quantity	Action
1.3.1	Product Data	X	R
1.3.2	Shop Drawings	X	R
1.3.3	Samples for Verification	X	R
1.3.4	Product Certificates	X	I
1.3.5	Special Inspection Reports	X	R

X Submit quantity specified in Division 1 Section “Submittals.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Installer Qualifications

a. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1.4.2. Source Limitations

a. Obtain shade house canopy structure system through one source from a single manufacturer.

1.4.3. Professional Engineer Qualifications

a. A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of shade house canopy structure systems that are similar to those indicated for this Project in material, design, and extent.

1.4.4. Manufacturer Qualifications

a. A firm experienced in manufacturing shade house canopy structure systems similar to those indicated for this Project and with a record of successful in-service performance.

1.4.5. Engineering Responsibility

a. Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1.4.6. Product Options

a. Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

1.4.7. Structural Steel

a. Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design", or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings" for design requirements and allowable stresses.

1.4.8. Cold-Formed Steel

a. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members", or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members" for design requirements and allowable stresses.

1.4.9. Cast-In-Place Concrete

a. Comply with quality assurance provisions of Division 3 Section "Cast-In-Place Concrete".

1.5 COORDINATION

1.5.1. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Basis-of-Design Products

2.1.1.1. Subject to compliance with requirements, provide either the named products or equal products. Refer to Division 1 Section "Reference Standards and Definitions".

a. Hendee Enterprises, Inc., Houston, TX, (800) 231-7275. Contact: Pat Rivers, Extension 6124 or www.patr@hendee.com.

2.2 SHADE HOUSE

2.2.1. Rigid Roof

2.2.1.1. Manufacturer

a. Fiberglass (FRP) Panels:

(1) Resolite, Zelienople, PA, (724) 452-6800.
(2) Enduro Systems, Inc.: Tuff Span, Houston, TX, (713) 358-4169.

b. Metal Panels:

(1) McElroy Metal, Bossier City, LA, (800) 950-6531.

2.2.1.2. Fiberglass (FRP) Panels: One of the following:

a. Resolite:

(1) Product: 1230 Thirty Series Roofing Panels by Reolite.
(2) Weight: 12 oz. per sq. ft.
(3) Fiberglass Material: FS25A translucent.
(4) Profile: 7.2 by 1.5 inches.
(5) Finish: EMB./Smooth.
(6) Color: 31 White.
(7) Light Transmission: 40%.

b. EnduroSystems

(1) Product: Series 250 FRP.
(2) Profile: 7.2 by 1.5 inches.
(3) Finish: EMB./Smooth.
(4) Color: Tuff Span N2002T.
(5) Light Transmission: 40%.

c. Substitutions: Permitted only for mechanical properties and only if approved by manufacturer's Engineer of Record.

2.2.1.3. Metal Roof Panels:

a. Metal Material: Galvalume steel sheet.
b. Profile: MegaRib.
c. Thickness: 24 gage.
d. Factory Finish: Fluorpolymer coating containing a minimum of 70 percent Pennwalt Kynar 500 resin with a minimum of 1.2 mil dry film thickness.
e. Color: Manufacturer's standard "White."
f. Substitutions: Not permitted with out Owner's approval.

2.2.2. Structure Columns, Outserts, Trusses, Purlins, and Bracing

2.2.2.1. Provide welded one- or two-piece shop fabricated galvanized structural trusses, tubular steel columns and framing.

2.2.2.2. Secondary framing may include extruded aluminum members with mill finish.

2.2.2.3. Materials:

a. Structural Steel Plates and Shapes: ASTM A 36, or equal.
b. Steel Tubes Less Than 3/16 Inch Thick: ASTM A 500, Grade A.
c. Cold-Formed Shop Fabricated Steel Shapes: FY=50 KSI, Fu=65 KSI.
d. Aluminum Shapes: Alloy 6063-T5, 6063-T6 or 6061-T6.

2.2.2.4. Steel Plate and Tube Galvanizing: ASTM A 653, G90.

2.2.3. Fasteners

2.2.3.1. Bolts: Type as appropriate or design requirements.

a. ASTM A 307 hot-dip galvanized bolts or stainless steel fasteners.
b. ASTM A 325 hot-dip galvanized structural bolts heat treated; 120/105 KSI minimum tensile strength. Used as required by the manufacturer's Engineer of Record.

2.2.3.2. Screws: Galvanized self-drilling with hex washer head.
2.2.3.3. Adhesive Anchors: Hilti Has ROD ANCHOR AND Hilti HY-150 adhesive or similar. Size and final requirement as determined by the manufacturer's Engineer of Record.

2.2.4. Gutter sand Downspouts:

2.2.4.1. Minimum 12 gage galvanized formed sheet steel.

2.2.5. Flashing and Gasketing:

2.2.5.1. Sheet metal flashing and resilient gasketing to provide watertight installation.

2.2.6. Additional Items:

2.2.6.1. Provide additional components including brackets, spacers, connectors, and other items required for erection.

2.2.6.2. Items shall be galvanized or corrosion resisting materials.

2.2.6.3. Provide miscellaneous item required for complete installation including base plates, anchor bolts, fasteners and other items recommended by manufacturer.

2.2.7. Backlit Awning Frame:

2.2.7.1. Awning frame fabricated from mill finish aluminum tubing and extruded shapes. Fabric covered front, top and rear. Awning attached to the gable end trusses and under cantilevered purlins. Metal roof and framing to cantilever over awning frame to protect awning from snow load..

a. Awning fascia includes backlit fabric and vinyl applied graphics.
b. Gable face fabric: Signmaster Supreme by John Boyle & Company, Inc.

(1) Color as indicated.

c. Internal Fabric: Blackout fabric to minimize any glare on inside.
d. Light fixtures shall be LED type, damp rated and installed in a sealed housing, Length 48 inches or 96 inches long, depending upon space and lighting requirements. Provide vendor's standard LED light fixture.

(1) Coordinate voltage requirements with Division 16.

e. Install light fixtures. Include wiring and main conduit to a main connection box in awning.
f. Provide final electrical coupling and on/off switch in accordance with Division 16.
g. Owner will provide graphics in electronic format

(1) Camera ready artwork in Adobe Illustrator 8.0 (.ia) or Corel 8.0 (.eps).
(2) Graphic colors will be specified using the Pantone system.

2.2.8. Welding:

a. AWS D1.1, AWS D1. 2 and AWS D1.3 type as required for materials being welded.

2.2.9. Framing Finish:

a. Finish steel by hot-dip galvanizing after fabrication or fabricate using pre-galvanized tubing with welded joints treated by shop applied thermo spray zinc coating process using zinc wire to provide rust protection.

2.3 MISCELLANEOUS MATERIALS

2.3.1. Bituminous Coating

2.3.1.1. Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3.2. Nonmetallic, Shrinkage-Resistant Grout

2.3.2.1. Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and with a 30-minute working time.

2.4 FABRICATION, GENERAL

2.4.1. General

2.4.1.1. Design components and field connections required for erection to permit easy assembly and disassembly.

a. Fabricate components in a manner that once assembled in the shop, they may be disassembled, repackaged, and reassembled in the field.
b. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
c. Fabricate framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.

2.5 ACCESSORIES

General: Provide accessories as standard with shade house canopy structure system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

3.1.1.1. Examine substrates, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of shade house canopy structure system. Verify that conditions conform to product manufacturer's requirements and installation conditions. Do not proceed until unsatisfactory conditions have been corrected.

3.1.1.2. Beginning of installation indicates acceptance of existing conditions.

3.2 ERECTION

3.2.1. General

3.2.1.1. Erect shade house canopy structure system according to manufacturer's written instructions and erection drawings.

3.2.1.2. Do not field cut, drill, or alter structural members without written approval from shade house canopy structure system manufacturer's professional engineer.

3.2.1.3. Set structural framing in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

3.2.1.4. Provide for erection wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion or erection and installation of permanent bracing.

3.2.1.5. Baseplates: Clean concrete bearing surfaces of bond-reducing materials and roughen surfaces before setting baseplates. Clean bottom surface of baseplates.

a. Set column baseplates in non-shrink grout to achieve full plate bearing.
b. Set baseplates for structural members on wedges, shims, or setting nuts.
c. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of baseplate before packing with grout.
d. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

(1) Comply with manufacturer's written instructions for proprietary grout materials.

3.2.1.6. Align and adjust framing members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Make adjustments to compensate for discrepancies in elevations and alignment.

a. Level and plumb individual members of structure.

3.2.1.7. Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.

3.2.1.8. Bracing: Install bracing where indicated on erection drawings.

3.2.1.9. Install flashing, gasketing, gutters, and additional items.

3.2.1.10. Isolate dissimilar metals with bituminous coating.

3.2.2. Interface with Other Work:

3.2.2.1. Coordinate installation of the following items at locations indicated on Drawings.

a. Fence and gate post locations with shade house canopy structure columns.
b. Concrete footing locations with shade house canopy structure columns and posts.
c. Sheet metal flashing at interface between building and shade house canopy, if applicable.
d. Provide elbows at base of downspout to direct water away from building and, where indicated, onto pavement..
e. Lighting fixtures and attachment to shade house canopy structure and supports.

3.3 QUALITY CONTROL

3.3.1. Quality Control Compliance

3.3.1.1. Field quality control shall be in accordance with the Quality Control Plan.

3.3.2. Testing and Inspecting

3.3.2.1. The Contractor shall engage a testing agency to perform tests and inspections.

3.3.2.2. The Contractor shall employ a special inspector to perform special inspections.

3.3.3. Provide field quality control tests and inspections in accordance with requirements of the following

3.3.3.1. Division 3 Section “Cast-In-Place Concrete”.

3.3.3.2. Division 5 Section “Structural Steel”.

3.3.3.3. Division 5 Section “Steel Joists”.

3.4 CLEANING AND PROTECTION

3.4.1. General

3.4.1.1. Remove protective material fro prefinished surfaces.

3.4.1.2. Touch-up damaged finishes. Remove and replace components that cannot be satisfactorily repaired.

3.4.1.3. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair material.

3.4.1.4. On completion of installation, clean finished surfaces as recommended by shade house canopy manufacturer and maintain in a clean condition during construction.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 13720

INTRUSION DETECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes the following:

1.2.1.1. Intrusion detection with multiplexed, modular, microprocessor-based controls, intrusion sensors and detection devices, and hard-wired premise communication links to perform monitoring, alarm, and control functions.

1.2.2. Related Sections include the following:

1.2.2.1. Division 16 Section "Voice and Data Communication Cabling" for cabling between central-station control units and field-mounted devices and controllers.

1.3 DEFINITIONS

1.3.1. LCD: Liquid-crystal display.

1.3.2. LED: Light-emitting diode.

1.3.3. PIR: Passive infrared.

1.3.4. RFI: Radio-frequency interference.

1.3.5. UPS: Uninterruptible power supply.

1.3.6. Protected or Protection Zone: A space or area for which an intrusion must be detected and uniquely identified, the sensor or group of sensors assigned to perform the detection, and any interface equipment between sensors and communication link to central-station control unit.

1.3.7. Standard Intruder: A person who weighs 100 lb or less and whose height is 60 inches or less; dressed in a long-sleeved shirt, slacks, and shoes.

1.3.8. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.

1.4 SUBMITTALS

1.4.1. Product Data: Components for sensing, detecting, and control, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

1.4.1.1. Device Address List: Coordinate with final system programming.

1.4.1.2. System Wiring Diagrams: Include system diagrams unique to Project. Show connections for all devices, components, and auxiliary equipment. Include diagrams for equipment and for system with all terminals and interconnections identified.

1.4.1.3. Details of surge-protection devices and their installation.

1.4.1.4. Sensor detection patterns and adjustment ranges.

1.4.2. Equipment and System Operation Description: Include method of operation and supervision of each component and each type of circuit. Show sequence of operations for manually and automatically initiated system or equipment inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are not acceptable.

1.4.3. Qualification Data: For Installer, testing agency.

1.4.4. Field quality-control test reports.

1.4.5. Operation and Maintenance Data: For intrusion detection system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1.4.5.1. Data for each type of product, including features and operating sequences, both automatic and manual.

1.4.5.2. Central-station control-unit hardware and software data.

1.4.6. Warranty: Special warranty specified in this Section.

1.4.7. Other Information Submittals:

1.4.7.1. Test Plan and Schedule: Test plan defining all tests required to ensure that system meets technical, operational, and performance specifications within 60 days of date of Contract award.

1.4.7.2. Examination reports documenting inspections of substrates, areas, and conditions.

1.4.7.3. Anchor inspection reports documenting inspections of built-in and cast-in anchors.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications:

1.5.1.1. An employer of workers, at least one of whom is a technician certified by the National Burglar & Fire Alarm Association.

1.5.1.2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1.5.2. Intrusion Detection Systems Integrator Qualifications: An experienced intrusion detection equipment supplier and Installer who has completed systems integration work for installations similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

1.5.3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.4. FMG Compliance: FMG-approved and -labeled intrusion detection devices and equipment.

1.5.5. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

1.6.1. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1.6.1.1. Altitude: Sea level to 600 feet.

1.6.1.2. Central-Station Control Unit: Rated for continuous operation in an ambient of 60 to 85 deg F and a relative humidity of 0 to 60 percent, noncondensing.

1.6.1.3. Interior, Controlled Environment: System components, except central-station control unit, installed in temperature-controlled interior environments shall be rated for continuous operation in ambients of 60 to 85 deg F dry bulb and 40 to 60 percent relative humidity, noncondensing.

1.6.1.4. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments shall be rated for continuous operation in ambients of -22 to 110 deg F dry bulb and 30 to 80 percent relative humidity, noncondensing.

1.7 WARRANTY

1.7.1. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of intrusion detection devices and equipment which fail in materials or workmanship within specified warranty period.

1.7.1.1. Warranty Period: One year minimum from date of Substantial Completion.

1.8 EXTRA MATERIALS

1.8.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.8.1.1. Intrusion Detection Devices: Furnish quantity equal to five percent of the number of units of each type installed, but no fewer than one of each type.

1.8.1.2. Fuses: Three of each class and ampere rating.

1.8.1.3. Security Fasteners: Furnish no fewer than 1 box for every 50 boxes or fraction thereof, of each type and size of security fastener installed.

PART 2 - PRODUCTS MANUFACTURERS

2.1.1. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.1.1.1. Available Manufacturers: Subject to compliance with requirements, all manufacturers products may be incorporated into the Work, subject to prior approval according to the specified submittal process.

2.2 FUNCTIONAL DESCRIPTION OF SYSTEM

2.2.1. Supervision: System components shall be continuously monitored for normal, alarm, supervisory**,** and trouble conditions. Indicate deviations from normal conditions at any location in system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.

2.2.1.1. Alarm Signal: Display at central-station control unit and actuate audible and visual alarm devices.

2.2.1.2. Trouble Condition Signal: Distinct from other signals, indicating that system is not fully functional. Trouble signal shall indicate system problems such as battery failure, open or shorted transmission line conductors, or controller failure.

2.2.1.3. Supervisory Condition Signal: Distinct from other signals, indicating an abnormal condition as specified for the particular device or controller.

2.2.2. System Control: Central-station control unit shall directly monitor intrusion detection devices and connecting wiring in a multiplexed distributed control system or as part of a network.

2.2.3. System shall automatically reboot program without error or loss of status or alarm data after any system disturbance.

2.2.4. Operator Commands:

2.2.4.1. Help with System Operation: Display all commands available to operator. Help command, followed by a specific command, shall produce a short explanation of the purpose, use, and system reaction to that command.

2.2.4.2. Acknowledge Alarm: To indicate that alarm message has been observed by operator.

2.2.4.3. Place Protected Zone in Access: Disable all intrusion-alarm circuits of a specific protected zone. Tamper circuits may not be disabled by operator.

2.2.4.4. Place Protected Zone in Secure Mode: Activate all intrusion-alarm circuits of a protected zone.

2.2.4.5. Protected Zone Test: Initiate operational test of a specific protected zone.

2.2.4.6. System Test: Initiate system-wide operational test.

2.2.4.7. Print Reports.

2.2.5. Printed Record of Events: Print a record of alarm, supervisory, and trouble events on system printer. Sort and report by protected zone, device, and function. When central-station control unit receives a signal, print a report of alarm, supervisory, or trouble condition. Report type of signal (alarm, supervisory, or

trouble), protected zone description, date, and time of occurrence. Differentiate alarm signals from other indications. When system is reset, report reset event with the same information concerning device, location, date, and time. Commands shall initiate the reporting of a list of current alarm, supervisory, and trouble conditions in system or a log of past events.

2.2.6. Response Time: Thirty seconds maximum between actuation of any alarm and its indication at central-station control unit.

2.2.7. Circuit Supervision: Supervise all signal and data transmission lines, links with other systems, and sensors from central-station control unit. Indicate circuit and detection device faults with both protected zone and trouble signals, sound a distinctive audible tone, and illuminate an LED. Maximum permissible elapsed time between occurrence of a trouble condition and indication at central-station control unit is 20 seconds. Initiate an alarm in response to opening, closing, shorting, or grounding of a signal or data transmission line.

2.2.8. Manual Secure-Access Control: Coded entries at manual stations shall change status of associated protected zone between secure and access conditions.

2.2.9. Alarm Transmission to Remote Monitoring Station: Transmit all alarm and supervisory indications to a designated remote monitoring station via telephone lines. Transmissions must be compatible with existing remote monitoring station equipment used. The system shall dial primary and alternate phone numbers in event of alarm, numbers will be provided by base during construction for programming. The system shall dial in “Contact ID” format.

2.3 SYSTEM COMPONENT REQUIREMENTS

2.3.1. Surge Protection: Protect components from voltage surges originating externally to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.

2.3.1.1. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Division 16 Section "Transient Voltage Suppression."

2.3.1.2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements in Division 16 Section "Transient Voltage Suppression" as recommended by manufacturer for type of line being protected.

2.3.2. Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V RMS injected into power supply lines at 10 to 10,000 MHz.

2.3.3. Tamper Protection: Tamper switches on detection devices, controllers, annunciators, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Central-station control-unit alarm display shall identify tamper alarms and indicate locations.

2.3.4. Addressable Devices: Transmitter and receivers shall communicate unique device identification and status reports to central-station control unit.

2.4 ENCLOSURES

2.4.1. Interior Sensors: Enclosures that protect against dust, falling dirt, and dripping noncorrosive liquids.

2.4.2. Interior Electronics: NEMA 250, Type 12.

2.4.3. Exterior Electronics: NEMA 250, Type 4X stainless steel.

2.4.4. Corrosion Resistant: NEMA 250, Type 4X stainless steel.

2.4.5. Screw Covers: Where enclosures are accessible to unauthorized persons, secure with security fasteners of type appropriate for enclosure.

2.5 SECURE AND ACCESS DEVICES

2.5.1. Available Manufacturers:

2.5.1.1. ADEMCO Group; Pittway Corporation.

2.5.1.2. ADT

2.5.1.3. Continental Instruments.

2.5.1.4. Corby Industries Inc.

2.5.1.5. Crow Electronic Engineering, Inc.

2.5.1.6. George Risk Industries.

2.5.1.7. Honeywell International Inc.

2.5.1.8. International Electronics Inc.

2.5.1.9. NAPCO Security Systems, Inc.

2.5.1.10. Optex.

2.5.1.11. Richardson Electronics, Ltd.

2.5.1.12. Visonic Inc.

2.5.2. Keypad and Display Module: Arranged for entering and executing commands for system-status changes and for displaying system-status and command-related data.

2.6 DOOR AND WINDOW SWITCHES

2.6.1. Available Manufacturers:

2.6.1.1. ADEMCO Group; Pittway Corporation.

2.6.1.2. ADT

2.6.1.3. Aleph International Corporation.

2.6.1.4. Amseco; Division of Kobishi America, Inc.

2.6.1.5. FBII; Pittway Corporation.

2.6.1.6. GE Interlogix; General Electric Company.

2.6.1.7. George Risk Industries.

2.6.1.8. Honeywell International Inc.

2.6.1.9. Optex.

2.6.1.10. Ultrak, Inc.; a division of Ademco Video Systems.

2.6.2. Description: Balanced-magnetic switch, complying with UL 634, installed on frame with integral overcurrent device to limit current to 80 percent of switch capacity. Bias magnet and minimum of two encapsulated reed switches shall resist compromise from introduction of foreign magnetic fields.

2.6.3. Flush-Mounted Switches: Unobtrusive and flush with surface of door and window frame.

2.6.4. Overhead Door Switch: Balanced-magnetic type, listed for outdoor locations, and having door-mounting magnet and floor- or frame-mounting switch unit.

2.7 PIR SENSORS

2.7.1. Available Manufacturers:

2.7.1.1. ADEMCO Group; Pittway Corporation.

2.7.1.2. ADT

2.7.1.3. Aleph International Corporation.

2.7.1.4. Crow Electronic Engineering, Inc.

2.7.1.5. Digital Security Controls, Ltd.

2.7.1.6. FBII; Pittway Corporation.

2.7.1.7. Honeywell International Inc.

2.7.1.8. NAPCO Security Systems, Inc.

2.7.1.9. Optex.

2.7.1.10. Richardson Electronics, Ltd.

2.7.1.11. Visonic Inc.

2.7.2. Description: Sensors detect intrusion by monitoring infrared wavelengths emitted from a human body within their protected zone and by being insensitive to general thermal variations.

2.7.2.1. Wall-Mounting Unit Maximum Detection Range: 125 percent of indicated distance for individual units and not less than 50 feet.

2.7.2.2. Ceiling-Mounting Unit Spot-Detection Pattern: Full 360-degree conical.

2.7.2.3. Ceiling-Mounting Unit Pattern Size: 84-inch diameter at floor level for units mounted 96 inches above floor; 18-foot diameter at floor level for units mounted 25 feet above floor.

2.7.3. Device Performance:

2.7.3.1. Sensitivity: Adjustable pattern coverage to detect a change in temperature of 2 deg F or less, and standard-intruder movement within sensor's detection patterns at any speed between 0.3 to 7.5 fps across 2 adjacent segments of detector's field of view.

2.7.3.2. Test Indicator: LED test indicator that is not visible during normal operation. When visible, indicator shall light when sensor detects an intruder. Locate test enabling switch under sensor housing cover.

2.8 DURESS-ALARM SWITCHES

2.8.1. Available Manufacturers:

2.8.1.1. ADEMCO Group; Pittway Corporation.

2.8.1.2. ADT

2.8.1.3. GE Interlogix; General Electric Company.

2.8.1.4. NAPCO Security Systems, Inc.

2.8.1.5. Visonic Inc.

2.8.2. Description: A switch with a shroud over the activating lever that allows an individual to covertly send a duress signal to central-station control unit over supervised wiring, with no visible or audible indication when activated. Switch shall lock in activated position until reset with a key.

2.8.2.1. Minimum Switch Rating: 50,000 operations.

2.8.2.2. Push Button: Finger activated, suitable for mounting on horizontal or vertical surface.

2.9 VIBRATION SENSORS

2.9.1. Available Manufacturers:

2.9.1.1. ADEMCO Group; Pittway Corporation.

2.9.1.2. Potter Electric Signal.

2.9.1.3. PULNiX America, Inc.

2.9.2. Description: A sensor controller and piezoelectric crystal sensor elements that are designed to be rigidly mounted to structure being protected.

2.9.3. Device Performance: Detects high-frequency vibrations generated by use of such tools as oxyacetylene torches, oxygen lances, high-speed drills and saws, and explosives that penetrate a structure while not responding to any other mechanical vibration.

2.9.3.1. Circular detection pattern, with at least a 72-inch) radius on protected structure.

2.9.3.2. Hookup Cable: Factory installed, not less than 72 inches.

2.9.3.3. Controller: Integral with sensor housing or in a separate assembly, locally adjustable by control under housing cover.

2.10 CENTRAL-STATION CONTROL UNITS

2.10.1. Available Manufacturers:

2.10.1.1. ADEMCO Group; Pittway Corporation.

2.10.1.2. ADT

2.10.1.3. Amseco; Division of Kobishi America, Inc.

2.10.1.4. DAQ Electronics, Inc.

2.10.1.5. Diebold, Incorporated.

2.10.1.6. FBII; Pittway Corporation.

2.10.1.7. GE Interlogix; General Electric Company.

2.10.1.8. Honeywell International Inc.

2.10.1.9. Magal Security Systems Ltd.

2.10.1.10. NAPCO Security Systems, Inc.

2.10.1.11. Perimeter Products, Inc.

2.10.1.12. Richardson Electronics, Ltd.

2.10.1.13. Visonic Inc.

2.10.2. Construction: Modular, with separate and independent alarm and supervisory system modules. Alarm-initiating protected zone boards shall be plug-in cards. Arrangements that require removal of field wiring for module replacement are not acceptable.

2.10.3. Comply with UL 1076.

2.10.3.1. Alarm Indication: Audible signal sounds and a plain-language identification of protected zone originating the alarm appears on LED, LCD, or cathode-ray-tube display at central-station control unit. Annunciator panel alarm light and audible tone identify protected zone signaling an alarm.

2.10.4. Operator Controls: Manual switches and push-to-test buttons that do not require a key to operate. Include the following:

2.10.4.1. Acknowledge alarm.

2.10.4.2. Silence alarm.

2.10.4.3. System reset.

2.10.4.4. LED test.

2.10.5. Resetting Controls: Prevent resetting of alarm, supervisory, or trouble signals while alarm or trouble condition persists.

2.10.6. Alphanumeric Display and System Controls: Arranged for interface between operator and addressable system components, including annunciation and supervision. Display alarm, supervisory, component status messages, and programming and control menu.

2.10.6.1. Display: LCD, 80 characters, minimum.

2.10.6.2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

2.10.7. Protected Zones: Quantity of alarm and supervisory zones as indicated, with capacity for expanding number of protected zones by a minimum of 25 percent.

2.10.8. Power Supply Circuits: Central-station control units shall provide power for remote power-consuming detection devices. Circuit capacity shall be adequate for at least a 25 percent increase in load.

2.10.9. Standby Power Supply: Provide standby rechargeable battery backup system complete with built-in charger for direct power supply to the system. The standby power system shall be sized to provide a minimum of six hours of central-station control-unit operation.

2.10.10. Cabinet: Lockable, steel enclosure arranged so operations required for testing, normal operation, and maintenance are performed from front of enclosure. If more than a single cabinet is required to form a complete control unit, provide exactly matching modular enclosures. Accommodate all components and allow ample gutter space for field wiring. Identify each enclosure by an engraved, laminated, phenolic-resin nameplate. Lettering on enclosure nameplate shall not be less than 1 inch high. Identify, with permanent labels, individual components and modules within cabinets.

2.11 SECURITY FASTENERS

2.11.1. Operable only by tools produced for use on specific type of fastener by fastener manufacturer or other licensed fabricator. Drive system type, head style, material, and protective coating as required for assembly, installation, and strength.

2.11.2. Available Manufacturers:

2.11.2.1. Camcar Textron Inc.

2.11.2.2. Holo-Krome; a Danaher Corporation.

2.11.2.3. Safety Socket Screw Corporation.

2.11.2.4. Tamper-Pruf Screws, Inc.

2.11.3. Drive System Types: Pinned Torx-Plus, Pinned Torx, or pinned hex (Allen).

2.11.4. Socket Flat Countersunk Head Fasteners:

2.11.4.1. Heat-treated alloy steel, ASTM F 835.

2.11.4.2. Stainless steel, ASTM F 879, Group 1 CW.

2.11.5. Socket Button Head Fasteners:

2.11.5.1. Heat-treated alloy steel, ASTM F 835.

2.11.5.2. Stainless steel, ASTM F 879), Group 1 CW.

2.11.6. Socket Head Cap Fasteners:

2.11.6.1. Heat-treated alloy steel, ASTM A 574.

2.11.6.2. Stainless steel, ASTM F 837, Group 1 CW.

2.11.7. Protective Coatings for Heat-Treated Alloy Steel:

2.11.7.1. Zinc chromate, ASTM F 1135, Grade 3 or 4; for exterior applications and interior applications where indicated.

2.11.7.2. Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of intrusion detection.

3.1.1.1. Examine roughing-in for embedded and built-in anchors to verify actual locations of intrusion detection connections before intrusion detection installation.

3.1.1.2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of intrusion detection.

3.1.2. Inspect built-in and cast-in anchor installations, before installing intrusion detection, to verify that anchor installations comply with requirements. Prepare inspection reports.

3.1.2.1. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.

3.1.2.2. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.

3.1.3. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.

3.1.4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SYSTEM INSTALLATION

3.2.1. Comply with UL 681.

3.2.2. Security Fasteners: Where accessible to unauthorized persons, install intrusion detection components using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials except that a maximum of two different sets of tools shall be required to operate security fasteners for Project. Provide stainless-steel security fasteners in stainless-steel materials.

3.3 WIRING INSTALLATION

3.3.1. Wiring Method: Install wiring in metal raceways according to Division 16 Section "Raceways and Boxes." Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be 1/2 inch. Control and data transmission wiring shall not share conduit with other building wiring systems.

3.3.2. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.3.3. Wires and Cables:

3.3.3.1. Conductors: Size as recommended in writing by system manufacturer, unless otherwise indicated.

3.3.3.2. 120-V Power Wiring: Install according to Division 16 Section "Conductors and Cables," unless otherwise indicated.

3.3.3.3. Control and Signal Transmission Conductors: Install unshielded, twisted-pair cable, unless otherwise indicated or if manufacturer recommends shielded cable, according to Division 16 Section "Voice and Data Communication Cabling."

3.3.3.4. Computer and Data-Processing Cables: Install according to Division 16 Section "Voice and Data Communication Cabling."

3.3.4. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3.5. Install power supplies and other auxiliary components for detection devices at controllers, unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.

3.3.6. Identify components with engraved, laminated-plastic or metal nameplate for central-station control unit and each terminal cabinet, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 16 Section "Electrical Identification."

3.4 GROUNDING

3.4.1. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

3.4.2. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5-ohm ground. Measure, record, and report ground resistance.

3.4.3. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Division 16 Section "Grounding and Bonding."

3.5 FIELD QUALITY CONTROL

3.5.1. Pretesting: After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.

3.5.1.1. Report of Pretesting: After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.

3.5.2. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

3.5.3. Perform the following field tests and inspections and prepare reports:

3.5.3.1. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.

3.5.3.2. Operational Tests: Schedule tests after pretesting has been successfully completed. Test all modes of system operation and intrusion detection at each detection device. Test for detection of intrusion and for false alarms in each protected zone. Test for false alarms by simulating activities outside indicated detection patterns.

3.5.3.3. Electrical Tests: Comply with NFPA 72, Section A-7. Minimum required tests are as follows:

a. Verify the absence of unwanted voltages between circuit conductors and ground.

b. Test all conductors for short circuits using an insulation-testing device.

c. With each circuit pair, short circuit at the far end of circuit and measure circuit resistance with an ohmmeter. Record circuit resistance of each circuit on Record Drawings.

d. Verify that each controller is in normal condition as detailed in manufacturer's operation and maintenance manual.

e. Test signal and data transmission circuits complying with requirements in Division 16 Section "Voice and Data Communication Cabling" for proper signal transmission under open-circuit conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class of wiring used.

f. Verify that transient surge-protection devices are installed according to manufacturer's written instructions.

g. Test each initiating and indicating device for alarm operation and proper response at central-station control unit.

h. Test both primary and secondary power. Verify, by test, that standby power system is capable of operating the system for period and in manner specified.

3.5.4. Report of Tests and Inspections: Prepare a written record of tests, inspections, and detailed test results in the form of a test log.

3.5.5. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.

3.6 DEMONSTRATION

3.6.1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain intrusion detection. Refer to Division 1 Section "Demonstration and Training."

3.7 ADJUSTING

3.7.1. Occupancy Adjustments: When requested within 12 months of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose. Visits for this purpose shall be in addition to any required by warranty.

END OF SECTION 13720

CONSTRUCTION ISSUE

SECTION 13760

VIDEO SURVEILLANCE

PART 1. GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 GENERAL CHARACTERISTICS

1.2.1 Designed for establishing an integrated closed circuit security monitoring system throughout the store to reduce pilferage.

1.2.2 Integrated color digital cameras, PTZ (pan / tilt / zoom) controller / digital keyboard, digital video recorder with remote viewing capability, LCD monitor, and UPS power supply.

1.2.3 All new cameras provided with chassis, mounting kit, cables (crimped coax connections) and all components required for connection to the security system.

1.3 DEFINITIONS

1.3.1. AGC: Automatic gain control.

1.3.2. B/W: Black and white.

1.3.3. CCD: Charge-coupled device.

1.3.4. MPEG: Moving picture experts group.

1.3.5. NTSC: National Television System Committee.

1.3.6. UPS: Uninterruptible power supply.

1.4 SUBMITTALS

1.4.1. Product Data: For each type of product indicated, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

1.4.2. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project.

1.4.2.1. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.

1.4.2.2. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.

1.4.2.3. UPS: Sizing calculations.

1.4.2.4. Wiring Diagrams: Power, signal, and control wiring, and grounding.

1.4.3. Equipment List: Include every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of preset positions, description of alarms, and description of unit output responses to an alarm.

1.4.4. Manufacturer Seismic Qualification Certification: Submit certification that cameras, camera-supporting equipment, accessories, and components will withstand seismic forces defined in Division 16 Section "Electrical Supports and Seismic Restraints". Include the following:

1.4.4.1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.4.4.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.4.4.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.4.5. Field quality-control test reports.

1.4.6. Operation and Maintenance Data: For cameras, power supplies, infrared illuminators, monitors, digital video recorders, video switches, and control-station components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1.4.6.1. Lists of spare parts and replacement components recommended to be stored at the site for ready access.

1.4.7. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

1.5.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.2. Comply with NECA 1.

1.5.3. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

1.6.1. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1.6.1.1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.

1.6.1.2. Interior, Controlled Environment: System components, except central-station control unit, installed in temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of **40 to 100 deg F** dry bulb and 20 to 90 percent relative humidity, noncondensing. NEMA 250, Type 1 enclosures.

1.6.1.3. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of **0 to 110 deg F** dry bulb and 20 to 90 percent relative humidity, noncondensing. NEMA 250, Type **3R** enclosures.

1.6.1.4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of **minus 10 to plus 122 deg F** dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph **and snow cover up to 24 inches thick**. NEMA 250, Type **4X** enclosures.

1.6.1.5. Corrosive Environment: System components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. NEMA 250, Type **4X** enclosures.

1.7 WARRANTY

1.7.1 The Contractor shall provide logistics support and warranty maintenance to the Government for the Commissary installation for a period of three years commencing with the date of completion.

1.7.2 The warranty shall include parts and labor. Only new equipment installed by the Contractor shall be included in the equipment/parts warranty which will first consist of the Manufacturer's warranty followed by the Contractor's warranty for the remainder of the warranty years. During the full warranty period, the Contractor shall provide the necessary labor to service and maintain the system and replace new equipment, as necessary, to maintain system performance. During the warranty years, the replacement cost of original equipment that existed at the initiation of the installation and retained for continued use is not included under the warranty for either parts or labor. There will be one scheduled update near the end of the warranty period at which time the Contractor shall install and validate the latest released versions of any manufacturer's software.

1.7.3 The deliverables shall be warranty service and system maintenance, as described above, consisting of equipment/parts and labor for the continued performance of the CCTV system for three years after system acceptance and turnover. In addition, the deliverables shall include the installation and upgrade of appropriate manufacturer's software.

PART 2. PRODUCTS

2.1 MANUFACTURERS

2.1.1. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.1.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

a. Bosch Security Systems

b. GE Security

c. Honeywell

d. Tyco American Dynamics

2.2 SYSTEM REQUIREMENTS

2.2.1. Video signal format shall comply with the NTSC standard composite video, interlaced. Composite video signal termination shall be 75 ohms.

2.2.2. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.

2.2.2.1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Division 16 Section "Transient Voltage Suppression”.

2.2.2.2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Division 16 Section "Transient Voltage Suppression" as recommended by manufacturer for type of line being protected.

2.2.3. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.3 STANDARD CAMERAS

2.3.1. Color Camera:

2.3.1.1. Pickup Device: CCD interline transfer, 380,000 768(H) by 494(V) pixels.

2.3.1.2. Signal-to-Noise Ratio: Not less than 50 dB, with the camera AGC off.

2.3.1.3. With AGC, manually selectable on or off.

2.3.1.4. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. The illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with the camera AGC off.

2.3.1.5. Manually selectable modes for backlight compensation or normal lighting.

2.3.1.6. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.

2.3.1.7. White Balance: Auto-tracing white balance, with manually settable fixed balance option.

2.3.1.8. Motion Detector: Built-in digital.

2.3.2. Automatic Color Dome Camera: Assembled and tested as a manufactured unit, containing a dome assembly, color camera, motorized pan and tilt, zoom lens, and receiver/driver.

2.3.2.1. Pickup Device: CCD interline transfer, 380,000 768(H) by 494(V) pixels.

2.3.2.2. Signal-to-Noise Ratio: Not less than 50 dB, with the camera AGC off.

2.3.2.3. With AGC, manually selectable on or off.

2.3.2.4. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. The illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with the camera AGC off.

2.3.2.5. Manually selectable modes for backlight compensation or normal lighting.

2.3.2.6. Pan and Tilt: Direct-drive motor, 360-degree rotation angle, and 180-degree tilt angle. Pan-and-tilt speed shall be variable controlled by operator. Movement from preset positions shall be not less than 300 degrees per second.

2.3.2.7. Preset positioning: 8 user-definable scenes, each allowing 16-character titles. Controls shall include the following:

a. In "sequence mode," camera shall continuously sequence through preset positions, with dwell time and sequencing under operator control.

b. Motion detection shall be available at each camera position.

c. Smoked glass dome to conceal camera direction.

d. Up to four preset positions may be selected to be activated by an alarm. Each of the alarm positions may be programmed to output a response signal.

2.3.2.8. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.

2.3.2.9. White Balance: Auto-tracing white balance, with manually settable fixed balance option.

2.3.2.10. Motion Detector: Built-in digital.

2.3.2.11. Dome shall support multiplexed control communications using coaxial cable recommended by manufacturer.

2.4 LENSES

2.4.1. Description: Optical-quality coated optics, designed specifically for video surveillance applications, and matched to specified camera. Provide color-corrected lenses with color cameras.

2.4.1.1. Auto-Iris Lens: Electrically controlled iris with circuit set to maintain a constant video level in varying lighting conditions.

2.4.1.2. Fixed Lenses: With calibrated focus ring.

2.4.1.3. Zoom Lenses: Motorized, remote-controlled units, rated as "quiet operating." Features include the following:

a. Electrical Leads: Filtered to minimize video signal interference.

b. Motor Speed: Variable.

c. Lens shall be available with preset positioning capability to recall the position of specific scenes.

d. Minimum 18x optical and minimum 10x digital zoom capability

e. Neutral density filter for an f-stop of f-1. to f-360.

2.5 POWER SUPPLIES

2.5.1. Power Supplies: Low-voltage power supplies matched for voltage and current requirements of cameras and accessories, type as recommended by camera and lens manufacturer.

2.5.1.1. Enclosure: NEMA 250, Type 1.

2.6 CAMERA-SUPPORTING EQUIPMENT

2.6.1.1. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.

2.6.2. Pan Units: Motorized automatic-scanning units arranged to provide remote-controlled manual and automatic camera panning action and equipped with matching mounting brackets.

2.6.2.1. Scanning Operation: Silent, smooth, and positive.

2.6.2.2. Stops: Adjustable without disassembly, to limit the scanning arc.

2.6.3. Pan-and-Tilt Units: Motorized units arranged to provide remote-controlled aiming of cameras with smooth and silent operation and equipped with matching mounting brackets.

2.6.3.1. Panning Rotation: 0 to 355 degrees minimum, with adjustable stops.

2.6.3.2. Tilt Movement: 90 degrees, plus or minus 5 degrees, with adjustable stops.

2.6.3.3. Speed: 20 degrees per second horizontal, and 10 degrees per second vertical.

2.6.3.4. Wiring: Factory prewired for camera and zoom lens functions and pan-and-tilt power and control.

2.6.3.5. Built-in encoders or potentiometers for position feedback, and thermostat-controlled heater.

2.6.3.6. Pan-and-tilt unit shall be available with preset positioning capability to recall the position of a specific scene.

2.6.4. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment.

2.6.5. Protective Housings for Fixed and Movable Cameras: Steel enclosures with internal camera mounting and connecting provisions that are matched to camera/lens combination and mounting and installing arrangement of camera to be housed.

2.6.5.1. Camera Viewing Window: Lexan window, aligned with camera lens.

2.6.5.2. Duplex Receptacle: Internally mounted.

2.6.5.3. Alignment Provisions: Camera mounting shall provide for field aiming of camera and permit removal and reinstallation of camera lens without disturbing camera alignment.

2.6.5.4. Built-in thermostat-activated heater and blower units. Units shall be automatically controlled so the environmental limits of the camera equipment are not exceeded.

2.6.5.5. With sun shield that does not interfere with normal airflow around the housing.

2.6.5.6. Mounting bracket and hardware for wall or ceiling mounting of the housing. Bracket shall be of same material as the housing; mounting hardware shall be stainless steel.

2.6.5.7. Finish: Housing and mounting bracket shall be factory finished using manufacturer's standard finishing process suitable for the environment.

2.6.5.8. Enclosure Rating: NEMA 250, Type 3R.

2.7 MONITORS

2.7.1. Color:

2.7.1.1. Metal cabinet units designed for continuous operation.

2.7.1.2. Screen Size (Diagonal Dimension): 19 inches

2.7.1.3. LCD Display, 1024 x 640 resolution

2.7.1.4. Minimum Front Panel Devices and Controls: Power switch, power-on indicator, and brightness, contrast, color, and tint controls.

2.7.1.5. Mounting: **Single, 14-inch**, vertical, EIA 19-inch electronic equipment rack or cabinet complying with EIA 310.

2.7.1.6. Electrical: 120-V ac, 60 Hz.

2.7.2. Public View Color Monitor: 32” LCD, 1024 x 640 resolution, mounted as indicated on the drawings, 120vac, 60Hz.

2.8 DIGITAL VIDEO RECORDERS

2.8.1. Digital, time-lapse type, full frame and motion recorder, with two removable 500 GB hard drives.

2.8.1.1. Recording Time: 400 hours minimum.

2.8.1.2. Resolution: 720 by 480, minimum.

2.8.1.3. **32** Channels

2.8.1.4. Programming shall be from trackball and push buttons on face of the recorder, settings shall be displayed on any video monitor connected to the recorder. Programming shall include the following:

a. Motion analysis graph.

b. Password protection.

c. Alarm and timer controls.

d. Continuous recording option.

e. Time-lapse operating modes.

f. Search video by time, event, or motion.

2.8.1.5. Programming: SmartMedia card for software updating, image archiving, and image transfer to a PC.

2.8.1.6. Storage: 1 Tb HDD

2.8.1.7. Compression: MPEG-4

2.8.1.8. Time and Date Generator: Records time (hr:min:sec) and date legend of each frame.

2.8.1.9. Audio Recording: 70 to 7000 Hz. Input: phono and microphone; output: phono.

2.8.1.10. Mounting: Standard 19-inch rack complying with EIA 310, or freestanding desktop.

2.9 VIDEO SWITCHERS

2.9.1. Quad Switch: For displaying images from four cameras on a single monitor. Provide color switcher if one or more cameras or monitors are in color.

2.9.1.1. Controls: Unit-mounted front panel.

2.9.1.2. Resolution: 720 by 480.

2.9.1.3. Modes: Auto, manual, and alarm. In manual mode, each channel can be also viewed in single display mode. In the event of an alarm, alarming channel shall automatically switch to full screen. If several alarms are activated, channels in alarm shall be in auto-switching mode.

2.9.1.4. Channel Loss Alarm: Audible buzzer; occurrence details shall be recorded.

2.9.1.5. Time: Indicate date and time.

2.9.1.6. Timing of Auto-Switcher: 1 to 30 seconds, selectable.

2.9.1.7. Mounting: Standard 19-inch rack complying with EIA 310, or freestanding desktop.

2.9.2. Manual Switch Bank: Low-loss, high-isolation, multiple-video switch to allow manual switching of multiple quad switches and cameras to a single output. Switches shall be illuminated.

2.9.3. Sequential Switchers: Automatically sequence outputs of multiple cameras to single monitor and digital video recorder.

2.9.3.1. Switching Time Interval: Continuously adjustable, 5 to 20 seconds minimum, with manual override.

2.9.3.2. Skip-Sequential-Hold Switch: One for each camera, with LED to indicate active camera.

2.9.3.3. Camera Identification Legend: Either on-screen message or label at skip-sequential switch.

2.9.3.4. Alarm Switching: In the event of an alarm, alarming channel shall automatically switch the monitor to full screen.

2.9.3.5. Mounting: Standard 19-inch rack complying with EIA 310.

2.9.4. Pan-Tilt-Zoom Controls: Arranged for multiple-camera control, with switches to select camera to be controlled.

2.9.4.1. Pan-and-Tilt Control: Joystick type.

2.9.4.2. Zoom Control: Momentary-contact, "in-out" push button.

2.9.4.3. Automatic-Scan Control: A push button for each camera with pan capability places that camera in automatic-scanning mode.

2.10 CONTROL STATIONS

2.10.1. Heavy-duty, freestanding, modular metal furniture units arranged to house standard mounting electronic equipment. Coordinate video surveillance component arrangement and wiring with components and wiring of other systems.

2.10.2. Equipment Mounting: Standard 19-inch rack complying with EIA 310.

2.10.3. Normal System Power Supply: 120 V, 60 Hz, through a locked disconnect device and an isolation transformer in central-station control unit. Central-station control unit shall supply power to all components connected to it, unless otherwise indicated.

2.10.4. Power Continuity for Control Station: Batteries in power supplies of central-station control units and individual system components shall maintain continuous system operation during outages of both normal and backup ac system supply.

2.10.4.1. Batteries: Rechargeable, valve-regulated, recombinant, sealed, lead-acid type with nominal 10-year life expectancy. Capacity adequate to operate portion of system served, including audible trouble signal devices for up to 4 hours and audible and visual alarm devices under alarm conditions for an additional 10 minutes.

2.10.4.2. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Charger shall recharge fully discharged battery within 24 hours.

2.10.5. Annunciation: Indicate a change in system condition and switching of system or component to backup power.

2.11 SIGNAL TRANSMISSION COMPONENTS

2.11.1. Cable: Coaxial cable elements have 75-ohms nominal impedance. Cables shall comply with Division 16 Section "Voice and Data Communication Cabling".

2.11.2. Video Surveillance Coaxial Cable Connectors: BNC type, 75 ohms. Of three-piece construction, consisting of a crimp-type center tit, sleeve, and main body.

PART 3. EXECUTION

3.1 WIRING

3.1.1. Wiring Method: Install cables in raceways and as otherwise indicated. Conceal raceways and wiring except in unfinished spaces.

3.1.2. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.1.3. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.1.4. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.2 VIDEO SURVEILLANCE SYSTEM INSTALLATION

3.2.1 The Contractor shall install and functionally and performance test the equipment identified in the single-line block diagram and equipment elevation/arrangement drawings. The exact locations of cameras, and arrangement and mounting of all CCTV front-end monitoring station equipment shall be coordinated with the Commissary Store Director or his/her representative. The monitoring stations shall be located such that available electrical wall receptacles will be used to power the monitoring station equipment. The arrangement of monitoring station equipment shall be such that frequently used controls and equipment will be placed for convenience of use and viewing. It is not intended that rack mounting of monitoring station equipment will be required. Approximate, yet close, camera locations are shown on the floor plans.

3.2.2 The Contractor shall install only that equipment selected and identified to the Contracting Agency, unless otherwise directed by the Contracting Agency in writing. Electrical panel circuit break-

ers servicing CCTV equipment shall be appropriately labeled. Standard electrical power is 120VAC / 60 HZ / 1 PH (15 A circuit), unless otherwise specified. New cameras are to be powered with low voltage thru the dual-use coaxial cable. All new cameras will be installed in enclosures that protect the equipment against forced penetration. Video splitters will not be used to avoid needless reduction in resolution quality. An uninterruptible power supply (UPS) shall be provided for the system head end monitoring station. The UPS shall provide surge protection for CCTV equipment at the head end / monitoring station. Cameras shall NOT be powered with the UPS. The installation of all equipment shall be in accordance with Attachment (1) of this SOW. The installation of the system is not complete until each camera's field of view (height, width, and image target area) has been evaluated and accepted by the designated accepting official.

3.2.3 The Contactor shall be responsible for the restoration of any equipment, walls or ceilings located in public areas or office spaces that have holes or are scratched, dented or otherwise marred as a result of the Contractor removing, replacing or installing either CCTV or audio equipment. Holes in structural components, e.g. metal beams in public areas need not be filled, but will be repainted to match the color of the adjacent surrounding surface. Holes in walls or ornamental components, e.g. columns in public areas will be filled and painted to match the color of the adjacent surrounding surface. Holes left in structural components, e.g. metal beams in the warehouse or other nonpublic areas need not be filled, but are to be repainted with a rust retardant of similar color. Ceiling tiles will be replaced with new tiles of like color and texture to match adjacent surrounding material. Surfaces that are repainted shall match the color of the adjacent surrounding surface. The Contractor shall clean up any tools, equipment, material or debris and organize the work area at the completion of each work day in any public area, office space, or nonpublic area. During the performance of the tasking described in this Statement of Work the Contractor shall follow all applicable regulations and standards regarding the handling and storage of hazardous and toxic materials.

3.2.4 As may be appropriate, equipment functional testing shall be performed on each equipment/subsystem as it is installed, e.g. camera video, camera controls. Full system performance testing shall be performed after all equipment has passed functional testing. Equipment performance testing failures shall be corrected by the Contractor at the Contractor's expense. The Contracting Agency shall not be responsible in any way to correct equipment or system failure(s).

3.2.5 The Contractor shall submit a bi-weekly status report detailing the installation progress, relative to the schedule (Task A), to the Contracting Agency every second Monday. Deviations from the installation schedule shall be reported in accordance with Task A. During the installation, the Contractor shall maintain two copies of the associated drawings up-to-date and "red-line" any changes, at least once each week, to indicate variances from the design plan. The red-line drawings shall be available on-site at all times for review.

3.3 FIELD QUALITY CONTROL

3.3.1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation and supervise pretesting, testing, and adjusting of video surveillance equipment.

3.3.2. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.

3.3.3. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video surveillance equipment for acceptance and operational testing as follows:

3.3.3.1. Prepare equipment list described in Part 1 "Submittals" Article.

3.3.3.2. Verify operation of auto-iris lenses.

3.3.3.3. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.

3.3.3.4. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.

3.3.3.5. Set and name all preset positions; consult Owner's personnel.

3.3.3.6. Set sensitivity of motion detection.

3.3.3.7. Connect and verify responses to alarms.

3.3.3.8. Verify operation of control-station equipment.

3.3.4. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.

3.3.5 Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes. The Contractor shall perform a full CCTV system acceptance test and checkout. The Contractor shall demonstrate to the accepting/reviewing official that the system performs as specified without failure. All system performance and video functions as specified in Attachment (1) of this SOW, e.g. camera controls, video selection and display, video recording and playback shall be demonstrated. An Acceptance Test and Checkout document shall be provided to record test results. System equipment shall be identified on the Acceptance Test and Checkout document with “pass” or “fail” check boxes for all equipment. The acceptance document shall provide for identifying exceptions, i.e. equipment failing to meet performance requirements that will be corrected, and the date by which the “punch list” corrections will be made. When exceptions are noted, the Contractor is not forgiven correcting the failures or deficiencies which shall be at the Contractor’s expense. The Contractor shall identify and provide the locations of all hidden equipment to local management.

3.3.6 With successful completion of system testing, the accepting/reviewing official and the Contractor shall sign the Acceptance Test and Checkout document, thus turning the system over to the Government. Upon turnover of the system, the Contractor shall provide the Commissary Director, or his representative with a copy of the drawing package, including the red lined single-line block diagram and elevation and arrangement drawing(s) and one copy of all operating manuals or specification sheets, as available, for newly installed equipment. The Commissary Director shall provide the Contractor with one copy of the signed Acceptance document and will forward one copy to the Contracting Agency.

Deliverables

The deliverables shall be:

- acceptance testing,
- a list of exceptions (punch list),
- system acceptance document (with signatures),
- one copy each of newly installed equipment operating manuals and/or specification sheets, and
- one copy of red line single-line block diagram and equipment elevation/arrangement drawing(s).

NOTE: It is the responsibility of the Contractor to prepare an Acceptance Test and Checkout test document. Included with the test document shall be an acceptance signature sheet for the signatures of personnel authorized to transfer the system to the government. The acceptance signature sheet shall include the site location, identify the system to be tested and have provision for, as a minimum, the accepting official's signature, the installation Contractor's signature, and the date of acceptance and turnover.

3.3.7. Remove and replace malfunctioning items and retest as specified above.

3.3.8 Record test results for each piece of equipment.

3.3.9 Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.4 ADJUSTING

3.4.1. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions and to optimize performance of the installed equipment. Tasks shall include, but are not limited to, the following:

3.4.1.1. Check cable connections.

3.4.1.2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.

3.4.1.3. Adjust all preset positions; consult Owner's personnel.

3.4.1.4. Recommend changes to cameras, lenses, and associated equipment to improve Owner' utilization of video surveillance system.

3.4.1.5. Provide a written report of adjustments and recommendations.

3.5 CLEANING

3.5.1. Clean installed items using methods and materials recommended in writing by manufacturer.

3.5.2. Clean video surveillance system components, including camera-housing windows, lenses, and monitor screens.

3.6 DEMONSTRATION

3.6.1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain video surveillance equipment.

3.6.1.1. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining equipment.

3.6.1.2. Demonstrate methods of determining optimum alignment and adjustment of components and settings for system controls.

3.6.1.3. Review equipment list and data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data".

3.6.1.4. Conduct a minimum of six hours' training as specified in instructions to Government's employees in Division 1 Section "Demonstration and Training".

3.7 FINAL SYSTEM DRAWINGS

3.7.1. The contractor shall incorporate all red-line changes and corrections to the System Single Line Block Diagram and Equipment Elevation/Arrangement Drawings. The final system drawings shall include the following details.

3.7.1.1. Single-Line functional block diagram, including:
a.- Video signal
b. Data/Control signal
c. Interconnecting equipment cables
d. Electrical power

3.7.1.2. Equipment elevations and arrangements

3.7.1.3 List of equipment with quantities indicated

3.7.1.4. Drawing header identification block (on all sheets):

a. Title/description
b. Facility name and location
c. Contractor's identification
d. Date of acceptance
e. Accepting official's signature and position/title

3.7.2 The contractor shall incorporate all requirements and submit the final drawing package to the DeCA POC not more than 15 days after system acceptance and turnover.

END OF SECTION 13760

CONSTRUCTION ISSUE

SECTION 13851

FIRE ALARM

PART 1-GENERAL

1.1 SUMMARY

1.1.1. Fire protection systems are life-safety systems and will therefore be designed, installed, tested, and expected to perform as such.

1.1.2. This Section includes fire alarm systems.

1.1.3. Related Sections include the following:

1.1.3.1. Division 8 Section "Door Hardware" for door closers and holders with associated smoke detectors, electric door locks, and release devices that interface with the fire alarm system.

1.1.3.2. Division 13 Section “Mass Notification System”.

1.2 DEFINITIONS

1.2.1. FMCP: Combined Fire alarm / mass notification control panel.

1.2.2. LED: Light-emitting diode.

1.2.3. NICET: National Institute for Certification in Engineering Technologies.

1.2.4. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.2.5. AHJ: Authority Having Jurisdiction is an individual responsible for review, inspection, and/or approval of a system and shall include the building official, fire marshal, engineer, Contracting Officer, or owners insurance representative. For this project, the AHJ shall be NAVFAC Fire Protection Engineer and NSA Annapolis Fire Chief.

1.3 REFERENCES

1.3.1. All references shall be of the latest edition.

1.3.2. Factory Mutual (FM):

1.3.2.1. FM AG Approval Guide.

1.3.3. National Fire Protection Association (NFPA):

1.3.3.1. NFPA 13 Standard For The Installation of Sprinkler Systems

1.3.3.2. NFPA 70 National Electrical Code

1.3.3.3. NFPA 72 National Fire Alarm Code

1.3.3.4. NFPA 90A Standard For The Installation of Air Conditioning And Ventilating Systems

1.3.3.5. NFPA 101 Life Safety Code

1.3.4. Underwriters' Laboratories, Inc. (UL): Appropriate UL equipment standards:

1.3.4.1. UL 864 Control Panels.

1.3.4.2. UL 268 Smoke Detectors.

1.3.4.3. UL 268A Smoke Detectors (HVAC).

1.3.4.4. UL 38 Manually Actuated Signaling Boxes.

1.3.4.5. UL 346 Water flow Indicators for Fire Protection Signaling.

1.3.4.6. UL 1971, Standard for Visual Signaling Appliances.

1.3.5. Building Codes:

1.3.5.1. International Building Code

1.3.5.2. International Fire Code

1.3.6. ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.

1.3.7. Military Unified Facilities Criteria:

1.3.7.1. UFC 3-600-01

1.3.7.2. UFC 3-600-10N

1.3.7.3. UFC 3-600-02

1.3.7.4. UFC 4-021-01

1.4 SYSTEM DESCRIPTION

1.4.1. Noncoded, analog-addressable system; automatic sensitivity control of certain smoke detectors; and multiplexed signal transmission.

1.4.2. All equipment furnished shall be new and the latest state of the art products of a single manufacturer, engaged in the manufacturing and sale of analog fire detection devices for over ten years.

1.4.3. The system as specified shall be reviewed, fully tested and approved by each of the Authorities Having Jurisdiction, and turned over to the owner in an operational condition.

1.4.4. In the interest of job coordination and responsibilities the installing contractor shall contract with a single supplier for fire alarm equipment, engineering, programming, inspection and testing.

1.4.5. The contractor shall provide a representative as requested for project meetings such as to assist in coordination of crafts.

1.5 PERFORMANCE REQUIREMENTS

1.5.1. Comply with NFPA 72.

1.5.2. Fire alarm signal initiation shall be by one or more of the following devices:

1.5.2.1. Manual stations.

1.5.2.2. Smoke detectors.

1.5.2.3. Automatic sprinkler system water flow.

1.5.2.4. Fire extinguishing system operation.

1.5.3. Fire alarm signal shall initiate the following actions:

1.5.3.1. Sound an audible alarm and display a custom screen/message defining the building/zone/room in alarm and the specific alarm point initiating the alarm.

1.5.3.2. Log to the system history archives all activity pertaining to the alarm condition.

1.5.3.3. Sound the ANSI 117-1 signal with synchronized audible alarm and visual strobe signals throughout the facility.

1.5.3.4. Audible signals shall be silenced from the fire alarm control panel by an alarm silence switch. Visual signals shall be programmable to flash until system reset or additional alarm silencing, as required.

1.5.3.5. A signal dedicated to sprinkler system water flow alarm shall not be silenced while the sprinkler system is flowing at a rate of flow equal to a single head.

1.5.3.6. HVAC shut down shall be accomplished by system operated duct detectors as per local requirements. Unless specifically required by the AHJ, HVAC and duct detectors shall initiate a supervisory signal and not a building evacuation.

1.5.3.7. Door hold-open devices shall release by floor or when specifically indicated otherwise on Drawings or local requirements.

1.5.3.8. Electric door locking devices shall release by floor or when specifically indicated otherwise on Drawings or local requirements.

1.5.3.9. Provide for an alarm condition at an approved off-site monitoring station or as indicated on Drawings.

1.5.4. Supervisory signal initiation shall be by one or more of the following devices or actions:

1.5.4.1. Signal from the base-wide Mass Notification System.

1.5.4.2. Sprinkler Valve, Tamper Switches

1.5.4.3. Ventilation System emergency stop push button.

1.5.4.4. Display the origin of the supervisory condition report at the local fire alarm control panel.

1.5.4.5. Activate supervisory audible and dedicated visual signal.

1.5.4.6. Provide a means for silencing a supervisory signal shall be permitted only if it is key-operated, located in a locked enclosure, or arranged to provide equivalent protection against unauthorized use. Such a means shall be permitted only if it transfers the supervisory indication to a lamp or other visible indicator and subsequent supervisory signals in other zones cause the supervisory notification appliance(s) to re-sound.

1.5.4.7. Record within system history the initiating device and time of occurrence of the event.

1.5.4.8. Transmit the signal to the monitoring station.

1.5.5. System trouble signal initiation shall be by one or more of the following devices or actions:

1.5.5.1. Display at the local fire alarm control panel the origin of the trouble condition report.

1.5.5.2. Activate trouble audible and visual signals at the control panel and as indicated on the drawings.

1.5.5.3. Silence audible signals from the fire alarm control panel via a trouble acknowledge switch.

1.5.5.4. Trouble reports for primary system power failure to the master control shall be optionally delayed for a period of time not greater than 200 seconds. Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and not require operator intervention. This feature shall be software selectable and shall not preclude the logging of trouble events to the historical file.

1.5.5.5. Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event.

1.5.5.6. Transmit the signal to the monitoring station.

1.5.6. System Trouble and Supervisory Signal Actions: Ring trouble alarm and annunciate at the FMCP and remote annunciators.

1.5.7. Power and Voltage Limitations:

1.5.7.1. Battery capacity calculations. Battery size shall be a minimum of 125% of the calculated requirement.

1.5.7.2. Power supplies shall be sized to furnish the total connected load in a worst-case condition plus 25% spare capacity. (i.e. 4A supply x .25 spare = 1A reserve.)

1.5.7.3. Voltage drop calculations for wiring runs demonstrating worst-case condition. Unless otherwise approved by the engineer, voltage drop calculations shall be performed using the Lump-Sum approach using device nominal rating voltage. Calculations must include and clearly indicate wire length out and back to panel. Calculations shall be provided for horn, strobe, and speaker circuits. Use of notification power booster panels shall be limited.

1.5.7.4. Device current values for voltage calculations shall be based on the lowest nameplate voltage. (i.e. current values at a voltage of 20 volts shall be used when available rather than current values for 24 volts.)

1.5.7.5. Notification Appliance Circuit (NAC) design shall incorporate a 25% spare capacity for future expansion.

1.5.7.6. End-of-line voltage reading will be required for each circuit and must have a 25% spare capacity. (i.e. 24V circuit – 21V nameplate = 3 volt drop x 0.25 spare = 0.75 volt safety factor required.)

1.5.7.7. In no case shall horn/strobe circuits be designed or measured to have an end-of-line voltage below 20 volts or the manufactures nameplate voltage, whichever is higher.

1.6 SUBMITTALS

1.6.1. Product Data: For each type of product indicated.

1.6.2. Shop Drawings: Five copies of all submittals shall be submitted to the Contracting Officer for review. The contractor shall include the following information in submittals.

1.6.2.1. Shop Drawings shall be prepared and signed by persons with the following qualifications:

a. Trained and certified by manufacturer in fire alarm system design.

b. Fire alarm certified by NICET, minimum Level III, or registered Fire Protection Engineer.

1.6.2.2. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.

1.6.2.3. Device Address List: Coordinate with final system programming.

1.6.2.4. System riser diagram with device addresses, conduit sizes, and cable and wire types and sizes.

1.6.2.5. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.

1.6.2.6. Batteries: Size calculations.

1.6.2.7. Duct Smoke Detectors: Performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating. Coordinating the installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, the detector housing, and remote status and alarm indicators. Locate detectors according to manufacturers written recommendations.

1.6.2.8. Elevation Details: Details shall be provided showing mounting of wall and ceiling devices. Where exposed or pocketed ceilings are involved, specific dimensioned details of detector and notification devices shall be provided.

1.6.2.9. Device Mounting Details: Details of device back-box requirements shall be provided.

1.6.2.10. Floor Plans: Indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits. Unless prohibited by Owner, CADD files for floor plans may be obtained through General Contractor from the Architect/Engineer. .

1.6.3. Cut Sheets, Calculations, and Other Design Documents: Each set of shop drawings shall be accompanied with supportive submittal documentation. This documentation shall be quality bound and shall be organized and numerically tabbed into the following sections.

1.6.3.1. Fire Alarm Control Panels, Power Supplies and Annunciators

1.6.3.2. Detection Devices

1.6.3.3. Audio/Visual Devices

1.6.3.4. System Components, Modules and Relays

1.6.3.5. Battery Calculations and cut sheets (summary of results shall also be on plans)

1.6.3.6. Voltage Calculations (summary of results shall also be on plans)

1.6.3.7. Compatibility Listings (matrix, table, or info showing device compatibility)

1.6.3.8. Operating Instructions for entire System *(This will include a copy of what will be posted adjacent to FMCP)*

1.6.3.9. Manufacturers Inspection instructions and other maintenance criteria from NFPA 72 and UFC 3-600-02

1.6.3.10. Designer and installer certificates (documents prepared by a PE do not require certificate, but are required to be sealed.)

1.6.4. Qualification Data: Copies of certificates for installers and documenting approved manufacture representation shall be provided.

1.6.5. Field quality-control test reports.

1.6.6. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, Appendix A, recommendations for Owner's manual. Include abbreviated operating instructions for mounting at the FMCP.

1.6.7. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals specified in Division 1 Section "Submittals," make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Contracting Officer for review.

1.6.8. Documentation:

1.6.8.1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner and authorities having jurisdiction.

1.6.8.2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner. Format of the written sequence of operation shall be the optional input/output matrix.

a. Hard copies on paper to Owner.

1.6.9. A copy of these fire alarm specifications shall be included with all submittal packages including those to the engineer, owner, and local AHJ's.

1.6.10. Incomplete submittals shall be returned without review, unless previously approved by the Contracting Officer.

1.7 QUALITY ASSURANCE

1.7.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.7.2. Qualifications:

1.7.2.1. The contractor shall submit copies of all required Licenses and Bonds as required in the State having jurisdiction to the Contracting Officer upon award of contract, and engineer upon request.

1.7.2.2. The contractor shall employ on staff a minimum of one NICET level III Fire Alarm Technician, a registered Fire Protection Engineer, a professional engineer registered in the State of the installation, or a Certified Safety Professional with proven experience in fire alarm systems. This individual shall make regular site visits as necessary to oversee the system installation. This

individual will be held accountable for system oversight, code compliance, and quality of installation. This requirement shall apply to the fire alarm contractor and any other contractor installing portions of the system such as wiring and/or devices by an electrical contractor. Qualified individual shall immediately provide evidence of qualification upon request.

1.7.2.3. At least one NICET Level II Fire Alarm Technician shall be present and have oversight anytime fire alarm equipment and/or wiring is being installed. This requirement shall apply to the fire alarm contractor and any other contractor installing portions of the system such as wiring and/or devices by an electrical contractor. Technician shall immediately provide evidence of qualification upon request.

1.7.2.4. Fire alarm shop drawings shall be prepared and signed by a NICET Level III Fire Alarm Technician or a Professional Engineer with proven and documented experience/training in fire alarm system design and codes. Plans not prepared by the Professional Engineer or under the direct supervision (same employment) of the Professional Engineer shall not be approved. Design documents prepared by a Professional Engineer shall bear a seal of the engineer.

1.7.2.5. The Contracting Officer may accept a testing or qualification body other than NICET, if submitted and approved prior to bidding the project. Evidence of qualification and means for verification shall be provided in writing to the Contracting Officer with sufficient time for evaluating such request prior to awarding of contract. However, such qualifications shall be specifically focused towards fire alarm system design, installation, and codes. Qualifications for other low voltage systems such as security, access control, telephone, etc. shall not be approved.

1.7.2.6. The State approved or licensed fire alarm contractor whose name appears on the system and who is responsible for system warranty and service shall have sole authority to establish installation responsibilities. Thus, if any portion is to be wired or installed by a separate contractor (such as an electrical contractor), then the fire alarm contractor will by contract select and warrant such contractor. An electrical or other contractor not licensed by the state and/or not meeting qualification requirements of this specification shall not dictate installation conditions for this system.

1.8 REGULATORY REQUIREMENTS

1.8.1. Factory Mutual (FM).

1.8.1.1. FM AG Approval Guide.

1.9 EXTRA MATERIALS

1.9.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.9.1.1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but not less than 1 unit.

1.9.1.2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but not less than 1 unit.

1.9.1.3. Smoke, Fire, and Flame Detectors: Quantity equal to 10 percent of amount of each type installed, but not less than 1 unit of each type.

1.9.1.4. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but not less than 1 unit of each type.

1.9.1.5. Keys and Tools: One extra set for access to locked and tamperproofed components.

1.9.1.6. Audible and Visual Notification Appliances: One of each type installed.

1.9.1.7. Fuses: Two of each type installed in the system.

PART 2-PRODUCTS

2.1 MANUFACTURERS

2.1.1. Basis-of-Design Products:

2.1.1.1. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.1.1.2. Combined fire alarm/mass notification control panel (FMCP) and Equipment:

a. SimplexGrinnell LP; a Tyco International Company.

2.1.1.3. Wire and Cable:

a. Comtran Corporation.

b. Helix/HiTemp Cables, Inc.; a Draka USA Company.

c. Rockbestos-Suprenant Cable Corporation; a Marmon Group Company.

d. West Penn Wire/CDT; a division of Cable Design Technologies.

2.1.1.4. Audible and Visual Signals:

a. Gentex Corporation.

b. System Sensor; a GE-Honeywell Company.

c. Wheelock, Inc.

2.2 FMCP

2.2.1. General Description:

2.2.1.1. Modular, power-limited design with electronic modules, UL 864 listed.

2.2.1.2. Addressable initiation devices that communicate device identity and status.

a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at the FMCP.

b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.

2.2.1.3. Addressable control circuits for operation of mechanical equipment.

2.2.1.4. Combined with the Mass Notification System. Refer to Division 13 Section “Mass Notification System”.

2.2.2. Alphanumeric Display and System Controls: Arranged for interface between human operator at the FMCP and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

2.2.2.1. Annunciator and Display: Liquid-crystal type, three line(s) of 160 characters, minimum.

2.2.2.2. Keypad: Arranged to permit entry and execution of programming, display, and control commands; and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

2.2.3. Circuits:

2.2.3.1. Signaling Line Circuits: NFPA 72, Class A, Style 6.

2.2.3.2. Notification-Appliance Circuits: NFPA 72, Class A, Style Z.

2.2.3.3. Actuation of alarm notification appliances, emergency voice communications, annunciation, elevator recall, and actuation of suppression systems shall occur within 10 seconds after the activation of an initiating device.

2.2.3.4. Electrical monitoring for the integrity of wiring external to the FMCP for mechanical equipment shutdown and magnetic door-holding circuits is not required, provided a break in the circuit will cause doors to close and mechanical equipment to shut down.

2.2.4. Smoke-Alarm Verification:

2.2.4.1. Initiate audible and visible indication of an "alarm verification" signal at the FMCP.

2.2.4.2. Activate a listed and approved "alarm verification" sequence of 20 seconds at the FMCP and the detector.

2.2.4.3. Record events by the system printer.

2.2.4.4. Sound general alarm if the alarm is verified.

2.2.4.5. Cancel FMCP indication and system reset if the alarm is not verified.

2.2.5. Notification-Appliance Circuit: Operation shall sound in a temporal pattern, complying with ANSI S3.41. The voice evacuation message shall be a female voice and state the following:

"May I have your attend please? May I have your attention please? A fire emergency has been reported in the building. Please leave the building by the nearest exit."

2.2.6. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.

2.2.7. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the FMCP and remote annunciators, after initiating devices are restored to normal.

2.2.7.1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.

2.2.7.2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.

2.2.7.3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.

2.2.8. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. Enabling of this mode shall require the entry of a password. The FMCP and annunciators shall display a test indication while the test is underway. If testing ceases while in walk-test mode, after a preset delay, the system shall automatically return to normal.

2.2.9. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and control of changes in those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and make a print-out of the final adjusted values on the system printer.

2.2.10. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, trouble, and supervisory signals to the remote alarm station through Sig Com Radio Frequency Transmitter.

2.2.11. Service Modem: Ports shall be RS-232 for system printer and for connection to a dial-in terminal unit.

2.2.11.1. The dial-in port shall allow remote access to the FMCP for programming changes and system diagnostic routines. Access by a remote terminal shall be by encrypted password algorithm.

2.2.12. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal, and supervisory and digital alarm communicator transmitter shall be powered by the 24-V dc source.

2.2.12.1. The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.

2.2.12.2. Power supply shall have a dedicated fused safety switch for this connection at the service entrance equipment. Paint the switch box red and identify it with "FIRE ALARM SYSTEM POWER."

2.2.13. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.

2.2.13.1. Batteries: Sealed lead calcium.

2.2.13.2. Battery and Charger Capacity: Comply with NFPA 72.

2.2.14. Surge Protection:

2.2.14.1. Install surge protection on normal ac power for the FMCP and its accessories. Comply with Division 16 Section "Transient Voltage Suppression" for auxiliary panel suppressors.

2.2.14.2. Install surge protectors recommended by FMCP manufacturer. Install on all system wiring external to the building housing the FMCP. This shall include power, telephone, and radio transmitter wiring.

2.2.15. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.3 MANUAL FIRE ALARM BOXES

2.3.1. Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box.

2.3.1.1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FMCP.

2.3.1.2. Station Reset: Key- or wrench-operated switch.

2.3.1.3. Indoor Protective Shield: Factory-fabricated clear polycarbonate plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.

2.4 SYSTEM SMOKE DETECTORS

2.4.1. General Description:

2.4.1.1. UL 268 listed, operating at 24-V dc, nominal.

2.4.1.2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FMCP.

2.4.1.3. Multipurpose type, containing the following:

a. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FMCP.

b. Heat sensor, combination rate-of-rise and fixed temperature.

2.4.1.4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.

2.4.1.5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

2.4.1.6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.

2.4.1.7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FMCP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FMCP.

a. Rate-of-rise temperature characteristic shall be selectable at the FMCP for 15 or 20 deg F per minute.

b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at the FMCP to operate at 135 or 155 deg F.

c. Provide multiple levels of detection sensitivity for each sensor.

2.4.2. Photoelectric Smoke Detectors:

2.4.2.1. Sensor: LED or infrared light source with matching silicon-cell receiver.

2.4.2.2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.

2.4.3. Duct Smoke Detectors:

2.4.3.1. Photoelectric Smoke Detectors:

a. Sensor: LED or infrared light source with matching silicon-cell receiver.

b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.

2.4.3.2. UL 268A listed, operating at 24-V dc, nominal.

2.4.3.3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FMCP.

2.4.3.4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.

a. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector. The enclosure shall comply with NEMA 250 requirements for Type 4X.

2.4.3.5. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.

2.4.3.6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.

2.4.3.7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FMCP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FMCP.

2.4.3.8. Each sensor shall have multiple levels of detection sensitivity.

2.4.3.9. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.

2.4.3.10. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.4.3.11. Provide remote test switches and remote LEDs for each duct smoke detector.

2.5 NOTIFICATION APPLIANCES

2.5.1. Description: Equipped for mounting as indicated and with screw terminals for system connections.

2.5.1.1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.

2.5.2. Bells: Electric-vibrating, 24-V dc, under-dome type; with provision for housing the operating mechanism behind the bell. Bells shall produce a sound-pressure level of 94 dBA, measured 10 feet from the bell. 10-inch size, unless otherwise indicated. Bells are weatherproof where indicated.

2.5.3. Speakers: See Section 13853 for Combined Fire Alarm / Mass Notification speakers.

2.5.4. Visible Alarm Devices: See Section 13853 for combined Fire Alarm / Mass Notification strobes.

2.5.4.1. Rated Light Output: As indicated on the Drawings

2.5.4.2. Strobe Leads: Factory connected to screw terminals.

2.5.5. Manufacturer shall provide wall mount devices and ceiling mount devices. Devices shall be installed as indicated on drawings.

2.5.6. Notification devices shall be trimmed in white unless indicated otherwise.

2.6 SPRINKLER SYSTEM REMOTE INDICATORS

2.6.1. Remote status and alarm indicator and test stations, with LED indicating lights. Light is connected to flash when the associated device is in an alarm or trouble mode. Lamp is flush mounted in a single-gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, device initiating the signal and room where the smoke detector or valve is located. For water-flow switches, the identification plate also designates protected spaces downstream from the water-flow switch.

2.7 MAGNETIC DOOR HOLDERS

2.7.1. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching door plate.

2.7.1.1. Electromagnet: Requires no more than 3 W to develop 25-lbf holding force.

2.7.1.2. Wall-Mounted Units: Flush mounted, unless otherwise indicated.

2.7.1.3. Rating: 24-V dc.

2.7.2. Material and Finish: Match door hardware.

2.8 REMOTE ANNUNCIATOR

2.8.1. Description: Duplicate annunciator functions of the FMCP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FMCP, including acknowledging, silencing, resetting, and testing.

2.8.1.1. Mounting: Flush cabinet, NEMA 250, Class 1.

2.8.2. Display Type and Functional Performance: Alphanumeric display same as the FMCP. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FMCP.

2.9 ADDRESSABLE INTERFACE DEVICE

2.9.1. Description: Microelectronic monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts. Provide a separate address for each water flow switch per UFC 3-600-10N.

2.9.2. Integral Relay: Capable of providing a direct signal to the elevator controller to initiate elevator recall.

2.10 GUARDS FOR PHYSICAL PROTECTION

2.10.1. Description: Welded wire mesh or polycarbonate of size and shape for the manual station, smoke detector, strobe, or other device requiring protection. Any device located in Receiving/Staging area shall be protected as such.

2.10.2. Manual pull station shall have tamper proof cover equivalent to Edward Systems Stopper II with sounder.

2.11 WIRE AND CABLE

2.11.1. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

2.11.2. Signaling Line Circuits: Twisted, shielded pair, No. 14 AWG.

2.11.2.1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.

2.11.3. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.

2.11.3.1. Low-Voltage Circuits: No. 16 AWG, minimum.

2.11.3.2. Line-Voltage Circuits: No. 12 AWG, minimum.

2.12 AS-BUILT PLAN CABINET

2.12.1. An As-Built plan cabinet shall be installed with every new fire alarm system installation or replacement. The purpose of the cabinet is to provide a secured location for all fire alarm documentation related to the system. This will aid in future servicing and modifications to the system.

2.12.1.1. The plan cabinet shall be sized and contain approved plans, specifications, manuals, test reports, service reports, computer disk, and a hard copy printout of the system logic/programming.

2.12.1.2. The cabinet shall be keyed the same as the fire alarm panel.

2.12.1.3. The cabinet shall be located as shown on plans, adjacent to the main fire alarm panel, or there shall be signage on the fire alarm panel indicating where the plan cabinet is located.

2.12.2. The cabinet shall be neatly and clearly labeled “As Built Drawings” and shall be equal to the DBX As Built Cabinets manufactured by Space Age Electronics.

2.13 FIRE ALARM MONITORING

2.13.1. The contractor shall connect the system to base-wide Fire Reporting System.

2.13.2. Provide a SIG COM (Signal Communications) radio-frequency transmitter and antenna for each building fire alarm control panel to match the base-wide fire reporting system.

2.13.3. This equipment shall be capable of transmitting to the monitoring service the device address that is in alarm, supervisory, and trouble conditions.

2.13.4. Water-flow signals shall be specifically received by the monitoring service as water flow alarms.

PART 3-EXECUTION

3.1 EQUIPMENT INSTALLATION

3.1.1. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.

3.1.1.1. Connect new equipment to the existing monitoring equipment at the Supervising Station.

3.1.2. Smoke or Heat Detector Spacing:

3.1.2.1. Smooth ceiling spacing shall not exceed 30 feet.

3.1.2.2. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.

3.1.2.3. Spacing of heat detectors shall be determined based on guidelines and recommendations in NFPA 72.

3.1.3. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.

3.1.4. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct.

3.1.5. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

3.1.6. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling, but not higher than 30 feet unless otherwise noted. Install bells and speakers on flush-mounted back boxes with the device-operating mechanism concealed behind a grille where finished walls are available for mounting. In large open ceiling areas where walls are not available, devices may be suspended on rigidly supported threaded conduit.

3.1.7. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm speaker and at least 6 inches below the ceiling, but not higher than 30 feet unless otherwise noted.

3.1.8. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.1.9. FMCP: Surface mount with tops of cabinets not more than 72 inches above the finished floor.

3.1.10. Annunciator: Install with top of panel not more than 72 inches above the finished floor.

3.1.11. Antenna for Radio Alarm Transmitter: Mount to building structure where indicated. Use mounting arrangement and substrate connection that will resist 100-mph wind load with a 1.3 gust factor without damage.

3.1.12. No portion of a fire alarm system shall be installed prior to having plans on site that have been approved and stamped by the Contracting Officer and the local AHJ. This includes wiring. Approved stamped plans shall be on site at all times while the system is in the installation stage.

3.1.12.1. Smoke detectors shall not be installed until the construction cleanup of all trades is complete per NFPA 72. Any smoke detector that has been installed prior to the construction cleanup of all trades and without prior written approval of the engineer and local AHJ shall be marked in a permanent manner that will identify it from re-use and shall be replaced prior to commissioning of the system and/or turning over to the owner. Such detectors shall be replaced at the sole expense of the installing contractor. Subject to approval of the engineer and local AHJ this may exclude services, which do not create air-born particles such as telephone/network services, and modular furniture installation.

3.1.12.2. Orange shipping covers, rubber gloves, tape, or other devices shall not be used to try and get around these basic requirements.

3.2 BACK BOXES

3.2.1. Any time fire alarm speakers are to be installed, a 4-square deep box with extension ring shall be installed to limit potential damage to wiring.

3.2.2. Manual pull stations shall be located on walls such that tamper resistant covers can be installed as may be indicated, or in the future. Therefore, a 3-inch clearance from other switches, window openings, door frames, etc. shall be provided on each side of a manual pull station and 4 inches clear area above and below the manual pull station.

3.3 WIRING INSTALLATION

3.3.1. Install wiring according to the following:

3.3.1.1. NECA 1.

3.3.1.2. TIA/EIA 568-A.

3.3.2. Wiring Method: Install wiring in raceway according to Division 16 Section "Raceways and Boxes."

3.3.2.1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

3.3.2.2. Devices need to be included on the circuits as indicated on the approved plans and calculations. Changes will need to be evaluated by the designer. Changes in wire routing may require new calculations.

3.3.2.3. Raceway system shall be minimum 3/4" EMT Type.

3.3.2.4. Paint all fire alarm fire alarm junction boxes and covers red in unfinished areas. In exposed ceiling areas, conduit shall be painted to match surroundings with the inside cover of the junction boxes identified as Fire Alarm and 3/4 inch red bands provided on the conduit every 10 feet on center and at each side of a floor, wall, or ceiling penetration.

3.3.3. Unless noted otherwise on the plans, power booster panels shall not be fed from a separate notification power booster panel (daisy chained).

3.3.4. Each floor of a building shall incorporate an isolation module on signaling and notification circuits. Such isolation module shall prevent any fault on a floor from affecting any other building floor. This same concept shall apply to isolate individual buildings when applicable.

3.3.5. Each circuit entering or exiting the building shall be protected with surge protection. This includes 24vdc, 120vac, and telephone circuits serving the fire alarm system.

3.3.6. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.3.7. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

3.3.8. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

3.3.9. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the FMCP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.4 IDENTIFICATION

3.4.1. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Electrical Identification."

3.4.2. Each conductor shall be identified as shown on the drawings at each end and at terminal points with wire markers. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.

3.4.3. Install instructions frame in a location visible from the FMCP.

3.4.4. Paint power-supply disconnect switch red and label "FIRE ALARM."

3.5 GROUNDING

3.5.1. Ground the FMCP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FMCP.

3.6 Field Quality Control

3.6.1. Contractor Pre-Testing and Record of Completion Testing

3.6.1.1. This section covers contractor pre-testing and documentation by the installing contractor that shall be conducted before any commissioning inspection or AHJ testing is scheduled.

3.6.1.2. Wiring runs shall be tested for continuity, short circuits and grounds before any system devices are installed or energized.

3.6.1.3. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.

3.6.1.4. Duct and HVAC detectors shall not be installed or in-place when the HVAC systems are first turned on. All HVAC systems shall be run sufficiently to remove loose dust and debris. Failure to protect detectors may result in detector replacement per this specification.

3.6.1.5. Audibility testing shall not be conducted until all doors, windows, walls, ceilings, and carpeting are in place.

3.6.1.6. All Alarm Initiating Devices shall be observed and logged for correct zone and sensitivity. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the initials of the installing technician and date.

3.6.1.7. Computer/labeler generated labels with the address number only may be installed on the exterior of the device as long as the background is clear and installed in a quality manner. This will assist in the inspection, testing, maintenance, and trouble-shooting of the system.

3.6.1.8. All Smoke detectors shall be commissioned using canned smoke or a method that will functionally test the smoke chamber. The use of Magnets for commission testing of smoke detectors is Strictly Prohibited.

3.6.1.9. A systematic record shall be maintained of all readings using schedules or charts of tests and measurements. Areas shall be provided on the logging form for readings, dates and witnesses.

3.6.1.10. Air velocity readings shall be taken and recorded for each HVAC related smoke detector.

3.6.1.11. The installing contractor shall make instruments, tools and labor required to conduct the system tests available.

3.6.1.12. The following equipment shall be a minimum for conducting the tests:

a. Ladders, scaffolds, or lifts as required to access all installed equipment.

b. Multimeter for reading voltage, current and resistance.

c. Two way radios, flashlights, screwdrivers, measuring tapes.

d. A manufacturer recommended device for measuring airflow through air duct smoke detector sampling assemblies.

e. Calibrated decibel meter.

3.6.2. At minimum the following tests shall be conducted and documented.

3.6.2.1. Turn each sprinkler system flow valve two full turns and verify proper supervisory alarm at the FMCP.

3.6.2.2. Verify activation of all flow switches under approved flowing conditions.

3.6.2.3. Open initiating device circuits and verify that the trouble signal actuates.

3.6.2.4. Open and short signaling line circuits and verify that the trouble signal actuates.

3.6.2.5. Open and short Notification Appliance Circuits and verify that trouble signal actuates.

3.6.2.6. Ground all circuits and verify response of trouble signals.

3.6.2.7. Check presence and audibility of tone throughout building spaces. This includes measuring dBA levels.

3.6.2.8. Check installation, supervision, and operation of all intelligent smoke detectors using the Walk Test feature.

3.6.2.9. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FMCP and the correct activation of the control points.

3.6.2.10. Each notification appliance circuit shall be tested under standby/battery power. End-of-line voltage readings shall be taken at the end-of-line resistor for Class "B" circuits, or at the booster panel for Class "A" circuits. Any circuit that measures less than 20 volts dc or the nameplate voltage, whichever is higher, shall be considered as failing the design. Note: Some systems incorporating synchronizing modules can impair results. If the module cannot be bypassed for voltage readings, the manufacturer should be contacted for guidance.

3.6.2.11. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.7 ACCEPTANCE TESTING

3.7.1. This section details criteria for commissioning inspections by AHJ's and the owner.

3.7.1.1. This stage of testing shall not be scheduled or conducted until all pre-testing has been completed and is in compliance with applicable requirements.

3.7.1.2. A signed Record of Completion shall be provided to the inspector prior to starting this testing.

3.7.1.3. The contractor is responsible for testing all components in accordance with the manufacturers required and suggested procedures and in accordance with NFPA 72. If this specification incorporates a detailed Acceptance Test Procedure (ATP) prepared by the engineer than it shall also be followed.

3.7.1.4. A program matrix shall be provided by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input.

3.7.1.5. The commissioning inspector shall use the system record drawings and other documents specified under this specification during the testing procedure to verify operation as programmed. In conducting the commissioning test, the inspector shall request demonstration of any or all input and output functions.

3.7.1.6. All Smoke detectors shall be commissioned using canned smoke or a method that will functionally test the smoke chamber. The use of magnets for commission testing of smoke detectors is strictly prohibited, unless otherwise approved by the authority having jurisdiction.

3.7.1.7. New detectors that show to be dirty through system sensitivity testing shall be replaced.

3.7.1.8. The items tested shall include but not be limited to the following:

a. System wiring shall be tested to show the following results and the systems subsequence operation:

(1) Open, Shorted or Grounded Circuits.

(2) Primary and Battery power disconnected.

(3) End-of-line voltage readings on notification circuits.

b. System notification circuits and appliances operate as programmed. Audibility and visual levels meet required standards.

c. A minimum of 15 dBA above ambient shall be obtained in every occupiable space (throughout) per NFPA 72. This includes storage rooms, electrical rooms, telephone rooms, and any other occupiable space.

d. System shall demonstrate the correct messages at the FMCP and any remote annunciator.

e. System off-site reporting shall be verified for alarm, supervisory, trouble, correct address, facility name, contact phone number, and contact name.

f. System shall be tested for stand-by battery backup as outlined in this specification.

3.8 FINAL DOCUMENTATION

3.8.1. System documentation shall be supplied to the owner and shall include but not be limited to the following:

3.8.1.1. System record (as-built) drawings and wiring details including one set of reproducible drawings, and a CD ROM with copies of the record drawings in AUTOCAD .dwg format, or .dxf format for use in a CAD drafting program.

3.8.1.2. System Operating, Installation and Maintenance Manuals.

3.8.1.3. System matrix showing input signals to output commands.

3.8.1.4. Provide a copy of the FMCP system programming on a CD-ROM.

3.8.2. A copy of all above materials and documentation shall be provided in the as-built plan cabinet.

3.8.3. The installation contractor shall provide the owner with account information, phone numbers, passwords, and terms/conditions of the monitoring company.

3.9 FINAL SYSTEM TRAINING

3.9.1. The installation contractor shall familiarize the owner and/or owner representative with location of all fire alarm panels, modules, devices, wire routing, and plan cabinet contents.

3.9.2. The installation contractor shall furnish training as follows:

3.9.2.1. A simplified training manual on system operation unique to the system shall be prepared and presented to the owner. This manual shall cover key items and day-to-day operation. Such manual shall be presented in a professional and legible format such as that provided through use of a Microsoft PowerPoint, or Microsoft Word.

3.9.2.2. The owner shall be provided with at least 3 hard-copies and an electronic format that can be edited through commonly available software.

3.9.2.3. The training program shall be presented such that the owner can readily train new staff over the life of the system.

3.9.2.4. Training in the receipt, handling and acknowledgment of alarms. This shall include emphasis that alarms shall not be silenced until after a complete and thorough investigation has been conducted. If there is a hazard, then only the fire department is authorized to silence an alarm.

3.9.2.5. Sequence of operation for all interconnected systems.

3.9.2.6. Training in the system operation including manual control of output functions from the system control panel.

3.9.2.7. The total training requirement shall be a minimum of 2 hours, but shall be sufficient to cover all items specified. The contractor shall provide two such training sessions.

3.10 ADJUSTING AND FOLLOW-UP

3.10.1. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to project outside normal occupancy hours for this purpose.

3.10.2. Follow-Up Tests and Inspections: After date of Substantial Completion, test the fire alarm system complying with testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for three monthly, and one quarterly, periods. The owner shall be encouraged to participate in these services. Following training outlined within this specification, the owner should be considered qualified for monthly and quarterly tests and inspection of the system.

3.10.3. Annual Test and Inspection: Eleven months after date of Substantial Completion, test the fire alarm system complying with the testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for monthly, quarterly, semiannual, and annual periods. Use forms developed for initial tests and inspections. The owner should be encouraged to participate in these services as reinforcement of system operability.

3.11 WARRANTY AND SERVICES

3.11.1. The contractor shall warranty the entire system for electrical and mechanical failures for a period of one year. The warranty shall begin with the completion of the commissioning testing or when beneficial use to the owner is determined and so documented.

3.11.2. If a commissioning test for an AHJ has been scheduled and is cancelled without sufficient notice to modify a travel schedule without financial penalties, or the system fails to pass all requirements of this specification resulting in a re-inspection, the AHJ reserves the right to bill the contractor for expenses incurred as a result thereof. Such expenses may include travel, transportation, lodging, meals, and daily wages. Daily wages shall not exceed $800 per day.

END OF SECTION 13851

CONSTRUCTION ISSUE

SECTION 13853

MASS NOTIFICATION SYSTEM

PART 1- GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.1.2. The design of this Mass Notification system incorporates specific components beyond that required for a fire alarm system, but will be combined with the fire alarm system as required per UFC 4-021-01 for Navy Installations.

1.2 SUMMARY

1.2.1. The United States Military has developed provisions for Mass Notification of personnel in the event of threats other than fire. Threats could vary from land attacks, sea attacks, chemical attacks, radiological attacks, and others.

1.2.2. The system components, supervision, and basic installation practices shall comply with criteria outlined in NFPA 72 and the Americans with Disabilities Act.

1.3 DEFINITIONS

1.3.1. FMCP: Combined Fire alarm / mass notification control panel.

1.3.2. UFC: Unified Facilities Criteria.

1.3.3. LED: Light-emitting diode.

1.3.4. NICET: National Institute for Certification in Engineering Technologies.

1.3.5. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.3.6. AHJ: Authority Having Jurisdiction is an individual responsible for review, inspection, and/or approval of a system and shall include the building official, fire marshal, engineer, architect, or owner's insurance representative. For this project, the AHJ shall be NAVFAC Fire Protection Engineer and NSA Annapolis Fire Chief.

1.4 REFERENCES

1.4.1. Military Documents:

1.4.1.1. UFC 3-600-01 Fire Protection Engineering For Facilities

1.4.1.2. UFC 3-600-10N Fire Protection Engineering

1.4.1.3. UFC 3-600-02 Inspection, Testing, and Maintenance of Fire Protection Systems

1.4.1.4. UFC 4-021-01 Mass Notification Systems For Facilities

1.4.2. National Fire Protection Association (NFPA):

1.4.2.1. NFPA 70 National Electrical Code

1.4.2.2. NFPA 72 National Fire Alarm Code

1.4.3. Underwriters' Laboratories, Inc. (UL): Appropriate UL equipment standards:

1.4.3.1. UL 864 Control Panels.

1.4.3.2. UL 38 Manually Actuated Signaling Boxes.

1.4.3.3. UL 1971, Standard for Visual Signaling Appliances.

1.4.4. State and Local Building Codes as adopted and/or amended by The Authority Having Jurisdiction (AHJ).

1.4.5. ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.

1.5 SYSTEM DESCRIPTION

1.5.1. Mass notification is the capability to provide real-time information to all building occupants or personnel in the immediate vicinity of a building during emergency situations. To reduce the risk of mass casualties, there must be a timely means to notify building occupants of threats and what should be done in response to those threats. Pre-recorded and live voice emergency messages are required to provide this capability.

1.5.2. Failure of either the mass notification control panel or the fire alarm control panel shall still provide for a minimum means of occupant notification by the remaining system.

1.5.3. The mass notification panel shall be interfaced with the building Public Address and Music System, where provided, for the delivery of alert tones and voice messages. Tones and voice messages initiated by the mass notification panel shall mute all other programs such as music, paging or prerecorded commercial announcements.

1.5.4. All equipment furnished shall be new and the latest state of the art products by manufacturers, engaged in the manufacturing and sale of analog fire detection and/or UL listed communication devices for over five years.

1.5.5. The system as specified is subject to review, full testing, and approval by each of the Authorities Having Jurisdiction, and shall be turned over to the owner in an operational condition.

1.5.6. The contractor shall provide a representative as requested for project meetings such as to assist in coordination of crafts.

1.6 POST CONTRACT MAINTENANCE

1.6.1. Refer to Section 13851, “Fire Alarm System”, for Post Contract Maintenance.

1.7 PERFORMANCE REQUIREMENTS

1.7.1. Comply with all referenced documents.

1.7.2. Mass Notification initiation shall be by one or more of the following devices:

1.7.2.1. Signal from base-wide mass notification system.

1.7.2.2. Switches located with the main and any remote microphones

1.7.3. Mass Notification activation shall initiate the following actions:

1.7.3.1. Display action initiated on the mass notification panel.

1.7.3.2. Initiate the appropriate alert tone and pre-recorded message for the respective alert switch activated.

1.7.3.3. Activate the mass notification strobes throughout the building.

1.7.3.4. Mass notification shall have alert priority over fire alarm system signals. Thus, if fire alarm is also in alarm state, the fire alarm audible message shall stop during the mass notification messages. Combined fire alarm / mass notification strobes will continue to flash.

1.7.3.5. Mass notification signals shall not be displayed as alarm conditions. Text descriptions shall clearly indicate appropriate condition.

1.7.3.6. Transmit the signal to the monitoring station.

1.7.4. Supervisory signal initiation shall be by one or more of the following devices or actions:

1.7.4.1. Display the origin of the supervisory condition report at the local fire alarm control panel and/or mass notification panel.

1.7.4.2. Activate supervisory audible and dedicated visual signals.

1.7.4.3. Provide a means for silencing a supervisory signal shall be permitted only if it is key-operated, located in a locked enclosure, or arranged to provide equivalent protection against unauthorized use. Such a means shall be permitted only if it transfers the supervisory indication to a lamp or other visible indicator and subsequent supervisory signals in other zones cause the supervisory notification appliance(s) to re-sound.

1.7.4.4. Record within system history the initiating device and time of occurrence of the event.

1.7.4.5. Transmit the signal to the monitoring station.

1.7.5. System trouble signal initiation shall be by one or more of the following devices or actions:

1.7.5.1. Display at the local fire alarm control panel and or mass notification panel the origin of the trouble condition report.

1.7.5.2. Activate trouble audible and visual signals at the control panels and as indicated on the drawings.

1.7.5.3. Silence audible signals via a trouble acknowledge switch.

1.7.5.4. Trouble reports for primary system power failure to the master control shall be optionally delayed for a period of time not greater than 200 seconds. Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and not require operator intervention. This feature shall be software selectable and shall not preclude the logging of trouble events to the historical file.

1.7.5.5. Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event.

1.7.5.6. Transmit the signal to the monitoring station.

1.7.6. System Trouble and Supervisory Signal Actions: Initiate audible and visual signals at the main panels and remote annunciators.

1.7.7. Power and Voltage Limitations:

1.7.7.1. Battery capacity calculations. Battery size shall be a minimum of 125% of the calculated requirement.

1.7.7.2. Power supplies shall be sized to furnish the total connected load in a worst-case condition plus 25% spare capacity. (i.e. 4A supply x .25 spare = 1A reserve.)

1.7.7.3. Voltage drop calculations for wiring runs demonstrating worst-case condition. Unless otherwise approved by the engineer, voltage drop calculations shall be performed using the Lump-Sum approach. Calculations must include and clearly indicate wire length out and back to panel. Calculations shall be provided for horn, strobe, and speaker circuits.

1.7.7.4. Device current values for voltage calculations shall be based on the lowest nameplate voltage. (i.e. current values at a voltage of 20 volts shall be used when available rather than current values for 24 volts.)

1.7.7.5. Notification Appliance Circuit (NAC) design shall incorporate a 25% spare capacity for future expansion.

1.7.7.6. End-of-line voltage reading will be required for each circuit and must have a 25% spare capacity. (i.e. 24V circuit – 21V nameplate = 3 volt drop x 0.25 spare = 0.75 volt safety factor required.)

1.7.7.7. In no case shall horn/strobe circuits be designed or measured to have an end-of-line voltage below 20 volts or the manufactures nameplate voltage, whichever is higher.

1.7.8. Notification zones and circuits shall be defined and configured such that organizational zones within a building can be isolated for zone evacuation, and/or isolation during testing conditions.

1.8 SUBMITTALS

1.8.1. Comply with submittal requirements in Section 13851, Fire Alarm System.

1.9 QUALITY ASSURANCE

1.9.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.9.2. Qualifications: See Section 13851, Fire Alarm System, for qualification requirements.

1.10 PROJECT CONDITIONS

1.10.1. See Section 13851, Fire Alarm System, for criteria.

1.11 SEQUENCING AND SCHEDULING

1.11.1. See Section 13851, Fire Alarm System, for criteria.

PART 2- PRODUCTS

2.1 MANUFACTURERS

2.1.1. See Section 13851, Fire Alarm System for criteria.

2.2 MASS NOTIFICATION COMPONENTS

2.2.1. Control Panel:

2.2.1.1. The system shall be a multi channel voice evacuation system incorporating user selectability of 8 distinct sounds for tone signaling, and the incorporation of a digital voice module for prerecorded messaging. The system shall incorporate microphone override. The system shall have the capability of utilizing a remote microphone station with redundant controls of the evacuation system control panel.

2.2.1.2. A hand held microphone shall be provided and, upon activation, shall take priority over any tone signal, recorded message or remote microphone operation in progress, while maintaining the strobe NAC Circuits activation.

2.2.1.3. The system shall be capable of interconnection with a larger campus/base wide notification system that includes operation from a central communication center and an outdoor public notification system provided by the same manufacturer.

2.2.1.4. Shall be capable of remote functions via a RS-232 or RS-485 interface.

2.2.2. Circuits:

2.2.2.1. Signaling Line Circuits: NFPA 72, Class A, Style 6.

2.2.2.2. Notification-Appliance Circuits: NFPA 72, Class A for speakers, Class A for strobes.

2.2.2.3. Actuation of alarm notification appliances including emergency voice communications shall occur within 10 seconds after the activation of an initiating device.

2.2.2.4. Electrical monitoring for the integrity of wiring external to the mass notification panel.

2.2.2.5. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.

2.2.2.6. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the mass notification panel and remote annunciators, after initiating devices are restored to normal.

2.2.2.7. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.

2.2.2.8. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.

2.2.2.9. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.

2.2.3. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. If testing ceases while in walk-test mode, after a preset delay, the system shall automatically return to normal.

2.2.4. Remote Microphone:

2.2.4.1. System shall be capable of adding up to three (3) remote microphones.

2.2.4.2. The Remote Microphone station shall be compatible with any Dual-Circuit Supervised Audio, Fire and Emergency Evacuation System.

2.2.4.3. The unit shall incorporate a Push-To-Talk (PTT) microphone, redundant controls and system status indicators of/for the system.

2.2.4.4. The unit shall incorporate microphone override of any tone generation or prerecorded messages.

2.2.4.5. The unit shall be fully supervised from the control panel.

2.2.4.6. The unit shall be made of steel and be flush mounted to a standard 4-gang electrical box.

2.2.4.7. The unit shall come equipped with a keyed lock that, when activated allows the use of the unit. The locking arrangement shall be identical to the control unit. The unit shall be painted red. The unit shall have a weight of 1 Lb., 8 oz. and its' dimensions shall be 5"H x 9"W x .5"D. The unit shall have a 3 YEAR WARRANTY.

2.2.4.8. The approvals for this unit shall include: UL Standard 864, FCC Part 15.

2.2.5. Function of Amplifier:

2.2.5.1. Indicated number of alarm channels for automatic, simultaneous transmission of different announcements to different zones, or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall be UL 1711 listed.

2.2.5.2. Allow the application of and evacuation signal to indicated number of zones.

2.2.5.3. Programmable tone and message sequence selection.

2.2.5.4. Standard digitally recorded messages for "Evacuation" and "All Clear."

2.2.5.5. Generate tones to be sequenced with audio messages of the type recommended by NFPA 72 and that are compatible with tone patterns of the notification-appliance circuits of the FMCP.

2.2.5.6. Status Annunciator: Indicate the status of various voice/alarm speaker zones. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

2.2.6. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal, and supervisory and digital alarm communicator transmitter shall be powered by the 24-V dc source.

2.2.6.1. The alarm current draw of the mass notification system shall not exceed 80 percent of each respective power-supply module ratings.

2.2.6.2. Power supply shall have a dedicated fused safety switch for this connection at the service entrance equipment. Provide a red label at circuit breakers and identify it with "FIRE ALARM/MASS NOTIFICATION SYSTEM."

2.2.7. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.

2.2.7.1. Batteries: Sealed lead calcium.

2.2.7.2. Battery and Charger Capacity: Comply with NFPA 72.

2.2.7.3. Provide minimum 72 hours standby and 15 minutes alarm back-up power.

2.2.8. Surge Protection:

2.2.8.1. Install surge protection on normal ac power for the control panel, each power supply, and all accessories. Comply with Division 16 Section "Transient Voltage Suppression" for auxiliary panel suppressors.

2.2.8.2. Install surge protectors recommended by control panel manufacturer. Install on all system wiring external to the building housing the control panel. This shall include power, telephone, and radio transmitter wiring.

2.2.9. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.3 NOTIFICATION APPLIANCES

2.3.1. Description: Equipped for mounting as indicated and with screw terminals for system connections.

2.3.1.1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.

2.3.2. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on a white trim faceplate. There shall be no wording on this strobe or trim.

2.3.2.1. Rated Light Output: As indicated on the Drawings

2.3.2.2. Strobe Leads: Factory connected to screw terminals.

2.3.3. Manufacturer shall provide wall mount devices and ceiling mount devices. Devices shall be installed as indicated on drawings.

2.3.4. Voice/Tone Speakers:

2.3.4.1. UL 1480 listed.

2.3.4.2. Range Units: Rated .1/8, 1/4, 1/2, 1, 2 watts at 70-volts.

2.3.4.3. Mounting: Flush; bi-directional.

2.3.4.4. Matching Transformers: Tap range matched to the acoustical environment of the speaker location.

2.3.4.5. Device shall be capable of multiple alert tones as indicated on plans or as required by the respective military facility.

2.3.4.6. Exterior mass notification appliances shall be UL listed outdoor speakers with sealed back speaker construction. Surface or flush mount speakers to outdoor back boxes on the exterior of the building where shown on the Drawings. Provide white vandal resistant die cast grilles. Wheelock Series ET-1010 or equal.

2.4 MAGNETIC DOOR HOLDERS

2.4.1. When magnetic door holders are provided, refer to Section 13851 for additional information.

2.4.2. Activation of the mass notification system shall release all magnetic hold opens within the building. Such release shall not be by zone as a chemical release can not be detected by zoned detection devices.

2.5 REMOTE ANNUNCIATOR

2.5.1. Trouble and supervisory conditions with the mass notification circuits shall be indicated on the fire alarm control panel and remote annunciators.

2.6 REMOTE COMMUNICATIONS

2.6.1. Mass notification panel shall be capable of integration with a site-wide wireless communication system UL listed for emergency notification.

2.7 WIRE AND CABLE

2.7.1. Wire and cable for mass notification systems shall be UL listed and labeled as complying with NFPA 70, Article 760 and shall be in accordance with requirement of Section 13851, Fire Alarm System.

2.7.2. Provide all necessary equipment and software to connect to the existing Federal Signal site wide mass notification system.

2.8 REMOTE LED TEXT DISPLAY

2.8.1. An LED text display shall be provided at locations as shown on the drawings. The LED text display shall be at least 2 lines with a minimum of 20 characters per line. The size shall not exceed 16” length by 6” height by 3” deep. The text display shall as a minimum meet the following requirements.

2.8.1.1. Two Lines of information for high priority messaging.

2.8.1.2. Minimum of 20 characters per line (40 total) displayed.

2.8.1.3. Text shall be no less than 1/2" in height and readable from 1 to 10 feet away.

2.8.1.4. Display shall be wall or ceiling mounted.

2.8.1.5. Mounting brackets for a convenient wall/cubicle mount.

2.8.2. An LED text display shall be provided at locations as shown on the drawings. The LED text display shall have minimum character size of 4" high and shall spell out the words "EVACUATE" and ANNOUNCEMENT". The design of LED text display shall be such that it cannot be read when not illuminated. The LED text display shall be capable of being wall or ceiling mounted.

2.9 AS-BUILT PLAN CABINET

2.9.1. An As-Built plan cabinet shall be installed with every new mass notification system installation or replacement. The purpose of the cabinet is to provide a secured location for all system documentation related to the system. This will aid in future servicing and modifications to the system.

2.9.1.1. The plan cabinet shall be sized and contain approved plans, specifications, manuals, test reports, service reports, computer disk, and a hard copy printout of the system logic/programming.

2.9.1.2. The cabinet shall be located as shown on plans, adjacent to the main control panel, or there shall be signage on the system control panel indicating where the plan cabinet is located.

2.9.1.3. When properly sized, fire alarm and mass notification documents may be kept in the same cabinet. There shall be room for future documentation such as inspection and testing reports or system expansions.

2.9.2. The cabinet shall be neatly and clearly labeled "As Built Drawings" and shall be equal to the DBX As Built Cabinets manufactured by Space Age Electronics.

PART 3- EXECUTION

3.1 EQUIPMENT INSTALLATION

3.1.1. Notification equipment shall be installed and mounted in accordance with design documents and specific mounting details.

3.1.2. Control panels shall be mounted in a neat, orderly, and space-limiting manner. Details in drawings shall be used as a guide and represent allotted space.

3.1.3. No portion of a mass notification system shall be installed prior to having plans on site that have been reviewed, approved, and stamped by the appropriate reviewing agency and/or AHJ. This includes wiring. Approved stamped plans shall be on site at all times while the system is in the installation stage.

3.2 BACK BOXES

3.2.1. All speakers are to be installed in at least a 4-inch square deep box with extension ring to limit potential damage to wiring.

3.2.2. 5" Square Boxes 2-7/8" x 5" (67 cubic inch) deep metal box with a 5" extension ring shall be allowed. If used, careful consideration in the centering of finished devices is required due to larger box size when mounted to studs.

3.3 WIRING INSTALLATION

3.3.1. Wiring shall be installed in accordance with Section 13851, Fire Alarm System.

3.4 IDENTIFICATION

3.4.1. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Electrical Identification."

3.4.2. Each conductor shall be identified as shown on the drawings at each end and at terminal points with wire markers. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.

3.5 GROUNDING

3.5.1. Ground the FMCP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the mass notification control panels.

3.6 FIELD QUALITY CONTROL

3.6.1. Contractor Pre-Testing and Record of Completion Testing shall be conducted prior to scheduling commission testing and shall comply with criteria in Section 13851.

3.7 ACCEPTANCE TESTING

3.7.1. System commission testing shall be conducted per criteria in Section 13851.

3.7.2. Testing shall include the initial activation of the fire alarm system and then a subsequent and sequential activation of the mass notification system. This sequence shall be reversed. System function shall comply with criteria of this Section.

3.7.3. System commission testing shall verify that the criteria outlined in this specification are complied with.

3.8 FINAL DOCUMENTATION

3.8.1. Final documentation shall be submitted following the criteria in Section 13851, Fire Alarm System.

3.9 FINAL SYSTEM TRAINING

3.9.1. Very detailed system training shall be provided to the owner following the criteria in Section 13851, Fire Alarm System.

3.10 ADJUSTING AND FOLLOW-UP

3.10.1. Mass notification system adjusting, inspection, and testing shall comply with the criteria in Section 13851, Fire Alarm System.

3.11 WARRANTY AND SERVICES

3.11.1. The contractor shall warranty the entire system for electrical and mechanical failures for a period of one year. The warranty shall begin with the completion of the commissioning testing or when beneficial use to the owner is determined and so documented.

3.11.2. The combined fire alarm / mass notification control panel shall have a 3-year manufacturer warranty.

3.11.3. If a commissioning test for an AHJ has been scheduled and is cancelled without sufficient notice to modify a travel schedule without financial penalties, or the system fails to pass all requirements of this specification resulting in a re-inspection, the AHJ reserves the right to bill the contractor for expenses incurred as a result thereof. Such expenses may include travel, transportation, lodging, meals, and daily wages. Daily wages shall not exceed $800 per day.

END OF SECTION 13853

CONSTRUCTION ISSUE

SECTION 13997

COMMISSIONING SPECIAL CONSTRUCTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
1. Division 13 responsibilities in the commissioning process.
2. Commissioning Intrusion Detection Systems.
3. Commissioning Video Surveillance Systems.
4. Commissioning Cold Storage Rooms and Doors.
5. Commissioning Fire Alarm Systems.
6. Commissioning Building Automation and Control Systems

B. Related Sections
1. Section 01810 - Commissioning Requirements.

1.2 DEFINITIONS

A. CA: Commissioning Agent.

B. CO: Contracting Officer.

C. GC: Contractor; General Contractor, not a Subcontractor.

D. O&M: Operations and Maintenance.

E. QC: Contractor's Quality Control Manager.

F. TI: Technical Inspector

1.3 DESCRIPTION

A. This Section describes commissioning requirements applicable to commissioned items and systems specified in Division 13 to ensure that all systems are operating in a manner consistent with the Contract Documents.

B. Conform to commissioning requirements and the commissioning plan.

1.4 RESPONSIBILITIES - GENERAL

A. Construction and Acceptance Phases
1. Include the cost of commissioning in the contract price.
2. In each purchase order or subcontract written, include requirements for submittal data, O&M data and training.
3. Conduct a commissioning scoping meeting and other meetings necessary to facilitate the Commissioning process.
4. Provide requested documentation to the TI, developed for functional testing procedures.

5. Provide functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
6. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the prefunctional checklists for all commissioned equipment. Submit to QC for review prior to startup. TI will verify plan for compliance. Refer to Section 01810 for further details related to start-up.
7. During the startup and initial checkout process, execute the prefunctional checklists for all commissioned equipment.
8. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the QC and TI.
9. Correct system deficiencies before functional testing.
10. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
11. Provide all test equipment necessary to fulfill specified testing requirements.
12. Assist the CA and TI in interpreting the monitoring data, as necessary.
13. Perform functional performance testing under the direction of the CA for specified equipment. Assist the CA in interpreting the monitoring data, as necessary.
14. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, TI and A/E and retest the equipment.
15. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
16. During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing). Prepare red-line as-built drawings for all drawings and final as-builts for contractor-generated coordination drawings.
17. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

B. Operation Manuals shall include:
1. A table of all addresses, setpoints and similar information and the implications when changing them.
2. Schedules.
3. Instructions for operation of each piece of equipment for emergencies.
4. Startup and shutdown.
5. Recommendations for recommissioning frequency by equipment type.

C. Warranty Period
1. Execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
2. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

1.5 SPECIAL RESPONSIBILITIES - FIRE SUPPRESSION CONTRACTOR

A. The responsibilities of the fire suppression contractor, during construction and acceptance phases in addition to those listed in Paragraph A, above, are:
1. Provide submittals as required by A/E and those listed on the pre-functional test sheets.
2. During the startup and initial checkout process, execute the fire suppression-related portions of the prefunctional checklists for all commissioned equipment.
3. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 STARTUP

A. Contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section and in 01810. Division 13 has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the Commissioning Agent, Technical Inspector, or Government.

B. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems, or sub-systems at the discretion of the PM and GC. Beginning system testing before full completion, does not relieve the Contractor from fully completing the system, including all prefunctional checklists as soon as possible.

3.2 OPERATIONS AND MAINTENANCE (O&M) MANUALS

A. The following O&M manual requirements do not replace O&M manual documentation requirements elsewhere in these specifications.

B. Division 13 shall compile and prepare documentation for all commissioned systems covered in Division 13 and deliver this documentation to the GC for inclusion in the O&M manuals prior to the training of Government personnel.

3.3 TRAINING OF GOVERNMENT PERSONNEL

A. The GC shall be responsible for training coordination and scheduling to ensure that training is completed.

B. The QC shall be responsible for reviewing the content and adequacy of the training of Government personnel for commissioned equipment or systems. TI will verify compliance.

C. Each systems Subcontractor shall have the following training responsibilities:
1. Provide the TI with a training plan four weeks before the planned training.
2. Provide designated Government personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of commissioned equipment or system.
3. Training shall start with classroom sessions, if necessary, followed by hands on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer’s representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.

6. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
7. Training shall include:
   a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
   b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
   c. Discussion of relevant health and safety issues and concerns.
   d. Discussion of warranties and guarantees.
   e. Common troubleshooting problems and solutions.
   f. Explanation of information included in the O&M manuals.
   g. Discussion of any peculiarities of equipment installation or operation.
   h. Classroom sessions shall include the use of overhead projections, slides, video and audio taped material as might be appropriate.
8. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and maintenance of all pieces of equipment.
9. Fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
10. Training shall occur after functional testing is complete, unless approved otherwise by the Project Manager.
11. Minimum Duration of Training. Subcontractor shall provide 8 hours of training.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15010

GENERAL PROVISIONS - MECHANICAL

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. General administrative and procedural requirements for the mechanical installations.

1.1.2. Related Sections:

a. General Provisions of the contract, including the following, shall apply to Division 15 Specification Sections: Solicitation Documents and Division 1.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable.

a. All work must be performed in accordance with the requirements of current editions of local, county, state and national codes and regulations including the requirements of the following:

(1) International Building Code.
(2) National Electrical Code.
(3) International Plumbing Code.
(4) International Mechanical Code.
(5) Occupational Safety and Health Act. of 1970
(6) For work not specifically listed above, use standards and codes of the National Fire Protection Association.

1.3 REGULATORY REQUIREMENTS

a. All equipment, apparatus and systems shall be rated, tested, fabricated and/or installed in accordance with the latest issue of the applicable industry standard mentioned. The following list will serve to clarify abbreviations that appear in other sections of this specification:

(1)	AABC	Associated Air Balance Council
(2)	ADC	Air Diffusion Council
(3)	AGA	American Gas Association.
(4)	AMCA	Air Moving and Conditioning Association
(5)	ARI	Air Conditioning and Refrigeration Institute
(6)	ANSI	American National Standards Institute
(7)	ASE	Association of Safety Engineers

(8)	ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineer
(9)	ASME	American Society of Mechanical Engineers
(10)	AWWA	American Water Works Association
(11)	EPA	Environmental Protection Agency
(12)	FS	Federal Specifications
(13)	IBR	Institute of Boiler and Radiator Manufacturers
(14)	IEEE	Institute of Electrical and Electronics Engineers
(15)	MCAA	Mechanical Contractors' Association of American
(16)	NEMA	National Electrical Manufacturers Association
(17)	NFPA	National Fire Protection Association
(18)	NSC	National Safety Council
(19)	NSF	National Sanitation Foundation
(20)	SBI	Steel Boiler Institute Industry
(21)	SMACNA	Sheet Metal and Air Conditioning Contractors National Association
(22)	UL	Underwriters Laboratories
(23)	ASTM	American Society for Testing and Materials.
(24)	NEBB	National Environmental Balancing Bureau.

1.4 DEFINITIONS

a. FURNISH: The term furnish means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation and similar operations.

b. INSTALL: The term install describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.

c. PROVIDE: The term provides means to furnish and install, complete and ready for intended use.

1.5 SHOP DRAWINGS AND SUBMITTALS

a. See Section 01400 for requirements for shop drawings and product data.

b. Asbestos-Free Material/Product: Prior to approval of the material/product to be used, the manufacturer/supplier shall furnish the Contracting Officer/Government's Designated Inspector with written certification that the material/product contains no asbestos. This certificate is mandatory before approval will be issued. Submittals furnished without the asbestos-free certification will be returned to the Contractor with no action taken until such certification is provided.

c. See applicable sections to this Division for items requiring shop drawings.

1.6 MATERIALS AND WORKMANSHIP

a. Materials, the style, make or quality of which is specifically designated, shall be as specified.

b. Contractor shall furnish necessary materials in ample quantities and as frequently as required to avoid delay in the progress of the Work, and shall so store them as to prevent interference with other work.

1.7 DEFECTIVE WORK AND MATERIAL

a. All materials or work found to be defective or not in strict conformity with the drawings or different from requirements of the drawings and specifications or defaced or injured through negligence of Contractor or his employees, or through action of fire or weather will be rejected and shall be immediately removed from premises by Contractor and satisfactory materials and work substituted without delay.

b. All defective work or imperfect work shall be corrected immediately on notice from Architect/Engineer. No previous inspection or certificate on account shall be held to relieve Contractor from his obligation to furnish sound materials and to perform good and satisfactory work.

1.8 COOPERATION AND COORDINATION

a. Contractor shall confer with other contractors at the site before installing his work to avoid interferences so that maximum head room and clearances may be maintained. In event that interferences develop between work of various contractors, Architect/Engineer's decision will be final and no additional compensation will be allowed for changes required.

b. Particular attention shall be paid to situations where recessed equipment, pipes and lights occur, or where the work of several trades occurs together above suspended ceilings, in pipe shafts or in areas where space is limited.

c. All fixtures, equipment, devices, switches, outlets, pumps, etc., shall be positioned to avoid all interferences with and to assure proper coordination with work of all other trades, cases, partitions, wall, floor and ceiling patterns, architectural features, etc. All recessed devices, fixtures, etc., shall be coordinated with all wall, floor and ceiling patterns. Architect/Engineer will reconcile conflicts and adjustments where such adjustments are warranted.

1.9 PROTECTION OF EQUIPMENT AND SYSTEMS

a. Contractor shall keep all his respective pipe openings closed by means of plugs or caps to prevent entrance of foreign matter during construction and cover all fixtures, equipment, and apparatus as required to protect them against dirt, water, chemical or mechanical damage both before and after installation. Any such fixtures, equipment or apparatus damaged prior to final acceptance of the Work shall be restored to its original condition or replaced by Contractor at no cost to Owner.

1.10 CONTRACT DRAWINGS

d. The layout shown on the Contract Drawings is necessarily diagrammatic but shall be followed as closely as actual construction and as other work will allow. The dimensions of work as shown on the Contract Drawings are not as-built dimensions. No measurements shall be scaled from the drawings and used as definite dimensions for laying out or fitting work in place.

e. The layout of manufactured equipment as shown on the drawings shall be checked and the exact location shall be determined from the dimensions of equipment shop drawings approved by the Architect/Engineer.

1.11 MAINTENANCE MANUAL AND OPERATING INSTRUCTIONS

a. Upon completion of the Work, Contractors shall provide the Architect/Engineer with six copies of maintenance manual for all equipment furnished and installed under his Work. Manuals shall be assembled in accordance with Section 01720. Manual shall include roster of all Owner training session attendees. The manual shall, however, first be approved by the Architect/Engineer.

b. The manual shall include manufacturer's lubricating and operating instructions and parts list and serial numbers for all operating machinery, including drive information, and motor horsepower, amperage, and voltage readings on all phases, valve chart, sequence of operation, index following the order listed in the specifications, warranties in the name of the Installation, and a list of manufacturers, service firms and subcontractors names and telephone numbers.

c. Training attendance rosters for each training session shall be included in manuals. Roster will identify training subject, date, attendees name, job title, office symbol, grade/rank, and telephone number.

d. All switches, controls, and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and as to operation and shall be tested in the presence of the Architect/Engineer designated representative to ensure that he understands their function and purpose.

e. Upon completion of the Work, Contractors shall put the systems into service. Contractors shall be entirely responsible for the equipment during all testing operations including the lubricating and turning on and off of such apparatus.

1.12 PROJECT RECORD AND CLOSEOUT DOCUMENTS

a. Refer to the Division-1 Section: 01720 Phase Turnover and Contract Closeout for requirements. The following paragraphs supplement the requirements of Division 1.

b. Mark Drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned for column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.

c. Mark Specifications to indicate addenda, approved substitutions, change orders, actual equipment and materials used.

1.13 DELIVERY, STORAGE AND HANDLING

a. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage and handling.

b. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

c. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

1.14 COMMISSIONING

a. All Mechanical, Plumbing, Controls (Sections 15935 and 15971), and TAB Contractors shall comply with the requirements of Section 01810 Commissioning and Section 15997 Commissioning of Mechanical Systems.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 ACCESSIBILITY

a. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
b. Extend all grease fittings to an accessible location.
c. Refer to the Division 8 Section: Access Doors and Frames.

3.2 ROUGH-IN

a. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
b. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.3 MECHANICAL INSTALLATIONS

a. General: sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

(1) Coordinate mechanical equipment and materials installation with other building components.
(2) Verify all dimensions by field measurements.
(3) Arrange for chases, slots, and openings in other building components to allow for mechanical installation.
(4) Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
(5) Sequence, coordinate and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
(6) Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.
(7) Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide maximum headroom possible.
(8) Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
(9) Coordinate the installation of mechanical materials and equipment above ceiling with suspension system, light fixtures, and other installations.
(10) Install access panel or doors where units are concealed behind finished surface. Access panels and doors are specified in Division 8 Section “Access Doors” and Division 15 Section “Basic Mechanical Materials and Methods.”
(11) Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
(12) Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
(13) Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.
(14) Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed expose in finished spaces.

3.4 CUTTING AND PATCHING

a. This Article specifies the cutting and patching of mechanical equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.
b. Refer to Section 01400 for general requirements for cutting and patching.
c. Refer to Division 16 for requirements for cutting and patching electrical equipment, components, and materials.
d. Do not endanger or damage installed Work through procedures and processes of cutting and patching.
e. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.
f. No additional compensation will be authorized for cutting and patching Work that is necessitated by ill-timed, defective, or non-conforming installations.
g. Perform cuttings, fittings, and patching of mechanical equipment and materials required to:

(1) Uncover Work to provide for installation of ill-timed work.
(2) Remove and replace defective work.
(3) Remove and replace Work not conforming to requirements of the Contract Documents.
(4) Remove samples of installed Work as specified for testing.
(5) Upon written instruction from the Architect/Engineer, uncover and restore Work to provide for Architect/Engineer's representative observation of concealed work.

h. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.5 CLEANING

a. Refer to the Division 1 Section: 01720 for general requirements for final cleaning.
b. Refer to Division 15 Section: 15990 TESTING, ADJUSTING, AND BALANCING for requirements for cleaning filters, strainers, and mechanical systems prior to final acceptance.

3.6 COMMISSIONING

a. Accomplish commissioning in accordance with the provisions of Section 01810 Commissioning and Section 15997 Commissioning of Mechanical Systems.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15135

GAGES AND METERS FOR HVAC AND PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Flow meters.
b. Pressure gages and Pressure gage taps.
c. Thermometers and thermometer wells.
d. Filter gages.
e. Temperature and Pressure (T&P) Stations.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and contract Closeout.
d. Section 15410 – Plumbing Piping.
e. Section 15510 - Hydronic Piping.
f. Section 15935 – Building HVAC Systems Controls.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 - Quality Control.
b. ASME B40.1 - Gages - Pressure Indicating Dial Type - Elastic Element.
c. ASME MFC-3M - Measurement of Fluid Flow in Pipes Using Orifice, Nozzle and Venturi.
d. ASTM D2458 - Method of Flow Measurement by The Venturi Motor Tube.
e. ASTM E1 - Standard Specification for ASTM Thermometers.
f. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.
g. ISA RP 3.2 - Flange Mounted Sharp Edged Orifice Plates for Flow Measurement.
h. UL 393 - Indicating Pressure Gauges for Fire-Protection Service.
i. UL 404 - Gages, Indicating Pressure, for Compressed Gas Service.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Submit under provisions of Section 01400.
b. Product Data: Provide manufacturers data and list which indicates use, operating range, total range, accuracy, and location for manufactured components.

c. Operation and Maintenance data.

1.3.2. Submittals At Project Closeout

a. Section 01720 – Phase Turnover and Contract Closeout.
b. Project Record Documents: Record actual locations of components and instrumentation.
c. Include instructions for calibrating instruments. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.4 DELIVERY, STORAGE, AND HANDLING

a. Section 01560 Environmental Protection: Environmental conditions affecting products on site.
b. Do not install instruments when areas are under construction, except for required rough-in, taps, supports and test plugs.

1.5 MAINTENANCE PRODUCTS

a. Section 01720 – Phase Turnover and Contract Closeout.

1.6 EXTRA MATERIALS

a. Section 1720 – Phase Turnover and Contract Closeout.

1.7 ENVIRONMENTAL REQUIREMENTS

a. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 - PRODUCTS

2.1 PRESSURE GAGES

a. Gage: ASME B40.1, UL 393 [UL 404] drawn steel case, phosphor bourdon tube, rotary brass movement, brass socket, front recalibration adjustment, black scale on white background.
b. Case: Steel with brass bourdon tube or Cast aluminum with phosphor bronze bourdon tube.
c. Size: 4-1/2 inch.
d. Dial Size: 4 inch diameter.
e. Mid-Scale Accuracy: Two percent.
f. Scale: Psi.

2.2 PRESSURE GAGE TAPPINGS

2.2.1. Gage Cock:

a. Tee or lever handle, brass for maximum 150 psig.

2.2.2. Needle Valve:

a. Brass, 1/4 inch NPT for minimum 150 psig.

2.2.3. Ball Valve:

a. Brass, 1/8 inch NPT 250 psi.

2.2.4. Pulsation Damper:

a. Pressure snubber, brass with 1/4 inch NPT connections.

2.3 THERMOMETERS

2.3.1. Stem Thermometer: ASTM E1, adjustable angle, red appearing mercury, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.

a. Size: 7 inch scale.
b. Window: Clear glass or Lexan.
c. Stem: Brass, 6 inch 3/4 inch NPT.
d. Accuracy: ASTM E77 2 percent.
e. Calibration: Degrees F.

2.3.2. Dial Thermometer: ASTM E1, stainless steel case, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed lens, stainless steel stem.

a. Size: 3-1/2 inch diameter dial.
b. Lens: Clear Lexan.
c. Accuracy: 1 percent.
d. Calibration: Degrees F.

2.4 THERMOMETER SUPPORTS

a. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain, to be mounted in piping systems.
b. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Section 01400 - Quality Control: Manufacturer's instructions.
b. Install one pressure gage per pump, with taps before strainers and on suction and discharge of pump; pipe to gage with isolating valves.
c. Install pressure gages with pulsation dampers. Provide gage cock, needle valve or ball valve to isolate each gage. Extend nipples to allow clearance from insulation.
d. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

e. Install thermometers in air duct systems on flanges.
f. Install Temperature and Pressure Stations in piping adjacent to controls systems thermostat, transmitter, or sensor sockets.
g. Locate additional Temperature and Pressure Stations where indicated.
h. Install thermometers in ductwork adjacent to thermostats and temperature sensors.
i. Provide instruments with scale ranges selected according to service with largest appropriate scale.
j. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
k. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
l. Locate duct mounted thermometers minimum 10 feet (3 m) downstream of mixing dampers, coils, or other devices causing air turbulence.
m. Coil and conceal excess capillary on remote element instruments.

3.2 SCHEDULES

a. Locate devices where shown on drawings.

b. Pressure Gage Schedule

LOCATION	SCALE RANGE
Cold Water supply to building	0 - 100 psig
Pumps	0 - 100 psig
Pressure reducing valves - at inlet and outlet	0 - 100 psig
Elsewhere as shown on drawings or details	

c. Stem Type Thermometer Schedule - Water Thermometers

LOCATION	SCALE RANGE
Thermostatic Mixing Valves - three required	50 - 250 deg.F
Headers to central equipment	50 - 250 deg.F
Water heaters - inlets and outlets	50 - 250 deg.F
Elsewhere as shown on drawings or details	

END OF SECTION

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SECTION 15140

SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Pipe and equipment hangers and supports.
b. Equipment bases and supports.
c. Sleeves and seals.
d. Flashing and sealing equipment and pipe stacks.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phase Turnover and Project Closeout.
d. Section 03300 - Cast-In-Place Concrete: Equipment bases.
e. Section 15240 - Vibration Isolation and Seismic Restraints
f. Division 16 – Electrical

1.2 QUALITY CONTROL

1.2.1. The following publications for a part of this specification to the extent they are applicable.

a. Section 01400 – Quality Control.
b. ASME B31.1 - Power Piping
c. ASME B31.2 - Fuel Gas Piping
d. ASME B31.5 - Refrigeration Piping
e. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
f. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
g. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
h. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
i. NFPA 13 - Installation of Sprinkler Systems.
j. UL 203 - Pipe Hanger Equipment for Fire Protection Service

1.3 REGULATORY REQUIREMENTS

a. Conform to applicable code for support of plumbing piping.
b. Supports for Sprinkler Piping: In conformance with NFPA 13.
c. Supports for Standpipes: In conformance with NFPA 14.

PART 2 - PRODUCTS

2.1 ACCESSORIES

a. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
b. Beam clamps shall not be of the set screw type unless they also have a positive means of securing the clamp against horizontal movement, i.e. horizontal j-bolt extending to the opposite flange of the beam or joist or similar device.
c. Hanger loads of up to 300 pounds can be applied to the top or bottom chord of a bar joist using a threaded rod between the chord angles with washer and double nuts above and below the chord within 6" of a panel point. Heavier loads require coordination with the joist manufacturer.

2.2 PIPE HANGERS AND SUPPORTS

2.2.1. Plumbing Piping - DWV:

a. Conform to MSS SP58, MSS SP69, MSS SP89.
b. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
c. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
d. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
e. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
f. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
g. Vertical Support: Steel riser clamp.
h. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
i. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.2.2. Plumbing Piping – Water and Natural Gas:

a. Conform to MSS SP58, MSS SP69, MSS SP89.
b. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
c. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
d. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
e. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
f. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
g. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
h. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
i. Vertical Support: Steel riser clamp.
j. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
k. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
l. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.3 INSERTS

a. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
b. Self drilling expansion anchors, powder driven anchors, or other similar devices shall be applied in

accord with their manufacturers published ratings and instructions.

2.4 FLASHING

a. Metal Flashing: 26 gage galvanized steel.
b. Metal Counterflashing: 22 gage galvanized steel.

2.5 EQUIPMENT CURBS AND ROOF MOUNTING RAILS

a. Fabrication: Welded 18 gage (1.2 mm) galvanized steel shell and base, mitered 3 inch (75 mm) cant, variable step to match roof insulation, 1-1/2 inch thick insulation, factory installed wood nailer, 14" minimum height, higher where noted. Vary height of curbs and rails to compensate for roof pitch and make top of curb level.
b. For piping penetration curbs, provide a curb cap with tapered neoprene pipe flashing sleeves and stainless steel drawbands.
c. Construct to meet the wind loading criteria on structural drawings.

2.6 SLEEVES

a. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage (1.2 mm thick) galvanized steel.
b. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gauge galvanized steel.
c. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, AWL listed.
d. Sleeves for Round Ductwork: Galvanized steel.
e. Sleeves for Rectangular Ductwork: Galvanized steel.
f. Firestopping Insulation: Glass fiber type, non-combustible.
g. Sealant: Acrylic

2.7 FLOOR SUPPORTS

a. Concrete housekeeping pads shall comply with Division 3. Concrete pads shall extend 6" (150 mm) beyond equipment and be 4" (100 mm) high.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with manufacturer's instructions.
b. Support of all equipment, piping, etc. such that it will withstand a force of 5 times its weight in any direction and 1.5 times its weight downward.
c. Do not attach to roof deck, connect to structural members and span between same with structural members, Unistrut, etc.
d. Roof mounted equipment curbs and roof mounting rails shall be installed to withstand the wind and seismic loading required by Section 01000.

3.2 INSERTS

a. Provide inserts for placement in concrete formwork.
b. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
c. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches (100 mm).
d. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
e. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.3 PIPE HANGERS AND SUPPORTS

a. Support horizontal piping as scheduled.
b. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
c. Place hangers within 12 inches of each horizontal elbow.
d. Use hangers with 1-1/2 inch minimum vertical adjustment.
e. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
f. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
g. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
h. Support riser piping independently of connected horizontal piping.
i. Provide [copper plated hangers and supports for copper piping] [sheet lead packing between hanger or support and piping].
j. Design hangers for pipe movement without disengagement of supported pipe.

3.4 EQUIPMENT BASES AND SUPPORTS

a. Provide housekeeping pads of concrete, minimum 4 inches (100 mm) thick and extending 6 inches (150 mm) beyond supported equipment. Refer to Section 03300.
b. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
c. Construct supports of steel members. Brace and fasten with flanges or plates bolted to structure.
d. Provide rigid anchors for pipes after vibration isolation components are installed.

3.5 FLASHING

a. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
b. Provide curbs for mechanical roof installations 14 inches (350 mm) minimum high above roofing surface. Flash and counterflash with sheet metal; seal watertight. Attach counterflashing and mechanical equipment, and lap base flashing on roof curbs. Flatten and solder joints.
c. Adjust storm collars tight to pipe with bolts; calk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.6 SLEEVES

a. Set sleeves in position in formwork. Provide reinforcing around sleeves.
b. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
c. Extend sleeves through floors one inch (25 mm) above finished floor level. Calk sleeves.
d. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and

adjacent work with stuffing (fire stopping at fire walls) insulation and caulk air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

e. Install chrome plated steel escutcheons at finished surfaces.

3.7 HANGER SPACING

HANGER ROD PIPE SIZE Inches	MAX. HANGER SPACING Feet	DIAMETER Inches
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2
4 to 6	10	5/8
8 to 12	14	7/8
14 and Over	20	1
PVC (All Sizes)	6	3/8
C.I. Bell and Spigot (or No-Hub) and at Joints	5	As above

3.8 ROOF CURBS

a. Fasten curbs to structure and units to curb in such a way as to withstand design wind loading.

END OF SECTION

CONSTRUCTION ISSUE

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CONSTRUCTION ISSUE

SECTION 15170

MOTORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Single phase electric motors.
b. Three phase electric motors.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phase Turnover and Project Closeout.
d. Division 16 – Electrical

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable.

a. Section 01400 - Quality Control.
b. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
c. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
d. IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.
e. NEMA MG 1 - Motors and Generators.
f. NFPA 70 - National Electrical Code.

1.3 QUALIFICATIONS

a. Manufacturer: Company specializing in manufacture of electric motors for the intended use, and their accessories, with minimum three years documented product development, testing, and manufacturing experience.

1.4 REGULATORY REQUIREMENTS

a. Conform to all applicable electrical and energy codes, NFPA 70.
b. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. as suitable for the purpose specified and indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

a. Section 01560 – Environmental Protection.
b. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 - PRODUCTS

2.1 GENERAL CONSTRUCTION AND REQUIREMENTS

a. Motors Less Than 250 Watts, for Intermittent Service: Equipment manufacturer's standard and need not conform to these specifications.
b. Refer to Schedules on Contract Drawings for required electrical characteristics.
c. Type:

(1) Open drip-proof except where specifically noted otherwise.
(2) Motors: Design for continuous operation in 40 degrees C environment.
(3) Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
(4) Motors with frame sizes 143T and larger: Energy Efficient Type.

d. Explosion-Proof Motors: UL approved and labeled for hazard classification, with over temperature protection.
e. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
f. Wiring Terminations:

(1) Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
(2) For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

g. Motors shall be quiet running, free of vibration and magnetic hum.
h. All motors shall be designed for the operating conditions and service requirements of the intended service.
i. All motors shall be designated "NEMA Premium Motors".
j. Motors controlled by variable frequency drives shall be rated for that service.

2.2 SINGLE PHASE POWER - SPLIT PHASE MOTORS

a. Starting Torque: Less than 150 percent of full load torque.
b. Starting Current: Up to seven times full load current.
c. Breakdown Torque: Approximately 200 percent of full load torque.
d. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
e. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.3 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

a. Starting Torque: Exceeding one fourth of full load torque.
b. Starting Current: Up to six times full load current.

c. Multiple Speed: Through tapped windings.
d. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.4 SINGLE PHASE POWER - CAPACITOR START MOTORS

a. Starting Torque: Three times full load torque.
b. Starting Current: Less than five times full load current.
c. Pull-up Torque: Up to 350 percent of full load torque.
d. Breakdown Torque: Approximately 250 percent of full load torque.
e. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
f. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
g. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.5 THREE PHASE POWER - SQUIRREL CAGE MOTORS

a. Starting Torque: Between 1 and 1-1/2 times full load torque.
b. Starting Current: Six times full load current.
c. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
d. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.
e. Insulation System: NEMA Class B or better.
f. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
g. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
h. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 16483 - Motor Starters.
i. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt centre line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
j. Sound Power Levels: To NEMA MG 1.
k. Part Winding Start: Where indicated, use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
l. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure windings with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
m. Nominal Efficiency: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.
n. Nominal Power Factor: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.

PART 3 - EXECUTION

3.1 APPLICATION

a. Single phase motors for shaft mounted fans centrifugal pumps: Split phase type.
b. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
c. Single phase motors for fans, pumps, blowers, air compressors: Capacitor start type.
d. Single phase motors for fans, blowers, pumps: Capacitor start, capacitor run type.
e. Motors located in exterior locations, wet air streams downstream draw thru cooling coils, air cooled condensers: Totally enclosed type.

3.2 INSTALLATION

a. Install in accordance with manufacturer's instructions.
b. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
c. Check line voltage and phase and ensure agreement with nameplate.

3.3 NEMA OPEN MOTOR SERVICE FACTOR SCHEDULE

HP	3600 RPM	1800 RPM	1200 RPM	900 RPM
1/6-1/3	1.35	1.35	1.35	1.35
1/2	1.25	1.25	1.25	1.15
3/4	1.25	1.25	1.15	1.15
1	1.25	1.15	1.15	1.15
1.5-150	1.15	1.15	1.15	1.15

3.4 PERFORMANCE SCHEDULE: THREE PHASE - ENERGY EFFICIENT, OPEN DRIP-PROOF

HP	RPM(Syn)	NEMA Frame	Minimum Percent Efficiency	Minimum Percent Power Factor
1 & Less	1800	143T	85.4	84
1-1/2	1800	145T	86.5	85
2	1800	145T	86.5	85
3	1800	182T	89.5	86
5	1800	184T	89.5	87
7-1/2	1800	213T	91.0	86
10	1800	215T	91.7	85
15	1800	256T	93.0	86
20	1800	256T	93.6	86
25	1800	284T	94.1	86
30	1800	286T	94.1	88

3.5 PERFORMANCE SCHEDULE: THREE PHASE-ENERGY EFFICIENT, TOTALLY ENCLOSED, FAN COOLED

HP	RPM(Syn)	NEMA Frame	Minimum Percent Efficiency	Minimum Percent Power Factor
1 & Less	1800	143T	85.5	84
1-1/2	1800	145T	86.5	85
2	1800	145T	86.5	85
3	1800	182T	89.5	83
5	1800	184T	89.5	83
7-1/2	1800	213T	91.7	85
10	1800	215T	91.7	84
15	1800	256T	92.4	86
20	1800	256T	93.0	86
25	1800	284T	93.6	86
30	1800	286T	93.6	88

END OF SECTION

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SECTION 15190

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Nameplates.
b. Tags.
c. Stencils.
d. Pipe Markers.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ASME A13.1 - Scheme for the Identification of Piping Systems.

PART 2 - PRODUCTS

2.1 NAMEPLATES

a. Description: Laminated three-layer plastic with engraved black letters on light contrasting background color, 4"x1-1/2" or larger.

2.2 TAGS

a. Plastic Tags: Laminated three-layer plastic, brass, or aluminum with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch (40 mm).
b. Chart: Typewritten letter size list in anodized aluminum frame.

2.3 PIPE MARKERS

a. Color: Conform to ASME A13.1.
b. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
c. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.4 STENCILS

a. Stencils: With clean cut symbols and letters of following size:

(1) Up to 2 inch Outside Diameter of Insulation or Pipe: 1/2-inch high letters.
(2) 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1-inch high letters.
(3) Over 6 inches Outside Diameter of Insulation or Pipe: 1-3/4 inches high letters.
(4) Ductwork and Equipment: 1-3/4 inches high letters.

b. Stencil Paint: As specified in Section 09910, semi-gloss enamel, colors and lettering size conforming to ASME A13.1.

2.5 PIPE MARKERS

a. Color and Lettering: Conform to ASME A13.1.
b. Preformed plastic markers.

(1) Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

c. Plastic Tape Pipe Markers:

(1) Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.6 CEILING TACKS

a. Description: Steel with 3/4 inch (20 mm) diameter color coded head.
b. Color code as follows:

(1) Yellow - HVAC equipment
(2) Blue - Heating/cooling valves

PART 3 - EXECUTION

3.1 PREPARATION

a. Degrease and clean surfaces to receive adhesive for identification materials.
b. Prepare surfaces in accordance with Section 09910 for stencil painting.

3.2 INSTALLATION

a. Install identifying devices after completion of covering and painting.
b. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
c. Install tags with corrosion resistant chain.
d. Apply stencil painting in accordance with Section 09910.
e. Install plastic pipe markers in accordance with manufacturer's instructions.
f. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
g. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
h. Identify control panels and major control components outside panels with plastic nameplates.
i. Identify thermostats relating to terminal boxes or valves with nameplates.
j. Identify valves in main and branch piping with tags.
k. Identify air terminal units and radiator valves with numbered tags.
l. Tag automatic controls, instruments, and relays. Key to control schematic.
m. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Delete markers on piping 3/4 inch (20 mm) diameter and smaller. Identify service and flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 50 feet (15 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
n. Identify ductwork with stenciled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
o. Provide ceiling tacks to locate equipment, valves, or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15260

PIPING INSULATION FOR HVAC AND PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Piping insulation.
b. Jackets and accessories.

1.1.2. Related Sections:

a. Section 01115 - Sustainable Design Requirements.
b. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
c. Section 01400 - Quality Control.
d. Section 01720 – Closeout Procedures.
e. Section 15190 - Mechanical Identification.
f. Section 15410 - Plumbing Piping - Placement of Hangers.
g. Section 15535 – Refrigeration Piping and Specialties for HVAC

1.2 PERFORMANCE REQUIREMENTS

a. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with NFPA 255, and UL 723.
b. All materials and insulating values shall comply with the International Energy Conservation Code.

1.3 QUALITY CONTROL

1.3.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
c. ASTM E96 - Water Vapor Transmission of Materials.
d. NFPA 255 - Surface Burning Characteristics of Building Materials.
e. UL 723 - Surface Burning Characteristics of Building Materials.
f. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus.
g. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
h. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
i. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
j. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.

k. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
l. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation.
m. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation.
n. ASTM C578 - Standard Specification for Preformed, Cellular Polystyrene Thermal Insulation.
o. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyurethane Thermal Insulation.
p. ASTM C610 - Standard Specification for Expanded Perlite Block and Pipe Thermal Insulation.
q. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
r. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
s. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
t. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
u. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
v. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
w. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
x. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
y. NAIMA National Insulation Standards.
z. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
aa. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

1.4.1. Submittals for review:

a. Submit under provisions of Section 01400.
b. Product Data: Provide product description, list of materials and thickness for each service, and locations.
c. Operation and Maintenance Data.

1.5 DELIVERY, STORAGE, AND HANDLING

a. Section 01560 – Environmental Protection.
b. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
c. Store insulation in original wrapping and protect from weather and construction traffic.
d. Protect insulation against dirt, water, chemical, and mechanical damage.
e. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
f. Maintain temperature during and after installation for minimum period of 24 hours.

1.6 QUALIFICATIONS

a. Applicator: Company specializing in performing the work of this section with minimum three years experience.

1.6.2. Sustainable Design Submittals
a. Materials shall comply with the requirements of Division 1 Section “Sustainable Design Requirements.”

b. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."
(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Sealants and Adhesives, Interior on-site applied only

a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005

2.2 GLASS FIBER

2.2.1. Insulation:

a. ASTM C547; rigid molded, noncombustible.
b. 'K' value: ASTM C177, 0.24 at 75 degrees F.
c. Maximum service temperature: 850 degrees F.

2.2.2. Vapor Barrier Jacket:

a. ASTM C921, White kraft paper with glass fiber yarn, bonded to aluminized film.
b. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.

2.2.3. Tie Wire:

a. 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

2.2.4. Vapor Barrier Lap Adhesive:

a. Compatible with insulation.

2.2.5. Fibrous Glass Fabric:

a. Cloth: Untreated; 9 oz/sq yd weight.
b. Blanket: 1.0 lb/cu ft density.

2.3 JACKETS

2.3.1. PVC Plastic.

a. Jacket: ASTM D1784, One piece molded type fitting covers and sheet material, off-white color.

(1) Minimum service temperature: 0 degrees F.
(2) Maximum service temperature: 150 degrees F.
(3) Moisture vapor transmission: ASTM E96; 0.002 perm-inches.
(4) Thickness: 10 mil.
(5) Connections: Brush on welding adhesive or Pressure sensitive color matching vinyl tape.

2.4 CELLULAR FOAM

a. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.

(1) 'K' ('ksi') Value: ASTM C177 or C518; 0.27 at 75 degrees F (0.04 at 24 degrees C).
(2) Minimum Service Temperature: -40 degrees F (-40 degrees C).
(3) Maximum Service Temperature: 220 degrees F (104 degrees C).
(4) Maximum Moisture Absorption: ASTM D1056; 1.0 percent (pipe) by volume, 1.0 percent (sheet) by volume.
(5) Moisture Vapor Transmission: ASTM E96; 0.20 perm inches.
(6) Maximum Flame Spread: ASTM E84; 25.
(7) Maximum Smoke Developed: ASTM E84; 50.
(8) Connection: Waterproof vapor barrier adhesive.

b. Elastomeric Foam Adhesive

(1) Flexible Elastomeric Insulation Adhesive: Solvent-based, contact adhesives recommended by insulation manufacturer. Comply with MIL-A-24179A, Type II, Class I.

2.5 JACKET FOR EXTERIOR PIPE INSULATION

a. Fiberglass insulation installed outdoors and subject to water damage shall be provided with an additional 0.5 mm (0.016”) aluminum jacket with lock seam longitudinal joint and stainless steel “Bandit” straps for butted joints as required for a water-tight installation.

PART 3 - EXECUTION

3.1 EXAMINATION

a. Verify that piping has been tested before applying insulation materials.
b. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

3.2.1. General:

a. Install materials in accordance with manufacturer's instructions.
b. On exposed piping, locate insulation and cover seams in least visible locations.
c. Finish insulation at supports, protrusions, and interruptions.
d. For exterior applications, finish insulation with two coats of ultraviolet resistant finish as recommended by the manufacturer.

e. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
f. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
g. Finish at supports, protrusions, and interruptions.
h. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces less than 10 feet above finished floor: Finish with PVC jacket and fitting covers.
i. Install aluminum jacket on piping out of doors.

3.2.2. Installation: Glass fiber insulated pipes conveying fluids below ambient temperature:

a. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
b. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

3.2.3. Installation: Hot piping conveying fluids 140 degrees F or less, insulate flanges and unions at equipment completely. Bevel and seal ends of insulation.

a. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
b. Glass fiber insulated pipes conveying fluids above ambient temperature:

(1) Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
(2) Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

3.2.4. Cellular foam insulation:

a. All longitudinal and butt joints shall be fully glued and sealed.

3.2.5. Installation: Wicking pipe insulation:

a. Install in accordance with NAIMA National Insulation Standards and Knauf installation instructions.
b. Where insulation is indicated to be replaced, remove existing insulation. Allow piping to warm to above the dew point and to dry thoroughly before applying new insulation. Coordinate with the Commissary Officer to schedule work for times when the Commissary is closed.
c. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with PVC fitting covers. Install wicking material as directed by manufacturer.
d. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07270.
e. Install jacket with evaporation holes aligned with wicking material at the bottom of the pipe.

3.2.6. Inserts and Shields:

a. Application: Piping 2 diameter or larger.

(1) Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
(2) Insert location: Between support shield and piping and under the finish jacket.
(3) Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
(4) Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

3.3 TOLERANCE

a. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.4 CELLULAR FOAM INSULATION SCHEDULE

	PIPING SYSTEMS	PIPE SIZE Inch	THICKNESS Inch
a.	Air Conditioning Refrigeration Piping		
	Above 40 degrees F (5 degrees C)	To 2	¾“
		Larger	1”
	Below 40 degrees F (5 degrees C)	To 1	1”
		Larger	1.5”
	Condensate Inside Buildings	All	¾”
b.	Plumbing Piping	2" and less	1"
	Domestic hot water, Above Slab, hot,	Over 2"	1.5"
	cold, recirculated,	All runouts to 2”	½”
	Roof drains	All	½”

3.5 GLASS FIBER INSULATION SCHEDULE

a.	Roof drain bodies, horizontal downspouts above grade, and vertical downspouts from drains to horizontal downspouts	All	1

3.6 EXTERIOR PIPE INSULATION

a. Insulation installed outdoors shall be provided with an additional 0.5 mm (0.016”) aluminum jacket with lock seam longitudinal joint and stainless steel “Bandit” straps for butted joints as required for a water-tight installation.

3.7 PRODUCT REFRIGERATION SYSTEM

a. See Section 15651.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15290

DUCTWORK INSULATION

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Ductwork insulation.
b. Duct Liner.
c. Jackets.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15890 - Ductwork: Duct liner.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
c. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
d. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
e. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
f. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
g. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
h. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
i. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
j. NAIMA National Insulation Standards.
k. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
l. ASTM E119 – Standard Test Methods for fire Test of Building Construction and Materials.
m. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
n. ASTM E136 – Standard test Method for the Behavior of Materials in a Vertical Tube Furnace at 750ºC (Non-Combustibility Test).
o. ASTM E814 – Standard Test Method for Fire Tests of Through Penetrations Firestops.
p. ASTM C518 – Standard Test Method for Steady – State heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
q. ASTM C411 – Standard Test Method for Hot Surface Performance of High Temperature Thermal Insulation.

r. International Conference of Building Officials: ICBOES – Evaluation Report ER-5899 (FyreWrap 1.5 and MAX 2.0 Duct Insulation).
s. ISO 6944-1985 – Fire Resistance of Ventilation Ducts.
t. UL 723 – Surface Burning Characteristics of Building Materials.
u. UL 1479 – Fire Tests of Through Penetrations Firestops.
v. UL 263 – Full Scale External (Engulfment) Fire Test with Hose Stream.
w. UL 1978 (Section 12 & 13) Standard for Grease Ducts.
x. UL YYET – Grease Duct Enclosures, File R14514.
y. UL XHEZ – Through-Penetration Firestop Systems C-AJ-7007, C-AJ-7048.
z. UL 1887 – Modified, "Plastic Sprinkler Pipe Visible Flame and Smoke Characteristics.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Section 01400 - Submittals: Procedures for submittals.
b. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
c. Operation and Maintenance Data.

1.4 DELIVERY, STORAGE, AND HANDLING

a. Section 01560 – Environmental Protection.
b. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
c. Store insulation in original wrapping and protect from weather and construction traffic.
d. Protect insulation against dirt, water, chemical, and mechanical damage.
e. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
f. Maintain temperature during and after installation for minimum period of 24 hours.

1.5 QUALIFICATIONS

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum 5 years experience.
b. Applicator Qualifications: Company specializing in performing the work of this section with minimum 3 years experience approved by manufacturer.

1.6 REGULATORY REQUIREMENTS

a. Conform to the requirements of :

(1) International Mechanical code.
(2) NFPA 96.

PART 2 - PRODUCTS

2.1 GLASS FIBER, FLEXIBLE

a. Insulation: ASTM C553; flexible, noncombustible blanket.

(1) 'K' value : ASTM C518, 0.25 at 75 degrees F
(2) Maximum service temperature: 250degrees F.
(3) Maximum moisture absorption: 0.20 percent by volume.

b. Vapor Barrier Jacket:

(1) Kraft paper with glass fiber yarn and bonded to aluminized film.
(2) Moisture vapor transmission: ASTM E96; 0.02 perm.
(3) Secure with pressure sensitive tape.

c. Vapor Barrier Tape:

(1) Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

d. Tie Wire: Annealed steel, 16 gage.

2.2 GLASS FIBER, RIGID

a. Insulation: ASTM C612; rigid, noncombustible blanket.

(1) 'K' value: ASTM C518, 0.24at 75 degrees F.
(2) Maximum service temperature: 250 degrees F.
(3) Maximum moisture absorption: 0.20 percent by volume.
(4) Density: 3.0lb/cu ft.

b. Vapor Barrier Jacket:

(1) Kraft paper with glass fiber yarn and bonded to aluminized film.
(2) Moisture vapor transmission: ASTM E96; 0.04 perm.
(3) Secure with pressure sensitive tape.
(4) Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.3 GLASS FIBER DUCT LINER

a. Insulation: ASTM C1071; flexible or rigid, noncombustible blanket with poly vinyl acetate polymer or acrylic polymer meeting ASTM G21 impregnated surface and edge coat.
(1) ‘K’ Value: ASTM C1071 or ASTM C518, maximum 0.31 at 75 degrees F.
(2) Maximum Service Temperature: 250 degrees.
(3) Maximum Velocity on Coated Air Side: 5,000 fpm.
(4) Minimum Noise Reduction Criteria: ASTM C1071 0.45 for 1 inch thickness.

b. Adhesive:

(1) Waterproof, ASTM E162 fire-retardant type.

c. Liner Fasteners: Galvanized steel, self-adhesive pad, impact applied or welded with integral press-on head.
d. Vapor Barrier Tape:

(1) Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.4 FIRE BARRIER SYSTEMS FOR KITCHEN EXHAUST DUCTS

a. Unifrax FyreWrap MAX 2.0 Duct Insulation or equal.

(1) Material: High temperature soluble fiber blanket encapsulated in scrim reinforced foil.
(2) Type and Size: Roll 2.0” x 24” x 20LF or 2.0” x 48” x 20LF.
(3) Color: Aluminum silver.
(4) Weight: 1.33 lb/sf.
(5) Surface Burning Characteristics (ASTM E-84):
Core Blanket: Flame Spread Index = 0, Smoke Developed Index = 0
Encapsulated Blanket: Flame Spread Index = <25, Smoke Developed Index = <50.
(6) Combustibility (ASTM E-136): Noncombustible.
(7) Fire Resistance Shaft Rating equivalent to 2 hours.

PART 3 - EXECUTION

3.1 EXAMINATION

a. Section 01040 Coordination and Meetings: Verification of existing conditions before starting work.
b. Verify that ductwork has been tested before applying insulation materials.
c. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

3.2.1. General:

a. Section 01400 - Quality Control: Manufacturer's instructions.
b. Where replacement is indicated, remove existing insulation, allow duct to warm above dew point and dry thoroughly before applying new insulation. Coordinate with the Commissary Officer to schedule work for hours when the Commissary is closed.
c. Install in accordance with NAIMA National Insulation Standards.
d. Supply and return air ductwork:

(1) Provide insulation with vapor barrier jackets.
(2) Continue insulation through walls, sleeves, hangers, and other duct penetrations.
(3) Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
(4) Return and transfer ducts may be rigid round factory preinsulated ducts.

e. Exterior Applications: Provide duct liner in addition to insulation with vapor barrier jacket. Cover with caulked aluminum jacket with seams located on bottom side of horizontal duct section.

3.2.2. Installation – Glass Fiber:

a. External Duct Insulation Application:

(1) Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket. Pin insulation on sides and bottom with adhesive attached pins 18” o.c.

(2) Secure insulation without vapor barrier with staples, tape, or wires.
(3) Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
(4) Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
(5) Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

3.2.3. Duct And Plenum Liner Application:

a. Adhere insulation with adhesive for 100 percent coverage.
b. Secure insulation with mechanical liner fasteners 18 inches on center.
c. Seal and smooth joints. Seal and coat transverse joints.
d. Seal liner surface penetrations with adhesive.
e. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.2.4. Installation Glass Fiber Ductwork Insulation Schedule:

DUCTWORK	THICKNESS Inch	(mm)
Combustion Air Duct	1.5	(37)
Outside Air Intake Ducts	2	(50)
Mixed air Plenums	1.5	(37)
Ventilation Equipment Casings	Factory Pre-insulated	
Supply Ducts	1.5 covering on round, rectangular or flat oval ducts.	
Other Ducts and Plenums	As noted on the drawings.	
Rooftop HVAC Units	8” -3# density rigid insulation inside the roof curb as detailed on the drawings.	
Return Air Ducts	1 ½” covering	
Transfer Ducts	1” liner	
Factory Pre-insulated Ducts	None	
Diffusers	1.5” covering on back of diffuser shell	

Where duct is in an equipment room or otherwise exposed to view, provide rigid insulation.

**Ceiling spaces above air conditioned spaces which have lay-in ceilings and are sealed against outside air infiltration are considered to be un air conditioned and insulation is required.

**Where existing insulation is damaged as a result of this work, repair to match existing.

3.2.5. Installation Calcium Silicate:

a. Calcium silicate: Install in 2 layers, with joints tightly butted and staggered. Secure with No. 16 gauge stainless steel wire on square or rectangular surfaces – ½ in. x .015 galvanized steel bands on 12 in. maximum centers on cylindrical areas. Where required, provide studs, clips or angles as anchors for wire and bands. Secure insulation with circumferential steel straps.
b. Finish: 1 in. wire mesh with ¼ in. thick Keene Super-Powerhouse Finishing Cement and fiberglass cloth jacket. Reinforce all corners with corner bead.
c. Taper insulation to nameplates, cleanouts, manholes, etc. Leave nameplates exposed.
d. Insulate kitchen hood exhaust ducts with 2” of calcium silicate.

3.2.6. Installation Rigid Expanded Polyisocyanuarate:

a. Secure insulation without staples, tape, or wires.
b. Lift ductwork off trapeze hangers and install insulation and vapor barrier continuously past hanger.

c. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

d. Apply self adhesive vapor barrier jacket continuously overlapping joints 3". Lap vapor barrier 3" minimum onto hangers, bare metal where reinforcing is to be covered.

3.2.7. Installation Fire Barrier Systems for Kitchen Exhaust:

a. Install in strict accordance with manufacturer's instructions and as in tested assemblies.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15310

FIRE PROTECTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Pipe, fittings, valves, and connections for sprinkler systems.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Closeout Procedures.
d. Section 15140 - Supports and Anchors.
e. Section 15190 - Mechanical Identification: Piping identification.
f. Section 15240 - Vibration Isolation and Seismic Restraints.
g. Section 15325 - Sprinkler Systems: Sprinkler systems design.
h. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ASME Boiler and Pressure Vessel Code Section IX - Welding and Brazing Qualifications.
c. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
d. ASME B16.3 - Malleable Iron Threaded Fittings, Class 150 and 300.
e. ASME B16.4 - Cast Iron Threaded Fittings, Class 125 and 250.
f. ASME B16.5 - Pipe Flanges and Flanged Fittings.
g. ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings.
h. ASME B16.11 - Forged Steel Fittings, Socket-welding and Threaded.
i. ASME B16.25 - Buttwelding Ends.
j. ASME B36.10 - Welded and Seamless Wrought Steel Pipe.
k. ASTM A135 - Electric-Resistance-Welded Steel Pipe.
l. ASTM A47 - Malleable Iron Castings.
m. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.
n. ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
o. ASTM A795 - Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
p. AWS D10.9 - Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing.
q. AWWA C110 - Ductile Iron and Gray Iron Fittings.

r. AWWA C151 - Ductile Iron Pipe, Centrifugally Cast.
s. NFPA 13 - Installation of Sprinkler Systems, Latest Edition.
t. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances
u. UL - Fire Resistance Directory.
v. UL 262 - Gate Valves for Fire-Protection Service.
w. UL 312 - Check Valves for Fire-Protection Service.
x. UL 405 - Fire Department Connections.

1.3 QUALIFICATIONS

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
b. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience, and approved by the manufacturer.

1.4 SUBMITTALS

1.4.1. Submittals for Review:

a. Section 01400 - Submittals: Procedures for submittals. Manufacturer's data demonstration compliance with this specification for:

(1) Piping
(2) Valves
(3) Pipe hangers and supports
(4) Mechanical couplings

b. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.
c. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections. Prepare in accordance with NFPA 13, latest edition.
d. Operation and Maintenance Data.

1.4.2. Submittals At Project Closeout:

a. Section 01720 – Closeout Procedures: Procedures for submittals.
b. Project Record Documents: Record actual locations of components and tag numbering.
c. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.5 REGULATORY REQUIREMENTS

a. Welding Materials and Procedures: Conform to ASME Code.
b. Valves: Provide manufacturer's name and pressure rating marked on valve body.
c. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
d. International Building Code (IBC).

1.6 DELIVERY, STORAGE, AND PROTECTION

a. Deliver and store valves in shipping containers, with labeling in place.
b. Provide temporary protective coating on cast iron and steel valves.
c. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 - PRODUCTS

2.1 BURIED PIPING

a. Cast Iron Pipe: AWWA C151.

(1) Fittings: AWWA C110, standard thickness.
(2) Joints: AWWA C111, rubber gasket.
(3) Mechanical Couplings: Shaped composition sealing gasket, steel bolts, nuts, and washers.

2.2 ABOVE GROUND PIPING

a. Steel Pipe: ASTM A53; ASTM A135; ASTM A795; or ASME B36.10; Schedule 10. Threaded pipe and pipe 2" in diameter and smaller shall be Schedule 40.

(1) Steel Fittings: ASME B16.9, wrought steel, buttwelded; ASME B16.25, buttweld ends; ASTM A234, wrought carbon steel and alloy steel; ASME B16.5, steel flanges and fittings; ASME B16.11, forged steel socket welded and threaded.
(2) Cast Iron Fittings: ASME B16.1, flanges and flanged fittings; ASME B16.4, threaded fittings.
(3) Malleable Iron Fittings: ASME B16.3, threaded fittings ASTM A47.
(4) Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
(5) Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.
(6) Drain piping shall be galvanized.
(7) Sprinkler piping shall be painted as specified in Part 3.2 j. Sprinkler heads shall be taped to avoid receiving any paint residue. Ensure tape is removed once painting is complete.
(8) Sprinkler dry pipe system shall be Schedule 40 galvanized steel. Roll-grooved fittings are not permitted on galvanized pipe per UFC 3-600-10N.

b. Cast Iron Pipe: AWWA C151.

(1) Fittings: AWWA C110, standard thickness.
(2) Joints: AWWA C111, rubber gasket.
(3) Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.3 PIPE HANGERS AND SUPPORTS

a. Conform to NFPA 13, latest edition.
b. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.4 GATE VALVES CONTROLLING SPRINKLERS

a. Up to and including 2 Inches:

(1) Indicating bronze body, bronze trim, rising stem, handwheel, solid wedge or disc, threaded ends. Provide approved means for electric signal monitoring.

b. Over 2 Inches:

(1) Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid bronze or cast iron wedge. Flanged or mechanical grooved ends.
(2) Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, for use with iron body indicator post assembly.

2.5 GLOBE OR ANGLE VALVES

a. Up to and including 2 Inches:

(1) Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable rubber disc, threaded ends, with backseating capacity repackable under pressure.

b. Over 2 Inches:

(1) Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.6 CHECK VALVES

a. Up to and including 2 Inches:

(1) Bronze body and swing disc, rubber seat, threaded ends.

b. Over 2 Inches:

(1) Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged or mechanical grooved ends with automatic ball check where required.
(2) Iron body, bronze disc, stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

2.7 DRAIN VALVES

a. Ball Valve:

(1) Brass with cap and chain, 3/4 inch hose thread.
(2) Listed test/drain assembly.

PART 3 - EXECUTION

3.1 PREPARATION

a. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
b. Remove scale and foreign material, from inside and outside, before assembly.
c. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

a. Install piping in accordance with NFPA 13, latest edition, for sprinkler systems.
b. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
c. Install piping to conserve building space, to not interfere with use of space and other work.
d. Group piping whenever practical at common elevations.
e. Sleeve pipes passing through partitions, walls, and floors.
f. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
g. Inserts:

(1) Provide inserts for placement in concrete formwork.
(2) Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
(3) Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
(4) Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
(5) Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

h. Pipe Hangers and Supports:

(1) Install in accordance with NFPA 13, latest edition.
(2) Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
(3) Place hangers within 12 inches of each horizontal elbow.
(4) Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
(5) Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
(6) Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
(7) Prime coat exposed steel hangers and supports. Refer to Section 09910. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

i. Slope piping per NFPA 13 and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
j. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. As approved by the NAVFAC FPE, fire sprinkler piping in public accessible finished areas with painted exposed structure (sales areas and contiguous spaces) shall be painted to match the adjacent surfaces with piping identified by 2-inch red bands every 10 feet and on both sides of wall, ceiling, and floor penetrations. Fire sprinkler piping in all other areas shall be painted with one coat of red alkyd gloss enamel per UFC 3-600-10N. Refer to Section 09910.
k. Do not penetrate building structural members unless indicated.
l. Provide sleeves when penetrating footings, floors, and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
m. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

n. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.
o. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.
p. Provide gate or ball valves for shut-off or isolating service.
q. Provide drain valves at main shut-off valves, low points of piping and apparatus.
r. Provide galvanized pipe and fittings for dry pipe systems.
s. Subject to approval by the authority having jurisdiction, plastic pipe markers may be used in identifying sprinkler pipe. Refer to Section 15190, paragraph 2.3.

END OF SECTION 15310

CONSTRUCTION ISSUE

SECTION 15320

FIRE PUMPS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Fire pump package.
b. Fire pump motor.
c. Electric jockey pump.
d. Controllers.

1.1.2. Related Sections:

a. Section 01042 – Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 – Quality Control.
c. Section 01720 – Closeout Procedures.
d. Section 15170 - Motors.
e. Section 15240 - Vibration Isolation and Seismic Restraints.
f. Section 15310 - Fire Protection Piping.
g. Section 15410 - Plumbing Piping.
h. Division 16 - Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. National Electrical Manufacturers Association - NEMA MG-1 - Motors and Generators.
c. NEMA 250 - Enclosures for Electrical Equipment (1000 Volt Maximum).
d. National Fire Protection Association, NFPA 13 Latest Edition - Installation of Sprinkler Systems.
e. NFPA 20 - Installation of Centrifugal Fire Pumps.
f. NFPA 24 - Private Fire Service Mains and their Appurtenances.
g. NFPA 70 - National Electrical Code.
h. Unified Facilities Criteria – UFC 3-600-01 – Fire Protection Engineering for Facilities.
i. Unified Facilities Criteria - UFC 3-600-10N – Fire Protection Engineering.
j. Underwriters Laboratories - UL - Fire Protection Equipment Directory.
k. UL 448 - Pumps for Fire Protection Service.
l. UL 778 - Motor Operated Water Pumps.
m. UL 1478 - Fire Pump Relief Valves.

1.3 DESIGN REQUIREMENTS

a. Conform to NFPA 20, UFC 3-600-01, and UFC 3-600-10N.

1.4 PERFORMANCE REQUIREMENTS

a. Conform to NFPA 20 and NFPA 13, Latest Edition.

1.5 SUBMITTALS

1.5.1. Submittals for Review:

a. Section 01400 - Quality Control: Procedures for submittals.
b. Product Data: Provide manufacturers literature including general assembly, pump curves showing performance characteristics with pump and system, operating point indicated, NPSH curve, controls, wiring diagrams, and service connections.
c. Shop Drawings: Indicate layout, general assembly, components, dimensions, weights, clearances, and methods of assembly.
d. Drawings shall be sealed by the Fire Protection Engineer who prepared or supervised the preparation of the shop drawings.
e. Operation and Maintenance Data.

1.5.2. Submittals For Information:

a. Section 01400 - Quality Control: Procedures for submittals.
b. Test Reports: Indicate results of hydrostatic test and field acceptance tests performed in accordance with NFPA 20.
c. Manufacturer's Instructions: Indicate support details, connection requirements, for fire pump system.

1.5.3. Submittals At Project Closeout:

a. Section 01720 – Closeout Procedures.
b. Project Record Documents: Record actual locations of components and accessories.
c. Manufacturers' Certificates: Manufacturer shall certify that fire pumps meet or exceed specified requirements at specified operating conditions and that the installation complies with regulatory requirements. Submit summary and results of shop tests performed in accordance with NFPA 20.
d. Operation and Maintenance Data: Include manufacturers' instructions, start-up data, trouble-shooting check lists, for pumps, drivers, and controllers.
e. Maintenance Data: Include manufacturer's literature, cleaning procedures, replacement parts lists, and repair data for pumps, drivers and controllers.
f. The contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.6 DELIVERY, STORAGE, AND PROTECTION

a. Section 01400 -Quality Control: Transport, handle, store, and protect products.
b. Accept fire pumps and components on site in factory packing. Inspect for damage. Comply with manufacturers rigging and installation instructions.
c. Protect fire pumps and components from physical damage including effects of weather, water, and

construction debris.

d. Provide temporary inlet and outlet caps, and maintain in place until installation.

1.7 QUALIFICATIONS:

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
b. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience approved by manufacturer.
c. Design fire pump system under direct supervision of a state licensed Professional Fire Protection Engineer experienced in design of this Work.

1.8 REGULATORY REQUIREMENTS

a. Conform to UL.
b. Perform work in accordance with NFPA 20, UFC 3-600-01, and UFC 3-600-10N
c. Conform to NFPA 20 for installation and testing of fire pumps, drivers, and controllers.
d. Provide certificate of compliance from authority have jurisdiction indicating approval of field acceptance tests.
e. Equipment and Components: Bear UL label or marking.
f. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.9 PRE-INSTALLATION MEETING

a. Convene one week before starting work of this section.

1.10 DELIVERY, STORAGE, AND PROTECTION

a. Section 01400 -Quality Control: Transport, handle, store, and protect products.
b. Accept fire pumps and components on site in factory packing. Inspect for damage. Comply with manufacturers rigging and installation instructions.
c. Protect fire pumps and components from physical damage including effects of weather, water, and construction debris.
d. Provide temporary inlet and outlet caps, and maintain in place until installation.

1.11 EXTRA MATERIALS

a. Section 01720 – Closeout Procedures.
b. Provide one set of gaskets, screens and seals for each pump type and model supplied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Acceptable Manufacturers:

a. Peerless
b. Aurora
c. Armstrong
d. Fairbanks Morse
e. Other U.S. manufacturer providing UL listed and FM approved fire pumps for a minimum of the most recent 5-year period.

2.2 VERTICAL IN-LINE PUMPS

a. Type: UL 448 and UL 778, vertical, single stage, close coupled, radially or horizontally split casing, for in-line mounting, for 250 psi. Rating as indicated on the drawings.
b. Casting: Cast or ductile iron, with suction and discharge gage port, casing wear ring, seal flush connection, drain plug, flanged suction and discharge.
c. Impeller: Bronze, fully enclosed, keyed directly to motor shaft.
d. Shaft: Solid alloy steel with bronze sleeve.
e. Seal: Carbon rotating against a stationary ceramic seat, viton fitted, 107 degrees C maximum continuous operating temperature.

2.3 FIRE PUMP ACCESSORIES

a. Eccentric suction reducer and OS&Y gate valve on suction side of pump.
b. Concentric increaser and check valve in pump discharge and OS&Y gate or butterfly valve on system side of check valve.
c. Fire pump bypass fitted with OS&Y gate or butterfly valves and check valve where fire pump draws from positive pressure supply.
d. Suction pressure gage, 4 1/2 inch diameter dial with snubber, valve cock and lever handle.
e. Discharge pressure gage, valve cock and lever handle.
f. Casing 3/4 inch relief valve.
g. Float operated 3/4 inch automatic air release valve.
h. Hose valve manifold sized per NFPA 20 with a 2 1/2 inch hose gate valve for each 250 GPM of fire pump flow rating with caps and chains.

2.4 ELECTRIC MOTOR DRIVE

a. Motor: Squirrel cage induction type; in open drip proof NEMA MG-1 enclosure. Refer to Section 15170.
b. Controller: Reduced voltage starter, in NEMA 250 enclosure, including the following:

(1) Disconnect Switch: Externally operable, quick break type.
(2) Circuit Breaker: Size to NFPA 20, minimum 65,000 amperes interrupting capacity.
(3) Motor Starter: Energized automatically through pressure switch or manually by externally operable handle.
(4) Pressure Switch: Set to cut in at 50 psi adjustable.
(5) Running Period Timer: Keeps motor in operation when started automatically, for a minimum of seven minutes.
(6) Pilot Lamp: Indicates circuit breaker closed and power available.
(7) Test Accessories: Ammeter test link and voltmeter test studs.
(8) Alarm Relay: Energizes alarm to indicate circuit breaker open or power failure.
(9) Switch Relay: For remote start.

(10) Manual Selector Station: On enclosure marked "Automatic" and "Non-Automatic."

2.5 PRESSURE MAINTENANCE (JOCKEY) PUMP

2.5.1. Acceptable manufacturers:

a. Peerless
b. Aurora
c. Armstrong
d. Grundfos
e. Other U.S. manufacturer providing UL listed and FM approved jockey pumps for a minimum of the most recent 5-year period.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with NFPA 20.
b. Provide access space around pumps for service; no less than minimum as recommended by manufacturer. Maintain minimum required space around controllers.
c. Install piping in accordance with Section 15310. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For base mounted pumps, provide supports under elbows on pump suction and discharge.
d. Provide drains for bases and seals, piped to and discharging into floor drains.
e. Mount unit on vibration isolators. Refer to Section 15245.
f. Provide for connection to electrical service. Refer to Division 16.
g. Lubricate pumps before start-up.
h. Check, align, and certify base mounted pumps by qualified millwright prior to start-up.

3.2 FIELD QUALITY CONTROL

a. Perform flow test on entire system in accordance with NFPA 20.

b. Require test to be witnessed by authority having jurisdiction.

c. A fire pump manufacturer's representative is required to be present at the preliminary and final acceptance tests.

3.3 DEMONSTRATION AND INSTRUCTIONS

a. Section 01720 – Closeout Procedures:

(1) Demonstrate automatic operation of system including verification of pressure switch set points.

END OF SECTION 15320

CONSTRUCTION ISSUE

SECTION 15325

SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Wet-pipe sprinkler system.
b. Dry-pipe sprinkler system.
c. System design, installation, and certification.
d. Fire department connections.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Closeout Procedures.
d. Section 02225 - Trenching.
e. Section 15190 - Mechanical Identification.
f. Section 15310 – Fire Protection Piping.
g. Section 15320 – Fire Pumps.
h. Division 16 – Electrical.

1.1.3. System Description:

a. System to provide complete coverage for the entire building, including exterior canopies.
b. Provide system to Unified Facilities Criteria - UFC 3-600-01, UFC 3-600-10N, and National Fire Protection Association - NFPA 13, Latest Edition, and occupancy and hazard classifications shown on the drawings.
c. Conduct or obtain current flow tests. Determine volume and pressure of incoming water supply from water flow test data. Do not rely on data shown on drawings. Hydraulically design system based on this data.
d. Interface system with building fire and smoke alarm system.
e. Provide two remotely located fire department connections where indicated.

1.2 QUALITY ASSURANCE

a. Perform Work in accordance with NFPA 13, Latest Edition, UFC 3-600-01, and UFC 3-600-10N.

1.3 REFERENCES

1.3.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. NFPA 13, Latest Edition - Installation of Sprinkler Systems.
c. NFPA 70 - National Electrical Code.
d. UFC 3-600-01 Fire Protection Engineering for facilities.
e. UFC 3-600-10N Fire Protection Engineering
f. Underwriters Laboratories - UL 199 - Automatic Sprinklers.
g. American Society of Sanitary Engineering - ASSE 1015 - Double check backflow prevention assemblies and double check fire protection backflow assemblies.

1.4 SUBMITTALS

1.4.1. Submittals for Review:

a. Section 01400 - Quality Control: Procedures for submittals.
b. Manufacturer's Descriptive Data: Annotate descriptive data to show clearly the specific model, type, and size of each item. At a minimum, submit data for the following:
(1) Piping.
(2) Valves, including gate, check, and globe.
(3) Riser Check or Alarm Valve.
(4) Sprinklers.
(5) Pressure or flow switch.
(6) Pipe hangers and support.
(7) Fire department connections.
(8) Low air pressure supervisory panel.
(9) Dry pipe valves.
(10) Air compressor.
(11) Mechanical couplings/fittings.
(12) Backflow preventer.
(13) Tamper switch.
(14) Hose connection.

c. Shop Drawings:
(1) Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
(2) Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Hydraulic calculations must include a minimum pressure drop of 12 psi across the backflow preventer or the actual pressure drop, whichever is greater, regardless of type or size per UFC 3-600-10N. Indicate system controls.
(3) Prepare in accordance with NFPA 13, Latest Edition.

d. Fire sprinkler contractor shall perform a two hydrant flow test in accordance with NFPA 291 at time of actual design.
e. Submit complete sprinkler system shop drawings and hydraulic calculations sealed with the preparing subcontractor's PE stamp of the FPE who prepared or supervised the preparation of the shop drawings.
f. Samples: Submit two of each style of sprinkler specified.
g. Operation and Maintenance Data.

1.4.2. Submittals At Project Closeout:

a. Section 01720 – Closeout Procedures: Procedures for submittals.
b. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
c. Manufacturer's Certificate: The Design Engineer of Record shall inspect the system and certify that the system has been tested and meets or exceeds specified requirements and code requirements.
d. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
e. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
f. The contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.5 DELIVERY, STORAGE, AND PROTECTION

a. Section 01400 - Quality Control Material and Equipment: Transport, handle, store, and protect products.
b. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.6 QUALIFICATIONS

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
b. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.
c. Design system under direct supervision of a state licensed Professional Fire Protection Engineer.

1.7 REGULATORY REQUIREMENTS

a. Conform to Underwriters Laboratories - UL.
b. Perform Work in accordance with NFPA 13, Latest Edition.
c. Equipment and Components: Bear UL label or marking.
d. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.8 EXTRA MATERIALS

a. Section 01720 – Closeout Procedures - Maintenance Data.
b. Provide extra sprinklers under provisions of NFPA 13, Latest Edition.
c. Provide suitable wrenches for each sprinkler type.
d. Provide metal storage cabinet in location designated near Sprinkler Riser.

PART 2 - PRODUCTS

2.1 SPRINKLERS

2.1.1. Suspended Ceiling - Finished Rooms:

a. Type: Recessed pendent type with matching escutcheon plate. Maximum projection below ceiling 1 inch.
b. Finish: Chrome plated.
c. Escutcheon Plate Finish: Chrome plated.
d. Fusible Link: Fusible solder link type or Glass bulb type temperature rated for specific area hazard. Quick response unless noted otherwise.

2.1.2. Exposed Area - No Finished Ceiling Type:

a. Type: Standard upright type.
b. Finish: Brass.
c. Fusible Link: Fusible solder link type or Glass bulb type temperature rated for specific area hazard. Quick response unless noted otherwise.

2.1.3. Suspended Ceilings - Janitors closets, Storage, Mechanical Rooms:

a. Type: Standard type with matching flat escutcheon plate. Projection below ceiling shall not exceed 2".
b. Finish: Chrome.
c. Escutcheon Plate Finish: Chrome plated.
d. Fusible Link: Fusible solder link type or Glass bulb type temperature rated for specific area hazard. Quick response unless noted otherwise.

2.1.4. Dry Pendent Sprinklers - Coolers and Freezers:

a. Type: Standard dry pendent type with matching escutcheon plate.
b. Finish: Chrome.
c. Escutcheon Plate Finish: Chrome plated.
d. Fusible Link: Fusible solder link type temperature rated for specific area hazard or glass bulb type rated for -20ºF. Quick response unless noted otherwise.
.

2.1.5. Dry Horizontal Sidewall Sprinklers

a. Type: Dry Horizontal Sidewall type with matching escutcheon plate.
b. Finish: Chrome plated brass.
c. Escutcheon Plate Finish: Chrome plated.
d. Fusible Link: Fusible solder link type or glass bulb type temperature rated for specific area hazard. Quick response unless noted otherwise.

2.2 PIPING SPECIALTIES

a. Double Check Valve Assemblies: ANSI/ASSE 1012, AWWA C506; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with two OS&Y valves, 175 psig working pressure, drain pipe to floor drain with air gap fitting. Testing and certification of the backflow preventer is required after installation.
b. Wet pipe sprinkler swing check valve.

c. Dry Pipe Sprinkler Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm with accelerator and drain valve. Provide accelerator if required by NFPA 13.
d. Electric Alarm Bell: 6" electric alarm bell shall consist of an aluminum, steel, or stainless steel gong and an electric motor suitable for 120 volt operation. Alarm signal shall be activated by an electric pulse from a water flow switch, or other supervisory device. Finish of the gong shall be red enamel. Unit shall have U.L. listing.
e. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.
f. Pressure switches, diaphragm type, on each dry pipe riser.

2.2.1. Fire Department Connection and Backflow Preventer Test Header:

a. Type: Flush mounted wall type with chrome plated finish.
b. Outlets: Two-way inlets (FDC) or outlets (test header) with thread size to suit fire department hardware; threaded dust cap and chain of matching material and finish.
c. Drain: 3/4 inch automatic drip, connected to drain.
d. Label: "Sprinkler - Fire Department Connection" and "Backflow Preventer Test Header."
e. Signal: Electric strobe on outside wall above FDC tied in to each riser served by the particular FDC and activated by the alarm system when any water flow occurs.

2.2.2. Supervisory Switches:

a. On each control valve, arranged to actuate alarm when valve is closed.

2.2.3. Inspector's Test Station:

a. Per NFPA 13, Latest Edition. Hard piped to adequate drain or to exterior of building.
b. Minimum of one per system.

2.2.4. Air Compressor:

a. Single unit, electric motor driven, motor starter, safety valves, check valves, air maintenance device incorporating electric pressure switch and unloader valve.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with NFPA 13, Latest Edition.
b. Meet the Seismic Restraint requirements in NFPA 13, Latest Edition, Vibration Isolation and Seismic Restraints. Seismic coefficient to be provided or derived from Table 9.3.5.6.2, NFPA 13-2010, using site specific seismic data from Table E2, UFC 3-301-01, 27 January 2010.
c. Install equipment in accordance with manufacturers instructions.
d. Conceal piping above suspended ceilings.
e. Install buried shut-off valves in valve box. Provide post indicator.
f. Run piping as high as possible in areas without ceilings.
g. Provide approved double check valve backflow preventer assembly at sprinkler system water source connection. Provide means of forward flow testing at system demand per NFPA 13.

h. No sprinkler mains are permitted in Electrical Rooms. Provide quick response concealed sprinklers in all spaces with finished ceilings that contain electrical, electronic, or other water sensitive equipment per UFC 3-600-10N.
i. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
j. Locate outside electric alarm bell on building wall as indicated.
k. Place pipe runs to minimize obstruction to other work.
l. Place piping in concealed spaces above finished ceilings.
m. Center sprinklers in one direction in ceiling tile and provide piping offsets as required.
n. Coordinate sprinkler locations with light fixtures, structure, HVAC ducts, grilles, diffusers, etc. Provide additional heads under ducts, equipment, etc, as per NFPA 13, Latest Edition.
o. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting.
p. Install and connect to fire pump system in accordance with NFPA 13, Latest Edition, and Section 15320.
q. Install air compressor on vibration isolators. Refer to Section 15240.
r. Install guards on sprinklers where indicated or required.
s. Provide all electrical devices and wiring required but not provided under Division 16.
t. Flush entire piping system, new and existing, of foreign matter.
u. Install adequate drains piped to floor drains or out of doors.
v. Hydrostatically test entire system per NFPA 13, Latest Edition.
w. Conduct Preliminary Test in the presence of the Fire Department and the FPE. The test shall include hydrostatic test per NFPA 13, Latest Edition, and operational tests of alarms and all other devices. Make any corrections required. Submit a signed and dated certificate, similar to that specified in NFPA 13, Latest Edition, to the Contracting Officer. The FPE shall prepare a report documenting the test and results.
x. Submit a request for formal test and inspection at least 15 days prior to the desired inspection date and after the Preliminary test is complete and corrections are completed and approved. An experienced technician regularly employed by the system installer shall be present, as well as the Fire Department, and the FPE. The test shall include hydrostatic test per NFPA 13, Latest Edition, and operational tests of alarms and other devices. The Contracting Officer or Government's Designated Inspector shall witness formal tests and approve systems before they are accepted.
y. Provide labels on all controls, valves, etc. as required by NFPA 13, Latest Edition.

3.2 INTERFACE WITH OTHER PRODUCTS

a. Ensure required devices are installed and connected as required to fire alarm system.

END OF SECTION 15325

CONSTRUCTION ISSUE

SECTION 15410

PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Pipe, pipe fittings, valves, and connections for piping systems.

(1) Sanitary sewer.
(2) Domestic water.
(3) Storm water.
(4) Natural Gas

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Closeout Procedures.
d. Section 02300 - Earthwork.
e. Section 02510 - Water Distribution System.
f. Section 02530 - Sanitary Drainage.
g. Section 02630 - Storm Drainage.
h. Division 7 - Thermal and Moisture Protection.
i. Section 08311 - Access Doors and Frames.
j. Section 15140 - Supports and Anchors.
k. Section 15190 - Mechanical Identification.
l. Section 15240 - Vibration Isolation and Seismic Restraints.
m. Section 15260 - Piping Insulation for HVAC and Plumbing.
n. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 - Quality Control.
b. AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
c. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.
d. ASME B16.3 - Malleable Iron Threaded Fittings.
e. ASME B16.4 - Cast Iron Threaded Fittings Class 125 and 250.
f. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
g. ASME B16.22 - Wrought Copper and Bronze Solder Joint Pressure Fittings.
h. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

i. ASME B16.26 - Cast Bronze Fittings for Flared Copper Tubes.
j. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
k. ASME B31.2 – Fuel Gas Piping.
l. ASME B31.9 - Building Service Piping.
m. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
n. ASTM A74 - Cast Iron Soil Pipe and Fittings.
o. ASTM A234/A234M - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
p. ASTM B32 - Solder Metal.
q. ASTM B42 - Seamless Copper Pipe.
r. ASTM B88 - Seamless Copper Water Tube.
s. ASTM B306 - Copper Drainage Tube (DWV).
t. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
u. ASTM D1785 – Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
v. ASTM D2235 - Solvent Cement for Acrylonitrile - Butadiene - Styrene (ABS) Plastic Pipe and Fittings.
w. ASTM D2239 - Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
x. ASTM D2447 - Polyethylene (PE) Plastic Pipe Schedules 40 and 80, Based on Outside Diameter.
y. ASTM D2466 – Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
z. ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
aa. ASTM D2661 - Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
bb. ASTM D2665 - Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
cc. ASTM D2683 - Socket-Type Polyethylene Fillings for Outside Diameter-Controlled Polyethylene Pipe.
dd. ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
ee. ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
ff. ASTM D2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
gg. ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
hh. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
ii. ASTM F679 - Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
jj. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
kk. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.
ll. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
mm. MSS SP-67 - Butterfly Valves.
nn. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
oo. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
pp. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
qq. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
rr. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.
ss. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends.
tt. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
uu. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
vv. NFPA 54 – National Fuel Gas Code.

1.3 QUALITY ASSURANCE

a. Perform Work in accordance with applicable codes and standards.
b. Valves: Manufacturer's name and pressure rating marked on valve body.
c. Welding Materials and Procedures: Conform to ASME SEC IX and applicable state labor regulations.
d. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.4 SUBMITTALS

1.4.1. Submittals for Review:

a. Section 01400 - Quality Control: Procedures for submittals.
b. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
c. Operation and Maintenance Data.

1.4.2. Submittals At Project Closeout:

a. Section 01720 – Closeout Procedures - Procedures for submittals.
b. Project Record Documents: Record actual locations of valves.
c. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.5 DELIVERY, STORAGE, AND PROTECTION

a. Section 01400 - Quality Control: Transport, handle, store, and protect products.
b. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
c. Provide temporary protective coating on cast iron and steel valves.
d. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
e. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.6 REGULATORY REQUIREMENTS

a. Perform Work in accordance with International Plumbing Code (IPC) and International Fuel Gas Code (IFGC).
b. Conform to applicable code for installation of backflow prevention devices.
c. Provide certificate of compliance indicating approval of installation of backflow prevention devices.
d. Install gas piping and equipment in accord with NFPA 54 and the IFGC.

1.7 ENVIRONMENTAL REQUIREMENTS

a. Section 01400 - Quality Control: Environmental conditions affecting products on site.
b. Do not install underground piping when bedding is wet or frozen.

1.8 EXTRA MATERIALS

a. Section 01720 – Closeout Procedures.
b. Provide two repacking kits for each size valve.

PART 2 - PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING

a. See Section 02530 - Sanitary Drainage.

2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

a. Cast Iron Pipe: ASTM A74 weight.

(1) Fittings: Cast iron.
(2) Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

b. Cast Iron Pipe: CISPI 301, hubless.

(1) Fittings: Cast iron.
(2) Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.

2.3 SANITARY SEWER PIPING, ABOVE GRADE

2.3.1. Sanitary Sewer Piping, Above Grade, exposed locations.

a. Cast Iron Pipe 2” and Larger: CISPI 301, hubless, service weight.

(1) Fittings: Cast iron.
(2) Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

b. Copper Tube 1 ½” and Smaller: ASTM B306, DWV Type L, M.

Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper.
Joints: ASTM B32, solder, Grade 50B.

2.3.2. Sanitary Sewer Piping Above Grade, Concealed locations:

a. ABS Pipe: ASTM D2751:

(1) Fittings: ABS.
(2) Joints: ASTM D2235, solvent weld.

b. PVC Pipe: ASTM D2665 or ASTM D3034:

(1) Fittings: PVC.
(2) Joints: ASTM D2885, solvent weld with ASTM D2564 solvent cement.

2.4 WATER PIPING

2.4.1. Water Piping, Buried Beyond 5 Feet Of Building:

a. See Section 02510 - Water Distribution.

2.4.2. Water Piping, Buried Within 5 Feet Of Building:

a. Copper Tubing: ASTM B42, hard drawn or annealed, Type K.

(1) Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
(2) Joints: AWS A5.8, BCuP silver braze.

2.4.3. Water Piping, Above Grade:

a. Copper Tubing: ASTM B88 Type L, hard drawn.

(1) Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
(2) Joints: ASTM B32, solder, Grade 95TA.

2.5 STORM WATER PIPING

2.5.1. Storm Water Piping, Buried Beyond 5 Feet Of Building:

a. See Section 02630 - Storm Drainage.

2.5.2. Storm Water Piping, Buried Within 5 Feet Of Building:

a. Cast Iron Pipe: ASTM A74 service weight.

(1) Fittings: Cast iron.
(2) Joints: ASTM C564, neoprene gasket system or lead and oakum.

b. ABS Pipe: ASTM D2751.

(1) Fittings: ABS.
(2) Joints: ASTM D2235, solvent weld.

c. PVC Pipe: ASTM D2665 or ASTM D3034.

(1) Fittings: PVC.
(2) Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

d. PVC Pipe: ASTM D2665, ASTM D3034, or ASTM F679.

(1) Fittings: PVC.
(2) Joints: ASTM F477, elastomeric gaskets.

2.5.3. Storm Water Piping, Above Grade:

a. Cast Iron Pipe: ASTM A74 service weight.

(1) Fittings: Cast iron.
(2) Joints: ASTM C564, neoprene gasket system or lead and oakum.

b. Cast Iron Pipe: CISPI 301, hubless, service weight.

(1) Fittings: Cast iron.
(2) Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

c. ABS Pipe: ASTM D2751.

(1) Fittings: ABS.
(2) Joints: ASTM D2235, solvent weld.

d. PVC Pipe: ASTM D2665 or ASTM D3034.

(1) Fittings: PVC.
(2) Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

e. PVC Pipe: ASTM D2665, ASTM D3034, or ASTM F679.

(1) Fittings: PVC.
(2) Joints: ASTM F477, elastomeric gaskets.

2.6 NATURAL GAS PIPING, BURIED OUTSIDE OF BUILDING

a. See Natural Gas supplier standards.

2.7 NATURAL GAS PIPING, BURIED INSIDE OF BUILDING

a. Not permitted.

2.8 NATURAL GAS PIPING, ABOVE GRADE

a. Steel Pipe: ASTM A53 Schedule 40 black.

(1) Fittings: 2" and smaller - ASME B16.3, malleable iron. Larger than 2" - ASTM A234/A234M, forged steel welding type.
(2) Joints: NFPA 54, threaded or welded to ANSI B31.1

2.9 FLANGES, UNIONS, AND COUPLINGS

a. Pipe Size 3 Inches and Under:

(1) Ferrous pipe: Class 150 malleable iron threaded unions.
(2) Copper tube and pipe: Class 150 bronze unions with soldered joints.

b. Pipe Size Over 1 Inch:

(1) Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
(2) Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

c. Grooved and Shouldered Pipe End Couplings:

(1) Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
(2) Sealing gasket: "C" shape composition sealing gasket.

d. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.10 PIPE HANGERS AND SUPPORTS

a. Plumbing Piping - Drain, Waste, and Vent:

(1) Conform to ASME B31.9.
(2) Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or carbon steel, adjustable swivel, split ring.
(3) Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
(4) Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
(5) Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
(6) Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
(7) Vertical Support: Steel riser clamp.
(8) Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
(9) Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

b. Plumbing Piping – Water and natural gas.

(1) Conform to ASME B31.9.
(2) Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
(3) Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
(4) Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
(5) Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
(6) Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
(7) Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
(8) Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
(9) Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
(10) Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
(11) Vertical Support: Steel riser clamp.
(12) Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

(13) Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
(14) Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
(15) Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.11 GATE VALVES

a. Up To and Including 3 Inches:

(1) MSS SP-80, Class 150, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends.

2.12 GLOBE VALVES

a. Up To and Including 3 Inches:

(1) MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder or threaded ends.

2.13 BALL VALVES

a. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder or threaded ends.

2.14 PLUG VALVES

a. Construction 2-1/2 Inches and Larger: MSS SP-78, 175 psi, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.15 BUTTERFLY VALVES

a. Construction 2 inches or less: MSS SP-67, 200 psi, bronze iron body, bronze disc, resilient replaceable seat, extended neck, lever handle.

2.16 SWING CHECK VALVES

a. Up to and including 3 inches:

(1) MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends.

b. 2 Inches and Larger:

(1) MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

2.17 RELIEF VALVES

a. Pressure Relief:

(1) AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

b. Temperature and Pressure Relief:

(1) AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME SEC IV certified and labeled.

2.18 STRAINERS

a. Size 2 inch and Under:

(1) Threaded brass body for Class 150, threaded bronze body, Y pattern with 1/32 inch stainless steel perforated screen.

b. Size 1-1/2 inch to 4 inch:

(1) Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

PART 3 - EXECUTION

3.1 EXAMINATION

a. Section 01040 - Coordination: Verification of existing conditions before starting work.
b. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

a. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
b. Remove scale and dirt, on inside and outside, before assembly.
c. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

a. Install in accordance with manufacturer's instructions.
b. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
c. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
d. Install piping to maintain headroom, conserve space, and not interfere with use of space.

e. Group piping whenever practical at common elevations.
f. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 15121.
g. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 15260.
h. Provide access where valves and fittings are not exposed.
i. Establish elevations of buried piping outside the building to ensure not less than 5 ft of cover.
j. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
k. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
l. Provide support for utility meters in accordance with requirements of utility companies.
m. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09910.
n. Excavate in accordance with Sections 02300 for work of this Section.
o. Backfill in accordance with Sections 02300 for work of this Section.
p. Install bell and spigot pipe with bell end upstream.
q. Install valves with stems upright or horizontal, not inverted.
r. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
s. Install water piping to ASME B31.9.
t. Sleeve pipes passing through partitions, walls and floors.
u. Inserts:

(1) Provide inserts for placement in concrete formwork.
(2) Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
(3) Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
(4) Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
(5) Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

v. Pipe Hangers and Supports:

(1) Install in accordance with ASTM B31.9.
(2) Support horizontal piping as scheduled.
(3) Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
(4) Place hangers within 12 inches of each horizontal elbow.
(5) Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
(6) Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
(7) Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
(8) Provide copper plated hangers and supports for copper piping or sheet lead packing between hanger or support and piping.
(9) Prime coat exposed steel hangers and supports. Refer to Section 09900. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
(10) Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 15245.
(11) Support cast iron drainage piping at every joint.

3.4 APPLICATION

a. Use grooved mechanical couplings and fasteners only in accessible locations.
b. Install unions downstream of valves and at equipment or apparatus connections.

c. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
d. Install gate ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
e. Install globe ball or butterfly valves for throttling, bypass, or manual flow control services.
f. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
g. Provide spring loaded check valves on discharge of water pumps.
h. Provide plug valves in natural gas systems for shut-off service.
i. Provide flow controls in water recirculating systems where indicated.

3.5 ERECTION TOLERANCES

a. Section 01400 - Quality Control: Tolerances.
b. Establish invert elevations, slopes for drainage to 1/4 inch per foot for pipe 3 inches and smaller, 1/8 inch per foot for larger pipes. Maintain gradients.
c. Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

a. Prior to starting work, verify system is complete, flushed and clean.
b. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
c. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
d. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
e. Maintain disinfectant in system for 24 hours.
f. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
g. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
h. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.7 SERVICE CONNECTIONS

a. See section 02510 - Water Distribution

3.8 SCHEDULES

3.8.1. Pipe Hanger Spacing:

a. Metal Piping:

Pipe Size	Maximum Hanger Spacing, Ft.	Rod Size, Inches
1/2 to 1-1/4 inches:	6.5	3/8
1-1/2 to 2 inches:	10	3/8
2-1/2 to 3 inches:	10	1/2
4 to 6 inches:	10	5/8

8 to 12 inches:	14	3/8
14 inches and Over:	20	1

b. Plastic Piping:

All Sizes:	6	3/8

3.9 TESTING

a. Hydrostatically test water mains at 150 psi.
b. Air pressure test water mains at 150 psi.
c. Storm and Sanitary - Test at 10' water column.
d. Gas - Air test at 20 psig for 2 hours.

END OF SECTION 15410

CONSTRUCTION ISSUE

SECTION 15430

PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Roof and floor drains.
b. Cleanouts.
c. Hose bibs.
d. Hydrants.
e. Backflow preventers.
f. Water hammer arrestors.
g. Interceptors.
h. Thermostatic mixing valves.
i. Gas pressure regulators.
j. Water pressure reducing valves.
k. Gas meters.
l. Water meters.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Closeout Procedures.
d. Section 07540 - Thermoplastic Membrane Roofing.
e. Section 15140 – Supports, Anchors and Seals.
f. Section 15240 – Vibration Isolation and Seismic Restraints.
g. Section 15410 - Plumbing Piping.
h. Section 15440 - Plumbing Fixtures.
i. Section 15450 - Plumbing Equipment.
j. Division 16 – Electrical.
k. Section 01000 - Description of Work: Product requirements for Owner furnished equipment.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. ASME A112.21.1 - Floor Drains.
b. ASME A112.21.2 - Roof Drains.
c. ASME A112.26.1 - Water Hammer Arrestors.

d. ASSE 1011 - Hose Connection Vacuum Breakers.
e. ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.
f. ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.
g. ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
h. AWWA C506 - Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.
i. PDI WH-201 - Water Hammer Arrestors.
j. PDI WH-201 - Water Hammer Arrestors.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Section 01400 - Submittals: Procedures for submittals.
b. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
c. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
d. Operation and Maintenance Data.

1.3.2. Submittals For Information:

a. Section 01400 - Submittals: Procedures for submittals.
b. Certificates: Certify that grease interceptors meet or exceed specified requirements.
c. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.

1.3.3. Submittals At Project Closeout:

a. Section 01720 – Closeout Procedures.
b. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors, etc.
c. Operation Data: Indicate frequency of treatment required for interceptors.
d. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
e. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.4 DELIVERY, STORAGE, AND PROTECTION

a. Section 01600 - Material and Equipment: Transport, handle, store, and protect products.
b. Accept specialties on site in original factory packaging. Inspect for damage.

1.5 QUALIFICATIONS

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.1

2.2 ROOF DRAINS

a. See Drawings.

2.3 FLOOR DRAINS

a. See Drawings.

2.4 FLOOR SINKS

a. See Drawings

2.5 CLEANOUTS

a. See Drawings.

2.6 HOSE BIBS

a. See drawings.

2.7 HYDRANTS

a. See drawings.

2.8 BACKFLOW PREVENTERS

a. Reduced Pressure Backflow Preventers:

(1) ANSI/ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.9 WATER HAMMER ARRESTORS

a. ANSI A112.26.1; stainless steel construction, bellows type sized in accordance with PDI WH-201, precharged suitable for operation in temperature range 34 to 250 degrees F working pressure.

2.10 SUMPS

a. Precast concrete with required openings and drainage fittings.
b. Cover: 3/8 inch plate with gasket seal frames and anchor bolts.

2.11 THERMOSTATIC MIXING VALVES

a. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
b. Accessories:

(1) Check valve on inlets.
(2) Volume control shut-off valve on outlet.
(3) Stem thermometer on outlet.
(4) Strainer stop checks on inlets.

c. Cabinet: 16 gage stainless steel, for recessed mounting with keyed lock.

2.12 SEISMIC ACTUATION GAS SHUTOFF VALVE

a. ANSI Z21.70, mechanical operation, flanged end.

2.13 GAS PRESSURE REGULATORS

2.13.1. Acceptable Manufacturers:

a. Maxitrol #325-5H or #210-D
b. Fisher #S102 or S302
c. Rockwell

2.13.2. Construction:

a. Synthetic rubber seating surface to provide full positive shut-off.
b. Regulators shall maintain reduced pressure under static conditions when no gas is flowing. (lock up type).
c. 2 to 5 psi inlet pressure to 4 in. to 8 in. W.G. outlet pressure. (Verify).
d. See drawings for required capacities, inlet pressures and outlet pressures.
e. Extend vent to outdoors.

2.14 WATER PRESSURE REDUCING VALVE

2.14.1. Acceptable manufacturers

a. Boylston Figure 88
b. Spence
c. Monel trim

2.14.2. Construction

a. Gate valve before; Gate valve after; Globe valve in bypass; 1/2 in. regulator line, with needle valve, connected 15 ft.-0 in. down stream.

2.15 WATER METER

2.15.1. Acceptable Manufacturers:

a. Hersey
b. Rockwell
c. American Meter

2.15.2. Water Meters:

a. Shall conform to American Water Works Association (AWWA) C700.
b. Meters shall be positive displacement, oscillating piston, or disc nutation type.
c. Features: Magnetic drive with magnetic shielding, straight reading sealed register graduated in cubic feet. All bronze split case, integral strainer, threaded ends, and pulse switch initiator.
d. Meter shall be suitable for accurately measuring and handling water at pressure, temperatures and flow rates to be encountered.
e. Pulse initiator shall provide maximum number of pulses up to 500 per minute that is obtainable from the manufacturer. It shall not provide less than 1-pulse per 380 liters (100-gallons).

2.16 GAS METER

2.16.1. Acceptable Manufacturers:

a. Rockwell “Equimeter”
b. American Meter
c. Schlumberger

2.16.1. Gas Meters:

a. Shall conform to Federal Specification GG-M-2802, Style B.
b. Meters shall be suitable for accurately measuring and handling gas at pressures, temperatures and flow rates to be encountered.
c. Meters shall have a pulse switch initiator capable of operating up to speeds of 500-pulses per minute with no false pulses and shall require no field adjustments.

d. Initiators shall provide the maximum number of pulses up to 500 per minute that is obtainable from the manufacturer. It shall not provide less than 1-pulse per 3 cubic meters (100 cubic feet) of gas.

2.17 EYEWASH FOUNTAINS

2.17.1. ITEM 2M06: WALL MOUNT DRENCH HOSE

Salient Characteristics:

a. Dual stream eye-face wash with wall bracket for stationary flushing, or removable for spot body drenching.
b. Spray Heads: ABS plastic dual stream heads, float off covers secured with stainless steel bead chain and chrome plated brass piping.
c. Hand-Held Spray Hose: 6-foot long coiled drench hose with 3/8 inch NPT stay-open valve assembly.
d. Valve: ½ inch NPT.
e. Activator: Stainless steel push plate with actuation graphics.
f. Inlet: ½ inch NPT.
g. Flow Rate: 8 gpm at 45 psi.

Basis-of-Design Product: Lab Safety Supply Inc. (800) 356-0783 or www.labsafety.com.

h. Model 22194.

2.17.2. ITEM 2R05: EYE/FACE & BODY SPRAY

Salient Characteristics:

a. Spray Pattern: 9-inch by 8-inch (72 sq. in.) curtain of aerated water, easily controlled at any pressure for maximum protection.
b. Bowl: 300 Series stainless steel.
c. Spray Heads: Six brass, chrome-plated, aerated.
d. Hand-Held Spray Hose: 6-foot long reinforced vinyl hose with 3/8 inch NPT self-closing valve with aerated spray.
e. Valve: ½ inch NPT female brass, chrome-plated.
f. Activator: Stainless steel push handle and foot operation.
g. Shrouds: Yellow polypropylene.
h. Inlet: ½ inch NPT female.
i. Strainer: Brass, chrome-plated, in-line.
j. Pipe: 1-1/4-inch IPS galvanized steel.
k. Floor Flange: Brass casting with three17/32 inch diameter mounting holes on 9-inch diameter bolt circle, spaced 120 degrees apart.
l. Waste: 1-1/4-inch NPT female.
m. Finish: Safety green paint.
n. Emergency Sign: 1-7/8 inches by 7-7/8 inches plastic wall sign.

Basis-of-Design Product: Lab Safety Supply Inc. (800) 356-0783 or www.labsafety.com.

o. Model 14721 Eye/Face Wash.
p. Model 28908 Hand-Held Spray Hose.
q. Model 22085 Foot Pedal.

2.18 SINKS

2.18.1. ITEM 4S00: HAND WASH SINK

Salient Characteristics:

a. One piece sink bowl mounted on interlocking pedestal base.
b. Die formed countertop edge with 3/8 inch no-drip offset.
c. "Hands Free" Electronic Faucet: Infrared sensor activated solid brass, chrome plated, gooseneck lavatory faucet with solid brass solenoid and built-in filter. Sensor detects user's presence and immediately turns on water supply pre-mixed to desired temperature.
d. One sheet stainless steel with coved corners, no welded seams other than corners. Welded areas blended to match adjacent surfaces. Satin finish.
e. 8-inch backsplash.
f. Faucet: ½ inch IPS for hot and cold water with drain connections.
g. 1-1/2-inch IPS, 17 gauge, chrome plated trap.
h. Height to sink rim: 34 inches.
i. Bowl Dimensions:

(1) Length 14 inches.
(2) Width 10 inches
(3) Depth 5 inches.

j. Overall Sink Dimensions:

(1) Length 17-1/4 inches.
(2) Width 15-1/4 inches

k. Accessories:

(1) Liquid soap dispenser.
(2) Towel dispenser with hinged cover. Unit uses standard C-fold towels.
(3) Stainless steel 1-1/2-inch IPS basket drain.

l. Electrical: UL/CSA approved transformer 120VAC to 12 VDC with waterproof connectors.

Basis-of-Design Product: Advance Tabco. (800) 645-3166 or www.advancetabco.com.

m. Model 7-PS-91 Sink with Pedestal Skirt.
n. Model 7-PS-34 Towel and Soap Dispenser Unit.
o. Model K-176 AC Adapter Electronic Faucet.

2.18.2. ITEM 4S01L: ONE COMPARTMENT SINK, WITH ONE DRAINBOARD

Salient Characteristics:

a. Stainless Steel Sink:

(1) Construction: Sink, backsplash, and integral drainboard shall be 14 gauge type 304 stainless steel conforming to AISI-300 series.
(2) Sink bowl: Square in dimension with coved corners.

(3) Provide sink rims with rolled edges.
(4) Sink bowl compartment size:

(a) Length 22-24 inches.
(b) Width 22-24 inches (front to back).
(c) Depth 13-14 inches.

(5) Provide sink bowl compartment with lever operated waste drain, drain plug and overflow fitting.
(6) Sink backsplash: 8 – 10 inches high.
(7) Sink working height 34-36 inch above finished floor.
(8) Designed to accommodate ½ inch piping for hot and cold connections.
(9) Designed with stainless steel legs with adjustable stainless steel bullet feet.
(10) Drainboard mounted to the left of the sink bowl.

(a) Length 24 inches
(b) Width 24 inches (front to back).

(11) Approximate overall dimensions:

(a) Length 51 inches.
(b) Width 28 inches (front to back).
(c) Height 44 inches.
(d) Three-inch variance all dimensions.

b. Faucet with hose sprayer:

Provide with pre-rinse unit with mixing faucet and integrated hose sprayer.
Designed to be mounted to the backsplash, faucet has 8 inch center.
(1) Provide with a spring action type gooseneck hand-held spray hose unit.
(2) Provide with wall mount bracket to stabilize gooseneck unit.

c. Basis-of-Design Product: Marlo Manufacturing Co. (800) 222-0450 or www.marlomfg.com.

(1) Coved Sink Bowls Model No. ESC-1-2224-24 L (modified to 14 ga stainless steel), with pre-rinse faucet unit and wall bracket.

2.18.3. ITEM 4S02D: TWO COMPARTMENT SINK, WITH TWO DRAINBOARDS

Salient Characteristics:

a. Stainless Steel Sink:

(1) Construction: Sink, backsplash, and integral drainboards shall be 14 gauge type 304 stainless steel conforming to AISI-300 series.
(2) Sink bowl: Square in dimension with coved corners.
(3) Provide sink rims with rolled edges.
(4) Sink bowl compartment size:

(a) Length 22 inches.
(b) Width 28 inches (front to back).

(c) Depth 13 inches.

(5) Provide sink bowl compartment with lever operated waste drain, drain plug and overflow fitting.
(6) Sink backsplash: 8 – 10 inches high.
(7) Sink working height 34-36 inch above finished floor.
(8) Designed to accommodate ½ inch piping for hot and cold connections.
(9) Designed with stainless steel legs with adjustable stainless steel bullet feet.
(10) Provide with a 3 ½ inch sink collar to accommodate the disposal unit.
(11) Drainboards mounted to the left and right of the sink bowls. Size of each drainboard:

(a) Length 24 inches
(b) Width 30 inches (front to back).

(12) Approximate overall dimensions:

(a) Length 98 inches.
(b) Width 34 inches (front to back).
(c) Height 44 inches.
(d) Four-inch variance all dimensions.

b. Faucet with hose sprayer:

Provide with pre-rinse unit with mixing faucet and integrated hose sprayer.
Designed to be mounted to the backsplash, faucet has 8 inch center.
(1) Provide with a spring action type gooseneck hand-held spray hose unit.
(2) Provide with wall mount bracket to stabilize gooseneck unit.

c. Commercial disposal unit in damaged merchandise only:

(1) Designed to mount into a drain equipped with a 3-1/2 inch sink collar.
(2) Provide with a minimum .75 HP motor, water control valve, automatic reversing control system, and water drain.
(3) Standard electrical circuit to be 115 V / 60 HZ / 1 PH.
(4) Mount unit in the right sink compartment.

d. Basis-of-Design Product: Marlo Manufacturing Co. (800) 222-0450 or www.marlomfg.com.

(1) Bakery Sink Bowls Model No. ESC-2-4430-24 D with pre-rinse faucet unit and wall bracket.

e. Basis-of-Design Product: The Salvajor Company. (800) 725-8256 or www.salvajor.com.

(1) Disposal Unit Model 75 with ARSS controls. Provide adapter or modify sink as required to facilitate installation of disposal.

2.18.4. ITEM 4S03D: THREE COMPARTMENT SINK, WITH TWO DRAINBOARDS

Salient Characteristics:

a. Stainless Steel Sink:

(1) Construction: Sink, backsplash, and integral drainboards shall be 14 gauge type 304 stainless steel conforming to AISI-300 series.
(2) Sink bowl: Square in dimension with coved corners.
(3) Provide sink rims with rolled edges.
(4) Sink bowl depth 13 inches.
(5) Provide sink bowl compartment with lever operated waste drain, drain plug and overflow fitting.
(6) Sink backsplash: 8 – 10 inches high.
(7) Sink working height 34-36 inch above finished floor.
(8) Designed to accommodate ½ inch piping for hot and cold connections.
(9) Designed with stainless steel legs with adjustable stainless steel bullet feet.
(10) Provide with a 3 ½ inch sink collar to accommodate the disposal unit.
(11) Drainboards mounted to the left and right of the sink bowls.
(12) Approximate overall dimensions:

(a) Length 93 inches with sink 18 inches long by 22 inches wide (front to back) and each drainboard 18 inches long by 24 inches wide (front to back).
(b) Length 105 inches with sink 22 inches long by 22 inches wide (front to back) and each drainboard 18 inches long by 24 inches wide (front to back).
(c) Length 117 inches with sink 22 inches long by 22 inches wide (front to back) and each drainboard 24 inches long by 24 inches wide (front to back).
(d) Width 28 inches (front to back).
(e) Height 44 inches.
(f) Four-inch variance in each sink dimension; two-inch variance in length dimension.

b. Faucet with hose sprayer:

Provide with pre-rinse unit with mixing faucet and integrated hose sprayer.
Designed to be mounted to the backsplash, faucet has 8 inch center.
(1) Provide with a spring action type gooseneck hand-held spray hose unit.
(2) Provide with wall mount bracket to stabilize gooseneck unit.

c. Swing type faucet:

(1) Provide with swing type fourteen inch spout.
(2) 8-inch center faucet.
(3) Mount to backsplash.

d. Commercial disposal unit in Deli only:

(1) Designed to mount into a drain equipped with a 3-1/2 inch sink collar.
(2) Provide with a minimum .75 HP motor, water control valve, automatic reversing control system, and water drain.
(3) Standard electrical circuit to be 115V / 60 HZ / 1 PH.
(4) Mount unit in the left sink compartment.

e. Basis-of-Design Product: Marlo Manufacturing Co. (800) 222-0450 or www.marlomfg.com.

(1) 93-inch long Coved Sink Bowls Model No. ESC-3-5824-18 D (modified to 14 ga stainless steel) with pre-rinse faucet unit and wall bracket and swing type faucet.
(2) 105-inch long Coved Sink Bowls Model No. ESC-3-7024-18 D (modified to 14 ga stainless steel) with pre-rinse faucet unit and wall bracket and swing type faucet.

(3) 117-inch long Coved Sink Bowls Model No. ESC-3-7024-18 D (modified to 14 ga stainless steel) with pre-rinse faucet unit and wall bracket and swing type faucet.

f. Basis-of-Design Product: The Salvajor Company. (800) 725-8256 or www.salvajor.com.

(1) Disposal Unit Model 75 with ARSS controls. Provide adapter or modify sink as required to facilitate installation of disposal.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with manufacturer's instructions.
b. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
c. Encase exterior cleanouts in concrete flush with grade.
d. Install floor cleanouts at elevation to accommodate finished floor.
e. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibs.
f. Pipe relief from backflow preventer to nearest drain.
g. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories, sinks, washing machine outlets, and each washroom or group of fixtures.
h. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures. Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

END OF SECTION 15430

CONSTRUCTION ISSUE

SECTION 15440

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Water closets.
b. Urinals.
c. Lavatories.
d. Sinks.
e. Service sinks.
f. Electric water coolers.
g. Eye and face wash fountains.

1.1.2. Related Sections:

a. Section 01115 - Sustainable Design Requirements.
b. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
c. Section 01400 - Quality Control.
d. Section 01720 –Closeout Procedures.
e. Section 06402 - Interior Architectural Woodwork: Preparation of counters for sinks.
f. Section 07920 - Joint Sealants: Seal fixtures to walls and floors.
g. Section 15140 - Supports and Anchors.
h. Section 15240 - Vibration Isolation and Seismic Restraints.
i. Section 15410 - Plumbing Piping.
j. Section 15430 - Plumbing Specialties.
k. Section 15450 - Plumbing Equipment.
l. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ANSI Z358.1 - Emergency Eye Wash and Shower Equipment.
c. ARI 1010 - Drinking Fountains and Self-Contained Mechanically Refrigerated Drinking Water Coolers.
d. ASME A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use.
e. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.
f. ASME A112.19.1 - Enamelled Cast Iron Plumbing Fixtures.
g. ASME A112.19.2 - Vitreous China Plumbing Fixtures.
h. ASME A112.19.4 - Porcelain Enamelled Formed Steel Plumbing Fixtures.
i. ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.
j. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Section 01400 - Submittals: Procedures for submittals.
b. Product Data: Provide catalog illustrations of fixtures, electric/electronic controls for lavatories and flush valves, sizes, rough-in dimensions, utility sizes, trim, and finishes.
c. Operation and Maintenance Data.

1.3.2. Submittals For Information:

a. Section 01400 - Submittals: Procedures for submittals.
b. Manufacturer's Instructions: Indicate installation methods and procedures.

1.3.3. Sustainable Design Submittals
a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit manufacturer product data indicating the flow or flush rate for each plumbing fixtures.
c. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."
(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.3.4. Submittals At Project Closeout:

a. Section 01720 – Closeout Procedures: Procedures for submittals.
b. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
c. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
d. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.4 DELIVERY, STORAGE, AND PROTECTION

a. Section 01400 – Quality Control: Transport, handle, store, and protect products.
b. Accept fixtures on site in factory packaging. Inspect for damage.
c. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.5 QUALIFICATIONS

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

1.6 REGULATORY REQUIREMENTS

a. International Plumbing code, IPC.
b. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.7 WARRANTY

a. Section 01720 - Closeout Procedures.
b. Provide five year manufacturer warranty for electric water cooler and water heater.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Plumbing Fixtures
a. See drawings

2.1.3. Sealants and Adhesives, Interior on-site applied only.
a. Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 FLUSH VALVE WATER CLOSETS

a. See drawings.

2.2.2. Acceptable Manufacturers:

a. Kohler
b. American Standard
c. Eljer
d. Crane

2.3 WALL HUNG URINALS

a. See drawings

2.3.2. Acceptable Manufacturers:

a. Kohler
b. American Standard
c. Eljer
d. Crane

2.4 LAVATORIES

a. See drawings.

2.4.2. Acceptable Manufacturers:

a. Kohler
b. American Standard
c. Eljer
d. Crane

2.5 SINKS

a. See drawings.

2.5.2. Acceptable Manufacturers:

a. Elkay
b. Just
c. Baxter
d. Metalmasters

2.6 ELECTRIC WATER COOLERS

a. See drawings.

2.6.2. Acceptable Manufacturers:

a. Halsey Taylor
b. Elkay
c. Oasis
d. Haws

2.7 SERVICE SINKS

a. See drawings.

2.8 EMERGENCY EYE AND FACE WASH

a. See drawings.

2.8.2. Acceptable Manufacturers:

a. Haws

b. Speakman
c. Bradley

PART 3 - EXECUTION

3.1 EXAMINATION

a. Section 01040 - Coordination: Verification of existing conditions before starting work.
b. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
c. Verify that electric power is available and of the correct characteristics.
d. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

a. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

a. Install each fixture with trap, easily removable for servicing and cleaning.
b. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
c. Install components level and plumb.
d. Install and secure fixtures in place with wall carriers and bolts.
e. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07920, color to match fixture.
f. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.4 INTERFACE WITH OTHER PRODUCTS

a. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

a. Section 01720 – Closeout Procedures: Adjusting installed work.
b. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

a. Section 01720 – Closeout Procedures: Cleaning installed work.

b. Clean plumbing fixtures and equipment.

3.7 PROTECTION OF FINISHED WORK

a. Section 01720 – Closeout Procedures: Protecting installed work.
b. Do not permit use of fixtures.

END OF SECTION 15440

CONSTRUCTION ISSUE

SECTION 15450

PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Water Heaters.
b. Water Storage Tanks.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Closeout Procedures.
d. Section 15140 - Supports and Anchors.
e. Section 15240 - Vibration Isolation and Seismic Restraints.
f. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ASHRAE 90A - Energy Conservation in New Building Design.
c. ASME Section 8D - Pressure Vessels.
d. NFPA 30 - Flammable and Combustible Liquids Code.
e. NFPA 54 - National Fuel Gas Code.
f. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Section 01400 - Submittals: Procedures for submittals.
b. Product Data:

(1) Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
(2) Provide electrical characteristics and connection requirements.

c. Shop Drawings:

(1) Indicate heat exchanger dimensions, size of tappings, and performance data.
(2) Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

d. Operation and Maintenance Data.

1.3.2. Submittals For Information:

a. Section 01400 - Quality Control: Procedures for submittals.
b. Manufacturer's Instructions.

1.3.3. Submittals At Project Closeout:

a. Section 01720 – Closeout Procedures.
b. Project Record Documents: Record actual locations of components.
c. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
d. Warranty: Submit water heater manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
e. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.4 QUALITY ASSURANCE

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
b. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:

(1) American Gas Association (AGA).
(2) National Sanitation Foundation (NSF).
(3) American Society of Mechanical Engineers (ASME).
(4) National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
(5) National Electrical Manufacturers' Association (NEMA).
(6) Underwriters Laboratories (UL).

1.5 REGULATORY REQUIREMENTS

a. Conform to AGA, NSF, NFPA 54 requirements for water heaters.
b. Conform to ASME Section 8D for tanks.
c. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND PROTECTION

1.6.1. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.

a. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.7 WARRANTY

1.7.1. Section 01720 – Closeout Procedures.

a. Provide five year manufacturer warranty for domestic water heaters and water storage tanks.

1.8 EXTRA MATERIALS

1.8.1. Section 01720 – Closeout Procedures. Maintenance Data.

a. Provide two pump seals.

PART 2 - PRODUCTS

2.1 COMMERCIAL GAS FIRED WATER HEATERS

a. Packaged, integrated, separated combustion water heater with storage tank, controls, circulators and local piping. See drawings for performance.
b. Heater design shall be condensing flue coil, glass coated on the flue gas side. Pressure rating shall be 160 psig. Efficiency shall be 92%.
c. Factory installed bronze circulating pump(s) shall be provided.
d. Glass lined steel tank, ASME labeled; 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; built in drain pan, floor shield and legs.
e. Accessories: Brass water connections and dip tube, drain valve, magnesium anode, and ASME rated temperature and pressure relief valve.
f. Approval: By AGA as automatic storage water heater for operation at 180 degrees F.
g. Controls: Automatic direct immersion thermostat with temperature range adjustable minimum 140 degrees F differential, automatic reset high temperature limiting thermostat factory set at 195 degrees F, gas pressure regulator, multi-ribbon or tabular burner, 100 percent safety shut-off pilot and thermocouple, draft proving switch, intermittent electronic ignition monitoring pilot and main flame, trial for re-ignition for momentary loss of flame, shut down or pilot and main burner in 2-4 seconds after loss of flame, and power venter.

2.2 IN-LINE CIRCULATOR PUMPS

a. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.
b. Impeller: Bronze.
c. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
d. Seal: Carbon rotating against a stationary ceramic seat.

e. Drive: Flexible coupling.
f. Strap on aquastat wired to cycle hot water recirculating pumps.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install water heaters in accordance with manufacturer's instructions and to AGA requirements.
b. Coordinate with plumbing piping and related fuel piping, gas venting, and electrical work to achieve operating system.
c. Wire circulating pump controls.

END OF SECTION 15450

CONSTRUCTION ISSUE

SECTION 15535

REFRIGERANT PIPING AND SPECIALTIES FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Piping.
b. Refrigerant.
c. Flexible connections.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15140 - Supports and Anchors.
e. Section 15240 - Vibration Isolation and Seismic Restraints.
f. Section 15260 - Piping Insulation for HVAC and Plumbing.
g. Section 15935 - Building HVAC Systems Controls.
h. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ARI 710 - Liquid Line Dryers.
c. ARI 730 - Flow-Capacity Rating and Application of Suction-Line Filters and Filter-Driers
d. ASHRAE 15 - Safety Code for Mechanical Refrigeration.
e. ASHRAE 34 - Number Designation of Refrigerants.
f. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
g. ASME B16.26 - Cast Copper Alloy Fittings For Flared Copper Tubes.
h. ASME B31.5 - Refrigeration Piping.
i. ASME B31.9 - Building Services Piping.
j. ASTM B88 - Seamless Copper Water Tube.
k. ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
l. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
m. AWS A5.8 - Brazing Filler Metal.
n. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
o. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
p. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Submit under provisions of Section 01400.
b. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes developed by the Condensing Unit Manufacturer.
c. Operation and Maintenance Data.

1.3.2. Submittals At Project Closeout:

a. Section 01720 – Phase Turnover and Contract Closeout.
b. Project Record Documents: Record actual locations of components.
c. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
d. Warranty: Submit compressor manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
e. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.4 DELIVERY, STORAGE, AND HANDLING

a. Deliver and store piping and specialties in shipping containers with labeling in place.
b. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
c. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

1.5 QUALIFICATIONS

a. Installer: Company specializing in performing the work of this section with minimum three years documented experience.
b. Design piping system under direct supervision of a Professional Engineer experienced in design of this work, licensed in one of the states of the United States of America, and employed or approved by the manufacturer of the equipment.

1.6 REGULATORY REQUIREMENTS

a. Conform to IMC ASME B31.9 for installation of piping system.
b. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

PART 2 - PRODUCTS

2.1 PIPING

a. Copper Tubing: ASTM B280, Type ACR hard drawn

(1) Fittings: ASME B16.22 wrought copper.

(2) Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F (640 to 805 degrees C).

b. Copper Tubing to 7/8 inch (22 mm) OD: ASTM B88, Type K, annealed.

(1) Fittings: ASME B16.26 cast copper.
(2) Joints: Flared.

c. Pipe Supports and Anchors:

(1) See Section 15410.

2.2 REFRIGERANT

a. Refrigerant: ASHRAE 34:

(1) R-410A.

2.3 FLEXIBLE CONNECTORS

a. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches (230 mm) long with copper tube ends; for maximum working pressure 500 psig (3450 kPa).

2.4 DRAIN PIPING

a. Type DWV copper with wrought, copper fittings.

PART 3 - EXECUTION

3.1 SYSTEM DESCRIPTION

a. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
b. Provide pipe hangers and supports in accordance with MSS SP69 unless indicated otherwise.
c. Solenoid Valves:

(1) Use in liquid line of systems operating with single pump-out or pump-down compressor control.
(2) Use in liquid line of single or multiple evaporator systems.
(3) Use in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.

d. Flexible Connectors: Utilize at or near condensing units or coils in resiliently mounted equipment where piping configuration does not absorb vibration.

3.2 DRAIN PIPING

a. Install a trapped drain in to the nearest floor drain for each cooling coil. Pipe size shall be full drain pan outlet size.

3.3 FIELD QUALITY CONTROL

a. Pressure test system with dry nitrogen to 200 psig (1470 kPa). Perform final tests at 27 inches (92 kPa) vacuum and 200 psig (1470) kPa) using electronic leak detector. Test to no leakage.

3.4 PREPARATION

a. Ream pipe and tube ends. Remove burrs.
b. Remove scale and dirt on inside and outside before assembly.
c. Prepare piping connections to equipment with flanges or unions.

3.5 INSTALLATION

a. Install refrigeration specialties in accordance with manufacturer's instructions.
b. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
c. Install piping to conserve building space and not interfere with use of space.
d. Group piping whenever practical at common elevations and locations. Slope piping 1-inch per 20 ft. in direction of oil return.
e. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
f. Inserts: See Section 15140.
g. Pipe Hangers and Supports: See Section 15140.
h. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required.
i. Provide clearance for installation of insulation and access to valves and fittings.
j. Continuously purge piping system with nitrogen when brazing.
k. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.
l. Insulate piping; refer to Section 15260. .
m. Follow ASHRAE 15 procedures for charging and purging of systems and for disposal of refrigerant.
n. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
o. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
p. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.
q. Fully charge completed system with refrigerant after testing.
r. Provide electrical connection to solenoid valves. .

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15536

REFRIGERANT HANDLING FOR NEW WORK

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Installation of refrigerant.
b. Removal of refrigerant.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.

1.3 SUBMITTALS

1.3.1. Submittals At Project Closeout:

a. Section 01720 – Phase Turnover and Contract Closeout.
b. Refrigerant log book.

1.4 QUALIFICATIONS

a. Installer: Company specializing in performing the work of this section with minimum three years documented experience.

1.5 REGULATORY REQUIREMENTS

a. Conform to IMC.

PART 2 - PRODUCTS

2.1 Not applicable.

PART 3 - EXECUTION

3.1 REFRIGERANT HANDLING

3.1.1. Refrigerant to be Added to Equipment:

a. All refrigerant added to equipment is contractor furnished, contractor installed and new non-recycled.

3.1.2. Contractor Responsibilities for Safe Removal:

a. The contractor is responsible for safe handling, dismantling, removal, and disposal of all refrigeration equipment identified for removal as part of the contract documents unless otherwise specified. Prior to dismantling and removal of refrigeration equipment, the contractor will recover all refrigerants for recycling by transferring to an approved external vessel or certified recycling or recovery machine.

3.1.3. Ownership and Handling of Recovered Refrigerant:

a. Notification/Coordination: Provide the Contracting Officer a minimum of 30 days prior to the date for scheduled removal of refrigerant and a plan for disposal of recovered refrigerant in accordance with applicable federal, state and local laws, rules and regulations.
b. Recovery of Used Refrigerant: Recover all refrigerant from equipment being removed and transfer to appropriate containers. The contractor is responsible for providing approved containers for the recovery of recovered refrigerants. Complete all documents necessary to accompany transfer of removed refrigerant to appropriate government agencies or private entities legally designated to accept such refrigerants.
c. Ownership of Recovered Refrigerant: At the discretion of the government, the government may elect to retain ownership of the recovered refrigerant, at no additional cost. If the government elects to retain ownership of recovered refrigerant, it will designate a storage point on the installation for the contractor to store the containers. In event the government elects to relinquish ownership of used refrigerants, the refrigerant will become the property of the contractor. The contractor will then be responsible for transporting and recycling or disposal of the refrigerant in accordance with applicable regulations, and shall bear any associated costs or credits.

3.1.4. Refrigerant Log Book:

a. Furnish and maintain a refrigerant log book for recording refrigerant transfers.
(1) In the log book itemize services performed, actions taken, and amount of refrigerant added to or removed from each system installed, or affected, or removed by this project.
(2) The Refrigerant Log Book is a three-ring loose leaf binder containing a table of contents and a separate Refrigerant logging form for each piece of refrigeration and HVAC equipment (see sample form).

3.1.5. Execution of Record Keeping for Refrigerant Transfers:

a. Duration: Establish the Refrigerant Log Book at the start of construction and continuously maintain and keep current until completion of the warranty portion of the contract.

CONSTRUCTION ISSUE

b. Location of Refrigerant Log Book: During the construction period, keep the log book in the possession of the contractor at the construction site. After construction is completed, keep the log book in the Commissary Store Director's Office.

c. Project Close-out: Upon completion of the construction portion of the project, furnish two updated copies of the log book to DeCA/PM/FM. Then, turn the original log book over to the Commissary Store Director.

END OF SECTION

CONSTRUCTION ISSUE

SERVICE DATE	TECHNICIAN NAME	COMPANY NAME	REASON FOR SERVICING	ACTIONS TAKEN	Lbs REF ADDED +	Lbs REF REMOVED -	DESTINATION RECOVERED REFRIGERANT	CORRECTIVE ACTIONS FOR LOSSES/ REMARKS

CONSTRUCTION ISSUE

REFRIGERANT LOG BOOK

Location:_____ Refrigeration System:_____

Equipment Application:_____ Refrigerant Type:_____

Equipment designated as indicated on construction drawings:

Refrigeration Capacity:_____BTU/HR

Total amount of refrigerant initially installed in system:

Equipment manufacturer name:

Model number:_____ Serial number:

HVAC/refrigeration installing contractor's name:

Name of installing contractor's lead technician on site:

Date installed:

CONSTRUCTION ISSUE

SECTION 15575

BREECHINGS, CHIMNEYS, AND STACKS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Manufactured chimneys for gas fired equipment.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15140 - Supports and Anchors.
e. Section 15625 – Fuel Fired Heaters.
f. Section 07531 - EPDM Membrane Roofing.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 - Quality Control.
b. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
c. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
d. ASTM A527 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
e. ASTM A569 - Steel, Sheet and Strip, Carbon (0.15 Maximum Percent) Hot-Rolled Commercial Quality.
f. NFPA 54 (ANSI Z223.1) - The National Fuel Gas Code.
g. UL 103 - Standard for Factory Built Low Heat Chimneys.
h. UL 441 - Standard for Gas Vents.
i. UL 641 - Standard for Low Temperature Venting Systems.
j. UL 959 (ANSI Z181.1) - Medium Heat Appliance Factory Built Chimneys.

1.3 DEFINITIONS

a. Breeching: Vent Connector.
b. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.
c. Smoke Pipe: Round, single wall vent connector.

d. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
e. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

1.4 DESIGN REQUIREMENTS

a. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and are UL listed and labeled.
b. Design chimneys and vents metal stacks for wind loading and seismic loads specified in Section 01000.

1.5 SUBMITTALS

1.5.1. Submittals for Review:

a. Section 01300 - Submittals:
b. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.
c. Operation and Maintenance Data.

1.6 QUALIFICATIONS

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

a. Conform to IMC and NFPA 54 (ANSI Z223.1) code for installation of natural gas burning appliances and equipment.

PART 2 - PRODUCTS

2.1 TYPE B DOUBLE WALL GAS VENTS

a. Provide for AGA draft hood appliances.
b. Fabrication: Inner pipe of sheet aluminum, and outer pipe of galvanized sheet steel, tested in compliance with UL 441.
c. Provide rain cap, ventilated thimble, storm collar, flashing and other accessories required for a complete installation.

2.2 CONCENTRIC VENT/FLUE AND COMBUSTION AIR INTAKE DUCT

a. 24 gage or heavier galvanized steel pipe with accessories provided by the appliance manufacturer.
b. The assembly shall be constructed to maintain air tightness of both the flue and intake duct.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with manufacturer's instructions.
b. Install in accordance with NFPA 54 (ANSI Z223.1).
c. For Type B double wall gas vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation.
d. Level and plumb chimney and vents.
e. Clean chimneys and vents during installation, removing dust and debris.
f. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, breeching insulation, chimneys, or stacks.
g. Provide minimum length of breeching to connect appliance to chimney. Provide Type B chimney continuously from appliances.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15625

FUEL FIRED HEATERS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Gas Fired Radiant Heaters
b. Gas Fired Unit Heaters.
c. Gas Fired Rooftop Furnaces.
d. Makeup Air Unit.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15140 - Supports and Anchors.
e. Section 15170 - Motors.
f. Section 15240 - Vibration Isolation and Seismic Restraints.
g. Section 15290 - Ductwork Insulation.
h. Section 15575 - Breechings, Chimneys, and Stacks.
i. Section 15935 – Building HVAC Systems Controls.
j. Section 15990 – Testing, Adjusting, and Balancing.
k. Section 15997 – Commissioning.
l. Division 16 - Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. ASHRAE 103 - Heating Seasonal Efficiency of Central Furnaces and Boilers, Methods of Testing.
b. NEMA MG 1 - Motors and Generators.
c. NFPA 54 (AGA Z223.1) - National Fuel Gas Code.
d. NFPA 70 - National Electrical Code.
e. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
f. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
g. NFPA 211 - Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Section 01400 - Submittals: Procedures for submittals.
b. Product Data: Provide manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
c. Shop Drawings: Indicate assembly, required clearances, and locations and sizes of field connections.
d. Operation and Maintenance Data.

1.3.2. Submittals For Information:

a. Section 01400 - Submittals: Procedures for submittals.
b. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.

1.3.3. Submittals At Project Closeout:

a. Section 01720 – Phased Turnover and Project Closeout.
b. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listing.
c. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owners name and registered with manufacturer.
d. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.4 The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.5 REGULATORY REQUIREMENTS

a. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 GAS FIRED RADIANT HEATERS

a. Acceptable Manufacturers:

(1) Panelbloc.
(2) Perfection Schwank.
(3) Reznor.

b. Units: Self-contained, packaged, factory assembled, pre-wired, vented unit consisting of cabinet, heat exchanger, burner, reflector, controls for natural gas.
c. Cabinet: Galvanized steel with baked enamel finish.
d. Gas Burner:

(1) Vented atmospheric type with adjustable combustion air supply,
(2) Gas valve provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
(3) Electronic pilot ignition, with electric spark igniter.

e. Gas Burner Safety Controls: Thermo-couple sensor prevents opening of solenoid gas valve until pilot flame is proven and stops gas flow on ignition failure.
f. Room Thermostat: Provide a wall mounted thermostat to cycle burner to maintain room temperature setting. Provide locking cover.

2.2 GAS FIRED UNIT HEATERS

a. Acceptable Manufacturers

(1) Reznor
(2) Hastings
(3) Modine

b. Units: Self-contained, packaged factory assembled, pre-wired unit consisting of cabinet, supply fan, heat exchanger, burner, controls, and accessories. Provide separated combustion type where scheduled.

(1) Heating: Natural gas fired.
(2) Discharge Louvers: Individually adjustable horizontal and vertical louvers to match cabinet finish on propellor fan units.
(3) Downturn nozzle: 60 degree nozzle to match outlet and cabinet finish on centrifugal fan units.

c. Cabinet: Galvanized steel with baked enamel finish easily removed and secured access doors, glass fiber insulation and reflective liner.
d. Supply Fan: Propellor or Centrifugal forward curved type as scheduled with direct or belt drive.
e. Heat Exchanger: Type E-3 stainless steel welded construction.
f. Gas Burner:

(1) Separated combustion type
(2) Gas valve provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
(3) Electronic pilot ignition, with electric spark igniter with electronic flame supervision motor.
(4) Non-corrosive combustion air blower with permanently lubricated motor.
(5) Concentric flue kit.

g. Operating Controls

(1) Room Thermostat: Provide a wall mounted single temperature thermostat to cycle burner to maintain room temperature setting. Provide locking cover.
(2) Supply Fan Control: Energize from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.

2.3 GAS FIRED ROOFTOP FURNACES

a. Acceptable Manufacturers

(1) Reznor
(2) Hastings
(3) Modine

b. Units: Self-contained, power vented, [indoor] [rooftop], packaged, factory assembled, pre-wired unit consisting of cabinet and supply fan assembly, and duct furnaces each consisting of heat exchanger, burner, and roof curb.
c. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors, glass fiber insulation and reflective liner.
d. Supply Fan: Centrifugal type rubber mounted with belt drive, variable pitch motor pulley.
e. Filter: One inch (25 mm) thick glass fiber throw-away type, located to filter air before fan.
f. Gas Fired Duct Furnace Units: Self-contained, power vented, packaged, factory assembled, pre-wired unit consisting of cabinet, heat exchanger, burner, controls, and accessories.

(1) Heat Exchanger: Stainless steel welded construction.
(2) Gas Burner:

(a) Power vented, modulating type with adjustable combustion air supply,
(b) Gas valve provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
(c) Electronic pilot ignition, with electric spark igniter and electronic flame supervision.
(d) Non-corrosive power venter with permanently lubricated motor.

(3) Gas Burner Safety Controls:

(a) Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.

g. Operating Controls

(1) Room Thermostat: Provide a wall mounted modulating temperature thermostat with subbase and fan "on-off-auto" switch to cycle burner to maintain room temperature setting. Provide locking cover.
(2) Supply Fan Control: Energize from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.

h. Disconnect Switch

(1) Provide a factory mounted disconnect switch in the control panel.

i. Roof Curb
(1) Roof Mounting Curb: 14 inches (350 mm) high galvanized steel, channel frame with gaskets, nailer strips, insulated, top to be level, designed in accord with Section 15140 SUPPORTS AND ANCHORS.

2.4 MAKEUP AIR UNIT

a. Unit shall consist of a filtered makeup air fan and indirect gas fired heater, in take duct, and turn down cabinet all factory mounted and wired on a common roof curb.
b. The filtered makeup air unit shall have a resiliently mounted, belt driven, double width, double inlet centrifugal fan, with a permanently lubricated ball bearing motor and adjustable speed drive. The fan and turn down cabinets shall be constructed to be galvanized steel panels with 1: foil faced fiberglass insulation. The panels shall be removable for access to internal parts. Filters shall be UL classified aluminum mesh.
c. Roof curb and roof mounting rails shall be in accord with Section 15140.
d. The indirect as fired heater shall have a stainless steel heat exchanger, aluminized steel burners, gravity venting system, electric spark ignition pilot, gas pressure regulator, control transformer, modulation has valve, safety pilot, high limit switch, discharge thermostat to start and modulate the burner, and an enameled aluminized steel cabinet with 1" foil faced insulation.
e. The prewired control panel shall include a disconnect switch, main fuse blocks and fuses, motor starterswitch thermal overloads, control transformer, all UL listed and mounted in a unified control panel for single point electrical connection.
f. The inlet duct and hood shall extend 10' (or as required by code) from the exhaust fan discharge and be constructed of galvaneal or aluminized steel and painted to match the fan and furnace cabinets.

PART 3 - EXECUTION

3.1 EXAMINATION

a. Section 01040 - Coordination and Meetings: Verification of existing conditions before starting work.
b. Verify that space is ready for installation of units and openings are as indicated on shop drawings.
c. Verify that proper power supply is available.
d. Verify that proper fuel supply is available for connection.

3.2 INSTALLATION

a. Install in accordance with NFPA 90A and NFPA 90B.
b. Install gas fired units to NFPA 54.
c. Provide vent connections to NFPA 211. Refer to Section 15575.
d. Install unit heaters and dust furnaces with vibration isolation. Refer to Section 15240.
e. Provide operating controls; refer to Section 15980.
f. Provide connection to electrical power systems.
g. Control the Makeup air unit to run when the corresponding exhaust fan runs.

3.3 OPERATION AND MAINTENANCE TRAINING

3.3.1. Provide operational and maintenance training as required by Section 15720.

3.3.2. Training: The startup technician give the following training sessions for the equipment specified in this section, each session shall be coordinated with the contracting officer:

3.3.2.1. Training Session: A four hour training session (to a minimum of four Commissary Store Personnel) within 14 days after final acceptance and all final inspection punch list items are resolved. This training session should be considered in conjunction with 3 day commissioning start up visit.

3.3.3. Videos: Provide each video described below:

3.3.3.1. User Video: This video should be tailored to equipment installed on this project and will explain to commissary management how to operate and maintain the equipment specified in this section. Video length should be from 15 to 25 minutes.

3.3.3.2. Service Video: Video training tape on "Basic Service Procedure": This video should be tailored to maintaining the installed on this project. The video should be on the level that would enable a journeyman mechanic to make most repairs to the system. Video length shall be 25 to 70 minutes.

3.4 STARTUP INSPECTION AND CERTIFICATION

3.4.1.1. Startup Technician Responsibilities:

a. The manufacturer approved Startup Technician shall personally be on site at the Commissary to perform operational checkouts of the system.

b. The Startup Technician shall personally inspect the installation of the system to ensure that the system is installed in accordance with the manufacturer's recommended methods.

c. The Startup Technician shall provide a "Startup Inspection Report" listing all incomplete work and incorrectly installed equipment. This list shall be provided to the Contracting Officer.

3.4.1.2. Certification of Installation: The following installation certifications shall be provided:

a. Startup Technician Certification: The Startup Technician shall provide a letter certifying that all items indicated in the "Startup Inspection Report" have been corrected. This letter shall be provided to the Contracting Officer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15651

PRODUCT REFRIGERATION SYSTEM

PART 1 - GENERAL

1.1 Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01560 - Environmental Protection.
d. Section 01720 - Phased Turnover and Project Closeout.
e. Section 15140 - Supports and Anchors.
f. Section 15240 - Vibration Isolation and Seismic Restraints.
g. Section 15410 - Plumbing Piping.
h. Section 15971 - Refrigeration Monitoring and Control System (RMCS). Section 15651 contractor shall be responsible for section 15971.
i. Division 16 – Electrical. Section 15651 contractor shall be responsible for refrigeration electrical, see this section and contract drawings.

1.1.2. Total System Responsibility:

a. Section 15651 Contractor shall be either the installer of the refrigeration equipment or the manufacturer of the compressor systems or the manufacturer of the display cases. Section 15651 Contractor shall have total system responsibility for all material and work indicated in Section 15651 and 15971. This includes, refrigeration piping, refrigeration electrical and wiring, refrigeration equipment, RMCS equipment, RMCS wiring. Subcontracts for portions of Section 15651 or 15971, shall be made directly with, and shall be directly under the control of the Section 15651 Contractor.

1.2 SCOPE OF WORK:

a. The product refrigeration includes the design, procurement, installation, and testing of all products, equipment, and materials required for a complete, functional and usable system. This includes, but is not limited to display cases, compressors, condensers, heat recovery coils, evaporators, unit coolers, refrigerant piping, pipe insulation, Refrigeration Monitoring and Control System (RMCS), associated controls, and electrical panels and wiring including that not indicated on Drawings.
b. There will be 2 separate systems – One serving the Commissary and one serving the Exchange.

1.3 SUBMITTAL

a. Provide submittal of equipment and material to be used per submittal requirements indicated below:

(1) Submit within 30 days after receipt of Notice to Proceed, and before starting construction or installation of materials.
(2) Distribution: Two complete sets shall be provided to the following offices for approval. One set shall be submitted to the PMAC Technical Inspector and one set shall be mailed to HQ DeCA/PMF, Building 8400,

2250 Foulois Street, Suite 02, Lackland AFB TX 78236-1039. Each set shall be in a three ring binder with a hard cover.

(3) Contract Variances: If departures from the contract Drawings are deemed necessary, details of such departures, including changes in related portions of the project and the reasons therefore, shall be submitted with the drawings. Where such departures require piping or equipment to be supported otherwise than as shown, the details submitted shall include loading and type and kind of frames, brackets, stanchions, or other supports necessary. Approved departures shall be made at no additional cost to the government.

(4) Refrigeration Capacity Calculations: For each refrigeration system, capacity data (charts or tabulated information) for evaporator-compressor and compressor-condenser arrangements shall be submitted to assure properly balanced refrigeration equipment at the design conditions.

(5) Provide calculations on refrigeration piping pressure drops. (See Part 3 of this section for piping installation and manufacturer design requirements).

(6) Provide completed refrigeration schedules in same format as on contract drawings.

(7) Installation Drawings: The layout drawings shall include a plan of the proposed piping, wiring, and equipment to establish that the equipment will fit the allocated spaces with clearances for installation and maintenance, and that components of the total product refrigeration system are fully coordinated. Interconnecting piping and wiring between evaporators, unit coolers, heat recovery coils, and refrigerated display cases shall be clearly shown and sizes indicated. The drawings shall include proposed details for attachment, anchoring, and hanging to structural framing of the building; vibration isolation units; and foundation and supports.

(8) Electrical: (See Part 3 of this section for electrical installation and manufacturer design requirements)

(a) Letter Acknowledging Their Submitted Design: The contractor shall provide with the refrigeration submittal a letter from the display case manufacturer stating that the engineering department of the display case manufacturer has performed the design for the refrigeration electrical power wiring.

(b) Installation Drawings: Provide power layout drawings showing electrical runs with wire sizes, conduit sizes, and connection points. Wiring diagrams shall identify each component, and one diagram shall show interconnected or interlocked components.

(c) Breaker Cut Sheets: Provide cut sheets on all circuit breakers showing device termination temperature ratings, interrupting ratings on equipment, and interrupting ratings of breakers.

(d) Transformer Cut Sheets: Provide cut sheets on all transformers for refrigeration.

(9) Subcontract plan: Provide flow chart indicating General Contractor, Section 15651 contractor, and each and every subcontract related to work in Section 15651 and 15971. All subcontracts for work in Section 15651 or 16971 shall be made with and report to Section 15651 Contractor.

(10) Manufacturer Data Sheets: The list of materials and equipment shall be supported by sufficient descriptive materials, such as catalog cuts, diagrams, and other data published by the manufacturer, to demonstrate conformance to the Specification requirements. Model numbers alone will not be acceptable. Submit data concerning the following items for approval:

Compressors-condensers
Heat recovery coils
Unit coolers
Solenoid valves
Filter-driers
Oil separator
Oil pressure safety switch
Heat recovery diverting valves
Display cases & accessories
Resume of proposed installer

Silver braze materials
Fiberglass and unicellular insulation
Heat exchangers
Evaporator pressure regulator (EPR)
Reclaim hot water heaters
Thermostats
Low pressure control
High pressure control (conventional & solid state)
Colors for display cases as scheduled
Receiver capacity
Refrigerant oils

(11) Manufacturer Approval of Installer: As part of the submittal, the display case manufacturer shall submit a letter acknowledging their responsibility to inspect and certify the system installation and their approval of the contractor or sub contractor installing the equipment (see paragraph 1.3). No installation work on refrigeration systems shall start until this information is provided to the contracting officer.

(12) Installer Resume: As part of the submittal, the installing contractor shall furnish resumes and EPA certification of the key refrigeration mechanics and field superintendent responsible for installation of the refrigeration piping and components (see paragraph 1.3). No installation work on refrigeration systems shall start until this information is provided to the contracting officer.

b. Operation and Maintenance Data.

PART 2 - EQUIPMENT AND MATERIALS

2.1 COMPRESSOR SYSTEMS

a. Compressor Quantity/Capacity Selection: Compressor systems shall have the number of compressors as indicated on Drawings. On multiplex compressor systems, the minimum capacities shall be as required by the refrigerated display case loads determined by the display case manufacturers and by the refrigerated room loads indicated on the Drawings. The capacities shall be as indicated on Drawings and as approved by the display case manufacturer. On multiplex compressor systems, the approximate horsepower of compressors is indicated on the Drawings only as a method of indicating the steps of capacity reduction that is required. Compressors shall be selected for maximum energy efficiency and operating reliability. Each compressor unit shall conform to and consist of the equipment and accessories as listed in ARI Standard 510 or 520. The compressor unit shall be tested and rated in accordance with ASHRAE Standard 23-93.

b. Type Compressors: Compressors 2 KW (2 hp) and less may be welded hermetic type. Compressors above 2 KW (2 hp) shall be the accessible, semi-hermetic. Compressors shall be integrally cast housings of close-grained iron with oil- level bull's eye, cast cylinder heads, cast-aluminum or forged steel connecting rods, and cast iron or forged-steel crankshafts. The lubrication system on compressors 5 KW (5 hp) or larger shall be the forced-feed, positive-displacement type with oil strainer. The oil pump shall be reversible. Suction and discharge valves shall be flange connected, wrench-operated, rising stem with cap. Rotating parts shall be statically and dynamically balanced at the factory to eliminate vibration.

c. Compressor Accessories:

(1) Refrigerant: Systems shall use refrigerant R-404A unless otherwise indicated on Drawings.

(2) Provide permanent labels indicating the refrigerant type on the compressor systems.

(3) Motors: Motors shall be of the constant-speed, squirrel-cage, induction, hermetically sealed, low-starting-current, high-torque type.

(4) Oil Safety: Each compressor 5 KW (5 hp) or larger shall have a solid state oil pressure safety switch with a manual reset with auxiliary alarm contacts. Time delay duration shall be as recommended by compressor manufacturer.

(5) Head Fan: A compressor cooling fan shall be provided for each compressor which operates below 0 degrees F saturated suction temperature.

(6) Crankcase Heater: Each compressor shall have a crankcase oil heater. Control of the heaters shall be as recommended by the compressor manufacturer.

(7) Filters: Each compressor shall have a suction filter, replaceable core type, with felt element and Schrader valve.

(8) Overload: Compressors shall have electrical over current protection and inherent thermal protection.

d. Compressor System Fabrication/Configuration:

(1) Mounting: Compressor systems shall be factory-mounted and piped on a welded steel base mounted on vibration isolators and complete with controls and accessories.

(2) Electrical: Electrical panels containing breakers and contactors for compressors, unit cooler fans, defrost, and controls shall also be mounted on the compressor system.

(a) Lights: Pilot lights shall be provided to indicate status of heat reclaim valves, compressors, and to indicate when each refrigeration circuit is in defrost or in the refrigeration mode.

(b) Switches: Provide toggle switches for each refrigeration circuit liquid line solenoid valve. Single point 208 volt and 460 volt electrical connections shall be provided on compressor units.

(3) Liquid line filter driers: Filter-driers shall be installed in main liquid lines leaving the receiver. Filter-driers Sizes 15 mm (1/2") and larger shall be the full flow, replaceable core type. Sizes smaller than 15 mm (1/2") shall be the sealed type. Cores shall be of suitable desiccant that will not plug, cake, dust, channel, or break down. The desiccant shall remove water, acid, and foreign material from the refrigerant. The filter-drier shall be constructed so that none of the desiccant will pass into the refrigerant lines. The minimum bursting pressure shall be 10,000 kPa (1,500 psi). Filter-driers shall be provided where recommended by manufacturer of display cases. Liquid line filter-driers shall be wax removal desiccant or approved equivalent.

(4) Sight Glass: A moisture indicator sight-glass shall be provided in the liquid line preceding the liquid manifold. The moisture indicating elements shall be removable. Moisture indicators shall have a reversible color indicator which has an easily distinguished color change. Sight glasses shall be provided with a protective cover and shall have solder-type connections.

(5) Oil Separator: A 99% or higher efficiency discharge line oil seperator, shall be provided in the discharge line from each multiplex compressor system. Oil Separator shall have removable flanged head for ease in removing float assembly and removable screen cartridge assembly. Provide a line size shutoff valve and sight glass in the oil return line leaving the oil separator. Insure that oil separator is installed such that float removal is easily accomplished. Pipe oil return to oil reservoir.

(6) Oil Reservoir: An oil reservoir adequately sized for the system with two sight glass ports shall be installed above the compressor system. Provide 10 mm (3/8") angle service valves on top and bottom of reservoir. Install Reservoir Pressure Valve on top of reservoir and pipe to suction header. Provide manufacturer's standard filter on oil return line to oil level regulators.

(7) Separator/Reservoir: As an alternate to paragraphs above, an oil separator-reservoir assembly similar to the Hussmann "TurboShed" system is acceptable. This type of system shall consist of a combination separator-reservoir assembly and oil pressure regulation valve.

(8) Oil Regulators: On each compressor, provide an adjustable oil level regulator with shut-off valve on each inlet. This will allow removal of individual compressors without shutting down the whole system.

(9) Manifolds: Liquid and suction manifolds shall be provided on each multiplex system. Each manifold shall have the required number of service valves to permit servicing unit coolers and display cases. Each manifold shall have one spare 5/8" liquid stub and 1-3/8" suction stub. Each service valve shall have a gauge port which can be closed by back-seating the valve and a front seat which can close-off the line connected to the manifold. Service valves shall have a removable cap over the valve stem. Insulate suction header-manifolds with 20 mm (3/4") thick unicellular plastic insulation.

(10) EPR Valves: Suction Stop Evaporator Pressure Regulator (EPR) valves of the adjustable type shall be installed when indicated on refrigeration schedules. Unless otherwise noted on the refrigeration schedule, the EPR valves shall be installed at the compressor systems. Unless otherwise noted on the Drawings, the EPR valve shall use pressure from the high pressure side of the refrigeration system as a source of operating power. Provide on each EPR valve a schrader type valve so upstream pressure can be measured with a pressure gauge.

(11) Receiver: Liquid receivers shall be [vertical or] horizontal-type, designed, and rated in accordance with the recommendations of ARI Standard 495, except as modified herein. The receiver shall be constructed and tested in accordance with requirements of Section VIII of the ASME Boiler and Pressure Vessel Code. Each receiver shall be equipped with inlet, outlet drop pipe, service ports on inlet and outlet, purging valve, relief valves of capacity and setting required by ANSI-ASHRAE 15-1994. Provide calculations on receiver capacity sizing. On multiplex systems, provide liquid level gauge or liquid level indicators on receivers. Each

receiver should have a storage capacity not less than 225 kg (500 lbs) at 80 percent capacity. Each receiver shall have a liquid level sensor connected to the RMCS. See specification section 15971.

(12) Suction Accumulator: On multiplex systems, suction accumulators shall be installed and shall be designed within the suction header to provide a positive trap for liquid carry-over and to assure oil return to compressor. The accumulator internal liquid holding volume shall be at least 12 liters (0.4 cubic feet). Design shall insure that oil is not trapped in the accumulator.

(13) Pressure Tap: Provide on discharge line, receiver inlet, and suction manifolds a 3 mm (1/8) inch FPT with shut-off valve for installation of pressure transducers.

2.2 CONDENSING UNITS

a. Performance Standard: Condensing units shall be as described herein and in the schedule. Each unit shall conform to and shall consist of the equipment and accessories as listed in ARI Standard 510 or 52078 Positive Displacement Refrigerant Compressors, Compressor Units and Condensing Units). The units shall be tested and rated in accordance with ASHRAE Standard 14-80 (Methods of Testing for Rating Positive Displacement Condensing Units).

b. Capacity Selection: Air-cooled condensing unit shall be sized for a maximum condensing temperature of 8 degrees C (15 F) above ambient temperature. Condensers shall have a maximum of 475 fins per meter (12 fins per inch).

c. Compressors: Compressors shall be as specified in paragraph Compressor Systems, this section.

d. Condenser: Condenser tubes shall be copper with copper fins. Where condensing units are to be installed within 30 miles of a salt water body of water, condensers are to have copper fins.

e. Head Pressure Control: Provide head pressure controls. Condensing pressure controls shall enable condensing temperature to drop from that indicated on Drawings to 32 degrees C (90 degrees F), shall maintain proper condensing temperatures at outdoor temperatures down to - 18 degrees C (0 degrees F), and shall be automatic in operation without daily or seasonal adjustment. To maintain desired condensing temperatures, variable speed or standard condenser fan controls shall be provided along with a receiver heater.

f. Suction Accumulator: Suction accumulator shall be installed on condensing units serving unit coolers with electric defrost.

g. Receivers: Receivers shall have a storage capacity not less than 20 percent in excess of the following: refrigerant (liquid) in liquid line(s); refrigerant (vapor) in evaporator and discharge line; refrigerant (liquid) in condenser drain line; refrigerant (liquid) in condenser circuit (100% flooded); and sufficient liquid seal of at least 20% in receiver with the above conditions.

h. Fabrication:

(1) Mounting: Compressors shall be factory mounted with condensers, and piped on a welded steel base mounted on vibration isolators and complete with controls and accessories.

(2) Electrical: Panels on condensing units shall contain breakers and contactors for compressors and electric defrost. The defrost time clock(s) shall be factory mounted. Single point 208 Volt, 3 Phase, 60 HZ electrical connections shall be provided on condensing units. Also, electrical connection for defrost shall be provided on condensing units, where applicable.

(3) Liquid line solenoid valves shall be factory mounted and wired to defrost time clocks.

(4) Covers: Outdoor condensing units shall be provided with weather hoods.

2.3 CONTROLS:

2.3.1. COMMISSARY:

a. Scope: Controls shall include those required for automatic operation of each compressor, air-cooled condenser, and defrost cycle as specified herein, as indicated under Section 15971 Refrigeration Monitor and Control System (RMCS), as indicated on the Drawings, and as recommended by the manufacturer of the insulated cold storage room unit coolers and refrigerated display cases.

b. Factory Controls Installation: The compressor system manufacturer shall factory mount, install, and test each ICU installed on each compressor system. See section 15971.

c. Voltage/Interface: Control voltage for compressor control circuits, condenser control circuits, heat reclaim control valves, and liquid line solenoid valves shall be 208 volts 60 Hz. The RMCS shall be interfaced to these control circuits using relays.

d. Back-up Controls: Each compressor on the system shall have a conventional low pressure control wired in series with controls provided under the Refrigeration Monitor and Control System. Low-pressure control shall have automatic reset and micro adjustable cut-in and cut-out range. Use nylon reinforced rubber lines.

e. High Pressure Control: Each compressor shall have a single high-pressure control with manual reset, adjustable set-point, and auxiliary alarm contact. Use nylon reinforced rubber lines.

f. Heat Reclaim: Heat recovery coil circuits shall be "pumped out" when circuit is not in heat reclaim. RMCS controls on compressor system shall have adjustable lockout set points.

g. Head Pressure Control. Automatic condensing pressure controls shall be provided to enable the condensing temperature to drop from that indicated on Drawings to 24 degrees C (75 degrees F). They will maintain proper condensing temperatures at outdoor temperatures down to -18 degrees C (0 degrees F) and shall be automatic in operation without daily or seasonal adjustment. Head pressure controls, consisting of modulating valves and bypass check valves, shall be provided to control head pressure by flooding the condenser coil with liquid refrigerant to maintain desired condensing temperatures. On upstream pressure regulating valves, provide a schrader type of valve to measure upstream pressure on regulating valve.

h. Defrost: The defrost shall be initiated by the RMCS.

2.3.2. EXCHANGE:

a. Each compressor on the system shall have a conventional low pressure control. Low-pressure control shall have automatic reset and micro adjustable cut-in and cut-out range. Use nylon reinforced rubber lines.

b. High Pressure Control: Each compressor shall have a single high-pressure control with manual reset, adjustable set-point, and auxiliary alarm contact. Use nylon reinforced rubber lines.

c. Voltage/Interface: Control voltage for compressor control circuits, condenser control circuits and liquid line solenoid valves shall be 208 volts 60 Hz.

2.4 CONDENSERS

a. Service: Air-cooled condensers shall be suitable for remote installation.

b. Fabrication: The air-cooled condensers shall be a complete factory-fabricated and assembled units consisting of coils, fans, and electric-motor drive.

c. Coils: The condenser coil shall be of the extended-surface fin-and-tube type and constructed of seamless copper tubes with copper fins and stainless steel end plates. The fins shall be soldered or mechanically bonded to the tubes and installed in a metal casing. Condenser coil shall have a maximum of 393 fins per meter (10 fins per inch). The coil shall be dried to remove free moisture and capped to prevent entrance of foreign matter. A purging valve shall be installed on the refrigerant inlet to condenser.

d. Fans: Fans shall be the propeller-type, directly connected to the motor shaft and statically and dynamically balanced.

e. Cabinets and structures: Aluminum or stainless steel panels with rigid internal stainless steel or aluminum channel frame, fully gasketed joints. All internal and external surfaces, structural elements, and fasteners shall be aluminum or stainless steel. Fans shall be aluminum or epoxy coated steel.

f. Motors: Provide premium efficiency 850 rpm electric motors not to exceed 1.0 hp per 30” diameter fan. Motors shall be totally enclosed or open drip-proof type so located within an enclosure as to be fully protected from the weather. Motor starters shall be magnetic, across-the-line type with a general-purpose enclosure. Motors shall have built-in overload protection and breaker protection. Control circuit on 480 VAC condenser motors shall be 208 VAC maximum. Provide transformer at condenser for 208 VAC control.

g. Capacity: Sizing of the condensers for full capacity at design conditions shall be based on the following:

(1) Temperature difference (TD), condensing temperature minus entering air temperature, shall be as indicated on the condenser schedule.

(2) Condenser capacity, watts @ TD (BTUH @ TD), shall meet or exceed the heat of rejection for the compressor system(s). The heat of rejection shall be calculated by using the compressor system operating

conditions and capacity at design conditions and the appropriate heat of rejection factor for the compressors on the system.

h. Fan Control: On multiplex compressor systems, condenser fans shall be located so that each refrigerant circuit of a compressor system is under a set of fans which, when cycled, shall not affect another compressor system. The first fan at the header end of the condenser shall be first "ON" and last "OFF". Other fans shall be controlled by the RMCS (see specification 15971). Provide motor starters for each fan.

i. Low Ambient Capacity Control: In climates with the winter design temperature lower than 30 degrees F. Condensers with a heat of rejection capacity greater than 23 MBH @ 1"TD shall have a 50% /50% split header to circuit OFF 50% of the condenser at the RMCS programmed low outdoor ambient setpoint.

2.5 HEAT RECOVERY COILS

a. Heat recovery coils shall be furnished as an integral part of the product refrigeration system and shall be approved by the display case manufacturer who shall coordinate the installation of heat recovery coils with the HVAC.

b. Circuiting: Coils shall be single or multi-circuited as required and shall comply with the requirements outlined under condensers above. Coils shall be mounted for counter-flow service.

c. Valves: Diverting valves for heat recovery shall be furnished by display case manufacturer.

d. Controls: Other controls for the heat recovery are specified in Section 15971: REFRIGERATION MONITORING AND CONTROL SYSTEM.

e. Capacity: Heat recovery coils shall be sized for the capacity of circuits as indicated on Drawings and rated at 15 C degree (27 F degrees) temperature difference. Required refrigerant pressure drop across the coil shall not exceed 60 kPa (9 psi) between the inlet and outlet header. Static air pressure drop across the coil shall not exceed .4" of water. Coils shall have a maximum of 475 fins per meter (12 fins per inch). Tubing joints shall be brazed with silver brazing alloy. Performance of heat recovery coils shall be as scheduled on Drawings.

2.6 HEAT RECLAIM WATER HEATER/STORAGE

a. As indicated on contract drawings, provide heat reclaim water heater(s). The units shall be integrated into the product refrigeration system for maximum utilization. The refrigerant circuit shall be rated for 2750 kPa (400 psi). The unit shall be equivalent to "Therma-Stor" II-1.

b. Heat exchanger shall be glass lined 450 liter (119 gallon) storage tanks with heat exchanger wrapped around the tank with double wall construction. Insulate tank with 50 mm (2") foam insulation.

c. Controls as necessary to maintain water temperature in storage tank and heat pressure, shall be provided by display case manufacturer.

d. The heat reclaim water heaters shall be furnished as an integral part of the product refrigeration system and approved by the display case manufacturer.

2.7 UNIT COOLERS

a. Fabrication: Unit coolers shall be the suspended type. Each unit cooler shall be self-contained, enclosed in a suitable metallic casing which is the manufacturer's standard. Unit coolers shall be quiet in operation. Fans shall be of the propeller type directly connected to the motor shaft. Evaporator coils shall have copper tubes and aluminum fins.

b. Heat Exchangers: Heat exchangers shall be provided on unit coolers to sub-cool liquid refrigerant and shall be sized for each unit cooler at the operating conditions.

c. Capacity: Capacities of unit coolers after derating for motor heat shall be not less than required to meet or exceed the refrigerated room loads indicated on the Drawings and based on the operating conditions specified.

The quantity of unit cooler(s) required, temperature difference, fins per meter (fins per inch), capacities and the type of airflow (Type I or II), and type of defrost shall be as indicated on Drawings.

d. Valves: Unit coolers shall have a liquid line shut-off valve (soldered type). Provide Schrader type valve with cap on suction outlet of unit cooler. Provide balanced port thermal expansion valve (sweat fitting) for each unit cooler, properly sized and designed for use with the type of refrigerant indicated.

e. Motors: Provide premium efficiency 208/230V ECM (electrically commutated motors) fan motors. Shaded pole motors are not acceptable.

f. Filter Drier: Provide a (sweat type) filter drier at inlet of each expansion valve. Filter drier shall filter contaminants down to 20 microns. Flow capacity shall meet coil requirements.

2.8 MECHANICAL CENTERS

a. Install all compressor systems, supporting electrical panels and transformers as well as other supporting equipment, heat recovery water heaters, and related equipment in roof mounted mechanical center. These mechanical centers shall be factory prefabricated, prepiped and prewired ready to set in place, and requiring only single point electrical and piping connection.

b. The mechanical centers shall be a regularly furnished assembly supplied by the refrigeration system provider and shall be a minimum of 11’-0” in width, 8’-8” in height, and length as required to accommodate the equipment with proper clearances. Construction shall be in accord with IBC and adequate for seismic and wind loadings as required by Section 01000. Structural drawing submittal shall be signed and sealed by a registered structural engineer.

c. Provide the following features:

(1) Roof curb Grade mounting frame and structural attachment points coordinated with the building structure to assure adequate wind and seismic resistance. See structural design conditions, S Drawings.

(2) Adequate service lighting (30 foot candles at the compressors) and battery backed emergency lighting.

(3) Ventilation designed for 100 cfm per compressor horsepower. Inlet louvers (rain proof) [with motorized dampers] shall be located on one side of the center with sidewall exhaust fans with motorized dampers on the opposite side and offset lengthwise to draw air over the compressor racks, all in accord with Division 15.

(4) All necessary electrical panels, transformers, wiring, etc. required to support the Product Refrigeration system.

(5) Heat recovery water heaters, [gas fired water heaters, circulating pumps,] piped to the point of connection to the building. All plumbing equipment, piping, insulation, etc. shall be in accord with Section 15400.

(6) Doors sized and located to facilitate replacement of equipment.

(7) Trolley and track the length of the center with hoist to handle compressors.

(8) R-6 insulated corrugated galvanized steel wall and roof panels with factory baked enamel finish in color as selected by the contracting officer. Flame spread/smoke developed shall not exceed 25/50 by ASTM E84.

(9) 3/16” steel plate floor with the curb below the floor filled with 6 pound density board insulation for noise control. Floors of Roof Mounted Units shall have water tight floors which drain to the outside of the curb and have 4” high water tight sleeves at all penetrations.

(10) Electric unit heater selected to maintain 55 degrees F with thermostat all factory installed and wired in accord with Division 23.

(11) All non galvanized steel shall be factory painted.

(12) Top lifting eyes.

(13) Cantilevered steps at door, maximum 7” riser.

2.9 DISPLAY CASES

2.9.1. General:

a. Scope: The work includes the furnishing, installing, and adjusting of the display cases and accessories indicated, specified, or necessary for operation. The material, equipment, and appurtenances specified herein shall be the standard products of an established manufacturer and shall have a history of satisfactory commercial operating service.

b. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis-of-design", including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

c. Standards: Case ratings shall be based on ANSI/ASHRAE Standard 72-1998 "Method of Testing Open Refrigerators". The ratings which shall be employed are for a store environment of 24 degrees C (75 degrees F) dry bulb and 55 per cent relative humidity.

d. Temperature performance shall be based on the product temperatures maintained by the display cases. The intended result is preservation of the foods in such a fashion as is generally considered acceptable for displayed retail foods.

e. Color: Color of display cases and display case trim shall be as specified in the contract and approved by the Contracting Officer.

f. Accessibility: Cooling coils, thermal expansion valves, air circulators, and drains shall be accessible for ease of maintenance, removal, and replacement.

g. Insulation: Spaces between inner and outer walls of basic case shall be completely filled with not less than 50 mm (2") of polyurethane insulation foamed in place throughout, including end panels. Insulation "K" factor shall be equivalent to .02 watts per meter Kelvin (0.13 BTU degree F), per inch of thickness. Insulation shall be enclosed and waterproofed to prevent moisture penetration, and allow high pressure spray cleaning without damage to insulation.

h. All sheet metal and framing to be galvanized steel, stainless steel or anodized aluminum.

i. Floor Air Gap: Where return air for HVAC is drawn from under a refrigerated display case, that case shall be equipped for return air with one 100 mm x 600 mm (4" X 24") fixed return air grille for each 1200 mm (4') of case length or a 25 mm (1") opening the full length of the case.

j. End Panels: Cases located adjacent to solid walls shall have boxed end panels. Cases with exposed ends shall have contour end panels coordinated with case profile.

k. Mirrored panels: End panels on produce cases shall have a mirror on panel side towards the product.

l. Kick panels (plates) on cases shall be stainless steel.

m. Local Thermometers: Provide and install a solar powered digital thermometer with a minimum 10 mm (3/8") high display to read entering air temperature on each display case. Provide one digital thermometer for each side of the 1G07 display cases

n. Descriptive dimensions of display cases are only approximate. Some variation is permissible. However, minimum product capacity requirements shall be met or exceeded.

o. Controls: For controls, see Refrigeration Drawings, and section 15971. Provide a sensor in each refrigerated case.

p. Exterior Material: The exterior of the display case shall not be less than 20 gauge steel finished in baked porcelain enamel, baked refrigerator synthetic enamel, baked acrylic enamel, or a combination of these as standard with the manufacturer and as indicated in manufacturer's current catalogs and sales literature.

q. Interior Material: The interior area of the case shall be baked enamel on steel, minimum spangled zinc grip, or acid-resistant porcelain on steel, or bare aluminum with natural drainage outlets. When required by display case manufacturer, drain heaters shall be provided. Joints in lower compartments shall be waterproof.

r. Bumpers: Front of cases shall have a bumper rail of stainless steel or high impact rubber, PVC, or vinyl. Provide matching bumper rail on exposed end panels.

s. Lights: Display case lights shall be T-8 fluorescent fixtures with electronic ballast except where LED lighting is specified.. All fluorescent lights in display cases require protective shields.

(1) LED lighting in glass door cases shall be vertical LED strips at the ends of cases delivering 500 lumens and at vertical mullions delivering 1000 lumens. LED lights in glass door cases shall be provided with one motion sensor for each case to control lights in that case. These lights will also be controlled by the case lighting contactors to be permitted to operate only during the hours the store is open.

(2) LED lights 1G06/7 cases shall be controlled by the RMCS only.
(3) Fluorescent and LED lamps shall be 3500 degrees K.

t. Motors: Display case fan motors shall be the highest efficiency type available. Provide electronically commuted motors (ECM).

u. Filter Drier: Provide a (sweat type) filter drier at inlet of each expansion valve. Filter drier shall filter contaminants down to 20 microns. Flow capacity shall meet fixture requirements.

v. Factory install RMCS temperature probe in discharge air stream.

w. Defrost shall be off cycle or electric as scheduled on the drawings.

x. Evaporator coils shall have aluminum fins on copper or aluminum tubes with seamless, non-corrosive drain pan. Each liquid line connection shall have a hand valve.

y. All refrigerated cases shall have a 1" to 2" drain at the low point of the drain pan.

z. Electrical requirements shall be:
(1) 120 V for fans and lights and anti-sweat heaters.
(2) 208V, 1 phase defrost heaters and self contained cases except as noted.

aa. Transparent reach-in doors shall be of triple-pane glass with either heat-reflective treated glass or gas fill requiring no antisweat heaters to prevent external condensation in stores with less than 60% relative humidity. The door frames shall l be constructed of non conductive composite material (Hussmann Innovator II), or insulated aluminum with thermal break (Anthony Innovaator II) or similar construction requiring heat only to prevent freezing of the door gasket seal.

bb. Night curtains on shall be provided on multideck cases. Standard is Super Market Energy Technologies "Night Shield Night Covers" magnetically mounted, manually operated, spring loaded retractable anti-bacterial treated aluminized fabric screen. The screens shall be integrated into the design of the case so that they are concealed form view when retracted.

NOTE: The Contract Documents reflect dimensions based on a single manufacturer's fixture sizes and required clearances as "Basis-of-Design". If display cases from another manufacturer are provided, it will be necessary to adjust contract document dimensions accordingly. This will include, but is not limited to length, width, and height of display case openings and adjacent spaces/fixtures. Shop drawings shall accurately reflect all required changes for coordination with affected construction trades (i.e. plumbing, electrical, HVAC, etc.).
Where high performance coils are specified, suction temperature shall be at the scheduled temperature to obtain rated capacity.

2.9.1.2. 1B08 CASE, FROZEN FOOD, 2, 3, 4 OR 5 GLASS DOORS

a. SALIENT CHARACTERISTICS: Case, frozen food, reach-in, 2, 3, 4 or 5 glass doors (as specified), four upper solid shelves per door section, low temperature, remote refrigeration.

(1) Nominal dimensions:
(a) Length:
1B08-2: 2 Dr, 62 inches L, w/o ends (1" to 2" each end panel).
1B08-3: 3 Dr, 92 ½ inches L, w/o ends (1" to 2" each end panel).
1B08-4: 4 Dr, 122 7/8 inches L, w/o ends (1" to 2" each end panel).
1B08-5: 5 Dr, 153 3/8 inches L, w/o ends (1" to 2" each end panel).
(b) Height: 83 ½ inches.
(c) Depth: 39 ½ inches.
(d) Door Width: 30 inches.
(e) Upper shelves: 22 inches deep.
(f) Sill Height: 16 inches (max).
(2) Designed to maintain a product temperature of 0 to -10 degrees Fahrenheit.
(3) Lights: Vertical LED lighting assembly, one at each end and one between all doors.
(4) Shelves: Five solid adjustable upper shelves per door section with price tag molding. One bottom epoxy coated wire rack per door section with price tag molding.
(5) Doors: Constructed per paragraph 2.9.1.aa, 56 to 60 inches high with magnetic gaskets, automatic door closures, doors hinged on left or right side. Doors must be field reversible.

(6) Maximum refrigeration load for parallel system 1250 B/hr. lf.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model RLN

2.9.1.3. 1D00 -8, -12 CASE, DELI, REFRIGERATED, CLERK SERVICE, 8 or 12 FT

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:
(a) Length:
1D00-8: 96 3/8 inches.
1D00-12: 144 ½ inches.
(b) Height: 52 inches.
(c) Depth: 44 5/8 inches.

(2) Lights: One row of fluorescent lights in top of case and one row beneath each shelf the length of case.
(3) Shelving: Two 12 inch or one 12 inch and one 10 inch stainless steel or epoxy coated mezzanine shelves full length of case.
(4) Glass Front: Curved, lift up design, lockable, with fully gasketed perimeter.
(5) Sliding glass rear doors, lockable.
(6) Wrapping Board: Full length at rear of case.
(7) 9” deep package ledge continuous on front of case.
(8) Mirrored inside end panels.
(9) Scale Stand: Adjustable stand, 22 inches by 18 inches with 120V duplex receptacle for scales with paper cutter with serrated edge to accommodate 18 inch roll of paper.
(10) Designed to maintain average product temperature of 36 degree Fahrenheit.

(11) Maximum refrigeration load for parallel system 375 B/hr. lf.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model SMB

2.9.1.4. 1D22-6,CASE, WIDE ISLAND DISPLAY, LOW PROFILE, FRESH MEAT, PREPACK, OR DELI, WITH DELI SHELF, SELF-CONTAINED REFRIGERATION, AND TWO WRAPAROUND END DISPLAY UNITS.

a. SALIENT CHARACTERISTICS:

(1) Nominal dimensions:
(a) Length: 72” base unit and 2-37” wide wrap around units..
(b) Height: 44 inches.
(c) Width: 71 inches.
(d) Height to Front: 38 inches.

(2) Product display depth to be a minimum of 5” with adjustable angle wire racks.
(3) Case to be provided with one adjustable wire rack and one non-refrigerated top display area.
(4) Straight 7 ¾” high Plexiglas perimeter.
(5) Color shall be as indicated on architectural drawings.
(6) Self-contained refrigeration designed to maintain a product temperature of 28-34 degrees Fahrenheit for fresh meat, 34 to 38 degrees Fahrenheit for prepak meat or deli foods. With bottom mounted air cooled condensing unit, designed to slide out for ease of maintenance, electric temperature control, defrost controls, and anti-condensation heaters and condensate pan.
(7) Electrical requirement 208V, single phase.
(8) Case to be provided without requirement for floor drain to allow mobility for relocation. Seamless, non-corrosive electric condensate dissipater pan shall be included.

(9) Place a label in the bottom of the case every 3ft behind the front sill stating "Do not flush with water. There is no direct drain connection and the floor will be flooded."
(10) Provide power cord with suitable twist lock plug and receptacle.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model MWG+2-MWG

2.9.1.5. 1G02-8, 12 CASE, DAIRY, MULTI-DECK, FRONT LOAD, MEDIUM TEMPERATURE, OPEN TYPE, 8 or 12 FT.

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:
(a) Length:
1G02-8: 96 3/8 inches.
1G02-12: 144 ½ inches.
(b) Height: 81 7/8 inches.
(c) Depth: 43 inches.
(d) Height of front shall be 27 inches.

(2) Lights: Two full rows of fluorescent lighting at the canopy.
(3) Shelves: Six levels of display with 5 rows of removable upper cantilevered adjustable 22" shelves extending full length of case and one row in lower display area.
(4) Front edges of shelves and deck equipped with price tag molding to hold standard size price tags/labels.
(5) Designed to maintain a product temperature of 34-38 degrees Fahrenheit.
(6) Maximum refrigeration load for parallel system 1050 B/hr.1f.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model D5X-HEP

2.9.1.6. 1G06 CASE, FROZEN FOOD, END CAP FOR WIDE ISLAND, LOW TEMPERATURE

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:
(a) Length:
Match width of 1G07.
(b) Height: 35 7/8 inches.
(c) Depth: 42 inches.

(2) End caps shall be designed for compatibility and for wraparound appearance when joined to the wide island frozen island food case described at CED 1G07-A and 1G07-B. Dimensions, materials, accessories, trim and finish shall match adjoining cases.
(3) Shelves: Epoxy coated bottom wire shelves: adjustable to at least three positions.
Each case shall be furnished with modular sliding glass covers as follows:
(a) Self-supporting modular glass covers that slide left and right.
(b) Clear 4mm-thick tempered flat safety glass.
(c) Plastic frames positioned on the top of the glass for glass front display cases and on the top of the hand rail for solid front display cases, matched to the specific dimensions required per case model. Frames are provided with modular sliding sections for each four feet of case length, with two sliding covers per four foot section. End cases shall have two sliding covers for the entire length of the case. Case-to-case connections for 8-foot and 12-foot cases include a joint cap over the edge of the frame. Frames are secured to the display case with double stick tape. The modular sliding glass covers slide on tracks incorporated in each frame.

(d) LED lighting at the top of the center divider on double wide island cases (1G07) and at the top of the back divider on the wrap-around end cap (1G06). Provide one Eclipse EFDS Series LED linear fixture (nominal length 45-inches) on each side and for every four lineal feet of double wide island cases (1G07) and one fixture centered on every wrap-around end cap (1G06). Lumen output: 1,260 @ 4000K. LED lighting shall be controlled by RMCS.

(e) Aluminum double price bar, complete with perforated center cover and clamps for affixing advertising panels (HL display). Provide above center divider at double wide island cases (1G07) and above back divider at wrap-around end cap (1G06).

(f) Color: All components other than safety glass shall be manufacturer's standard black color.

(g) Basis-of-Design Product: Ecosafe Glass Covers by REMIS America; Elkhart, Indiana (877) 997-3647 or www.remisamerica.com.

(4) Designed to maintain a product temperature of 28-32 degrees Fahreneit or -10 to 0 degrees Fahrenheit. Provide a manual switch on the interior of one end case in the lineup to switch between RMCS temperature settings and alarm settings.

(5) Maximum refrigeration load for parallel system 1650 B/hr. lf.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model FWE

2.9.1.7. 1G07 CASE, FROZEN FOOD, WIDE ISLAND, LOW TEMPERATURE, OPEN TYPE, 8 or 12 FT.

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:

(a) Length:
1G07-8: 96 3/8 inches.
1G07-12: 144 ½ inches.

(b) Height: 35 7/8 inches.

(c) Depth: 80 ½ inches.

(2) Shelves: Epoxy coated bottom wire shelves; adjustable to at least three positions.

(3) Each case shall be furnished with modular sliding glass covers as follows:

(a) Self-supporting modular glass covers that slide left and right.

(b) Clear 4mm-thick tempered flat safety glass.

(c) Plastic frames positioned on the top of the glass for glass front display cases and on the top of the hand rail for solid front display cases, matched to the specific dimensions required per case model. Frames are provided with modular sliding sections for each four feet of case length, with two sliding covers per four foot section. End cases shall have two sliding covers for the entire length of the case. Case-to-case connections for 8-foot and 12-foot cases include a joint cap over the edge of the frame. Frames are secured to the display case with double stick tape. The modular sliding glass covers slide on tracks incorporated in each frame.

(d) LED lighting at the top of the center divider on double wide island cases (1G07) and at the top of the back divider on the wrap-around end cap (1G06). Provide one Eclipse EFDS Series LED linear fixture (nominal length 45-inches) on each side and for every four lineal feet of double wide island cases (1G07) and one fixture centered on every wrap-around end cap (1G06). Lumen output: 1,260 @ 4000K. LED lighting shall be controlled by RMCS.

(e) Aluminum double price bar, complete with perforated center cover and clamps for affixing advertising panels (HL display). Provide above center divider at double wide island cases (1G07) and above back divider at wrap-around end cap (1G06).

(f) Color: All components other than safety glass shall be manufacturer's standard black color.

(g) Basis-of-Design Product: Ecosafe Glass Covers by REMIS America; Elkhart, Indiana (877) 997-3647 or www.remisamerica.com

(4) Designed to maintain a product temperature of 28-32 degrees Fahrenheit or -10 to 0 degrees Fahrenheit. Provide a manual switch on the interior of one end case in the lineup to switch between RMCS temperature settings and alarm settings.
(5) Maximum refrigeration load for parallel system 640 B/hr. lf.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model FW

2.9.1.8. 1G10-2,-3,-4,-5 CASE, FROZEN FOOD, 2, 3, 4, or 5 GLASS DOORS, LOW TEMPERATURE, UPRIGHT

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:
(a) Length:
1G10-2: 2 Dr, 62 inches L, w/o ends (1" to 2" each end panel).
1G10-3: 3 Dr, 92 ½ inches L, w/o ends (1" to 2" each end panel).
1G10-4: 4 Dr, 122 7/8 inches L, w/o ends (1" to 2" each end panel).
1G10-5: 5 Dr, 153 3/8 inches L, w/o ends (1" to 2" each end panel).
(b) Height: 83 ½ inches.
(c) Depth: 39 ¾ inches.
(d) Door Width: 30 inches.
(e) Upper shelves: 22 inches deep.
(f) Sill Height: 16 inches (max).

(2) Shelves: Five solid adjustable upper shelves per door section with price tag molding. One bottom epoxy coated wire rack per door section with price tag molding.
(3) Lights: Vertical LED lighting assembly, one at each end and one between all doors.
(4) Doors: Constructed per paragraph 2.9.1.aa, 56 to 60 inches high with magnetic gaskets, automatic door closures, doors hinged on left or right side. Doors must be field reversible.
(5) Designed to maintain a product temperature of 0 degrees Fahrenheit.
(6) Maximum refrigeration load for parallel system 1250 B/hr. door.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model RLN

2.9.1.9. 1G12-2, 3, 4, 5 CASE, ICE-CREAM, FROZEN FOODS, FROZEN JUICE, 2, 3, 4, or 5 GLASS DOORS, LOW TEMPERATURE, UPRIGHT

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:
(a) Length:
1G12-2: 2 Dr, 62 inches L, w/o ends (1" to 2" each end panel).
1G12-3: 3 Dr, 92 ½ inches L, w/o ends (1" to 2" each end panel).
1G12-4: 4 Dr, 122 7/8 inches L, w/o ends (1" to 2" each end panel).
1G12-5: 5 Dr, 153 3/8 inches L, w/o ends (1" to 2" each end panel).
(b) Height: 83 ½ inches.
(c) Depth: 39 ¾ inches.
(d) Door Width: 30 inches.
(e) Upper shelves: 22 inches deep.
(f) Sill Height: 16 inches (max).

(2) Lights: Vertical LED lighting assembly, one at each end and one between all doors.

(3) Shelves: Five solid adjustable upper shelves per door section with price tag molding. One bottom epoxy coated wire rack per door section with price tag molding.
(4) Doors: Constructed per paragraph 2.9.1.aa, 56 to 60 inches high with magnetic gaskets, automatic door closures, doors hinged on left or right side. Doors must be field reversible.
(5) Designed to maintain a product temperature of -10 degrees Fahrenheit.
(6) Maximum refrigeration load for parallel system 1350 B/hr. door.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model RLN

2.9.1. 1G25-3.75,-4,-5,-6 Merchandiser, Grab-N-Go, Medium Temperature, Multi-Deck, Upright:

2.9.1.1. Salient Characteristics:

a. Upright refrigerated merchandiser cases, multi-deck, open type, medium temperature. Shall be customer self-service, grab-n-go type for home meal replacement. Case for use as an end cap or wall merchandiser.
b. Nominal Dimensions:

Length:

(a) 1G25-3.75: 45 inches plus 1-1/8 inch end panel thickness.
(b) 1G25-4: 48 inches plus 1-1/8 inch end panel thickness.
(c) 1G25-5: 60 inches: plus 1-1/8 inch end panel thickness.
(d) 1G25-6: 72 inches, plus 1-1/8 inch end panel thickness.

Width: 30-5/8 inches.
Height: 88-5/8 inches.
Sill Height: 16-3/4 inches.

c. Designed to maintain a product temperature of 33 to 37 deg F.
d. Shelves: Deck and five rows of upper adjustable/removable white powder coated sheet metal shelves with product stop extending full length of case. Shelves can be removed and adjusted to be flat or slanted (0 to 10 degrees).
e. Lighting at canopy and shelves.
f. Price Tag Molding: Front edge of each shelf and deck shall be equipped with price tag molding to hold standard size price tags and labels.
g. Maximum refrigeration load for parallel system 1690 B/hr/linear foot.

2.9.1.2. Basis-of Design-Product: Hussmann Model D6NX-LEP

2.9.1.3. 1M04-6, -8, -12 CASE, MEAT OR PREPACKAGED DELI, MULTI-DECK, MEDIUM TEMPERATURE, OPEN TYPE, 6, 8, or 12 FT.

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:
(a) Length:
1M04-6: 72 3/8 inches.
1M04-8: 96 3/8 inches.
1M04-12: 144 ½ inches.
(b) Height: 81 ¾ inches.

(c) Depth: 42 inches.
(d) Height of front shall be 27 inches.

(2) Lighting: Two full rows of fluorescent lighting at canopy.
(3) Shelving: Provided with five rows of 22-inch shelves, removable, and adjustable to three positions with one row of adjustable bottom screen.
(4) Designed to maintain a product temperature of 30-36 degrees Fahrenheit.
(5) Front edges of shelves and deck equipped with price tag molding to hold standard size price tags/labels
(6) Provide night curtains (2.9.1.cc.)
(7) Maximum refrigeration load for parallel system 1460 B/hr. lf..

b. BASIS OF DESIGN PRODUCT: Hussmann, Model D5X-HEP

2.9.1.4. 1M07 CASE, MEAT, MULTI-DECK, MEDIUM TEMPERATURE, OPEN TYPE, 8 or 12 FT.

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:
(a) Length:
1M07-8: 96 3/8 inches.
1M07-12: 144 ½ inches.
(b) Height: 78 inches.
(c) Depth: 42 inches.
(d) Height of front shall be 23 inches.

(2) Two full rows of fluorescent lighting at canopy.
(3) Shelves: 1-row of 16” shelves to be placed on top row of case. 4-rows of 18” shelves to be placed below the row of 16” shelves.
(4) Designed to maintain a product temperature of 28-34 degrees Fahrenheit.
(5) Front edges of shelves and deck equipped with price tag molding to hold standard size price tags/labels.
(6) Provide night curtains (2.9.1.cc.)
(7) Maximum refrigeration load for parallel system 1400 B/hr. lf.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model M5X-EP

2.9.1.5. 1P03-8, -12 CASE, PRODUCE, SINGLE DECK, MEDIUM TEMPERATURE, 8 or 12 FT.

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:
(a) Length:
1P03-8: 96 3/8 inches.
1P03-12: 144 ½ inches.
(b) Height: 74 inches.
(c) Depth: 42 inches.
(d) Height of front shall be 30 ½ inches.
(2) One full length double row of fluorescent lighting at canopy.
(3) Cases to have a single deck and a superstructure with a 30” slanted mirror. Mirror to be full length of case.
(4) Drain pan shall be stainless steel or fiberglass.
(5) Designed to maintain a product temperature of 34-38 degrees Fahrenheit.

(6) Front edge of deck equipped with price tag molding to hold standard size price tags/labels.
(7) Case to have minimum of 5 metal dividers per case.
(8) Quick disconnect fitting for water hose. Furnish one 24' water hose with shutoff spray nozzle for each 6 cases.
(9) Maximum refrigeration load for parallel system 950 B/hr. lf.

b. BASIS OF DESIGN PRODUCT: Hussmann P2X-EP

2.9.1.6. 1P07-8, -12 CASE, PRODUCE, PRE-CUT PACKAGED VEGETABLES, UPRIGHT, REFRIGERATED, 5 ADJUSTABLE UPPER SHELVES *8 or 12 FT.*

a. SALIENT CHARACTERISTICS:

(1) Nominal Dimensions:
(a) Length:
1P07-8: 96 3/8 inches.
1P07-12: 144 ½ inches.
(b) Height: 81 7/8 inches.
(c) Sill Height – 19 ¼ inches.
(d) Depth – 42 inches.
(2) Top discharge air curtain.
(3) Fluorescent lights, double row full length of case.
(4) Five rows of adjustable 20-inch deep upper shelves with the following accessories:

(a) Three clear or black color acrylic product dividers per each four foot section of shelf.
(b) Three inch high wire or acrylic front product stop, the entire length of each shelf.
(c) Price tag molding on front of each shelf.

(5) Interior of case to have black color finish.
(6) Designed to maintain a product temperature of 35-38 degrees Fahrenheit.
(7) Quick disconnect fitting for water hose. Furnish one 24' water hose with shutoff spray nozzle for each 6 cases.
(8) Maximum refrigeration load for parallel system 1265 B/hr. lf.

b. BASIS OF DESIGN PRODUCT: Hussmann, Model D5X –LEP

2.9.1.7. 2P07B PRODUCE MISTING SYSTEM

a. SALIENT CHARACTERISTICS:

(1) Designed to provide a controlled delivery moist environment for produce cases except 1P07. Adaptable to single deck, multi-deck, or island style cases.
(2) Primary components include a controller, timer, tunes, mist bars, and a reverse osmosis water filtering system.

b. OPERATIONAL CHARACTERISTICS BY COMPONENT

(1) Controller designed to control water flow upon direction from the timer mechanism
(2) Controller designed to be mounted separately from the timer by as much as fifty feet apart
(3) Water shut off valve for service.
(4) Controller to operate concurrently with the reverse osmosis unit.
(5) Timer:
(a) Designed as a 24V system stepped down from 110-120V by a transformer/power supply.
(b) Unit to be UL listed.

(c) Designed with solid state board and pre-programmed, unchangeable computer chip to permanently set the cycle to seven (7) seconds of mist every 16 minutes.
(d) LED light display and off / run / test selections.
(e) Timer will not have manual rocker arms, slide switches or dial settings.
(f) Timer designed to be mounted separately from the controller by as much as fifty feet apart.

(6) Tunes:
(a) Designed as a 24V system stepped down from 110-120V by a transformer/power supply.
(b) Unit to be UL listed
(c) Designed as a compact audio system with sound machine/amplifier, two strobe lights, and two water-resistant three way acoustic speakers.
(d) Designed to be compatible and coordinated with the misting system timer.
(e) Designed with pre-recorded tunes selection to include mist alerts lightning and thunder music / Misty tunes.
(f) Designed to allow user recorded tune or message from CD or cassettes. Provided with volume control.

(7) Mist bars:
(a) Constructed of virgin PVC co-extruded outside layer which is UV resistant and a co-extruded black inner core with UV and antibacterial resistance.
(b) Tubing designed with a one inch square (4-sided) tube with at least ½ inch round water supply through the center. Diagonal exterior corners are acceptable.
(c) All fittings must be quick connect to minimize install/service time. No glue, lubricants, sealants or screw together connections.
(d) Provided with double nozzle mist head. Designed with 360 degree rotation in both vertical and horizontal planes, adjustable and auto-locking.
(e) Each double nozzle head will be capable of being turned off independently. Nozzle head spray mist outflow to be adjustable for volume of spray.
(f) Double nozzle head to be spaced at 18 inches.
(g) Color of tubing to be white.

(8) Reverse osmosis water filtering system:
(a) Reverse osmosis (RO) system with a minimum capacity of 600 GPD (gallon per day), expandable to 900 GPD.
(b) Compact unit in an enclosed powder coated metal box for easy mounting in a produce prep room.
(c) Provided with quick connect water fittings.
(d) Four pre-filters: one 50-micron sediment filter, two 5-micron wrapped carbon filters, and one 5-micron sediment filter.
(e) Self-diagnostic filter replacement notification system with a “call for service” light and a reset button.

c. BASIS OF DESIGN PRODUCT: KES Misting Systems or equal.

2.10 REFRIGERATION PIPING AND ACCESSORIES

a. Scope: The refrigeration piping system shall consist of HVAC and product piping systems and heat reclaim piping systems handling fluorocarbon refrigerants.
b. Copper tubing/piping Classification: Copper tubing shall be type "L" hard-drawn. Tubing shall be dehydrated, marked "ACR", capped, sealed, and delivered to the job site in that condition.
c. Quality Assurance: Tubing delivered to the job site or found on the job site without capped ends shall be tagged and rejected from installation on this project.
d. Accessories:

(1) Product Standards: Refrigerant piping, valves, fittings, and accessories shall conform to the requirements of ANSI-ASHRAE 15-1994 and ANSI B31.5 unless otherwise specified.

(2) Fittings: Fittings for brazed joints shall be wrought copper or forged-brass sweat fittings. Cast sweat-type fittings shall not be allowed for brazed joints. Ells shall be of long radius type. No 45 degree elbows shall be used.

(3) Hand Valves: Refrigerant shut-off valves shall be designed for use with the refrigerant used and shall have pressure ratings compatible with system pressures encountered. Gate valves shall not be acceptable. Valves shall be all brass, handwheel-operated, diaphragm, packless-type, globe or angle valves in sizes up to and including 16 mm (5/8"). For valves 16 mm (5/8") and larger, ball valves designed specifically for refrigerant service shall be used.

(4) Check Valves: Check valves shall be steel or brass body, lift or swing type suitable for refrigerant liquid or gas service.

(5) Solenoid Vales: Solenoid valves shall be bronze, brass or steel body, packless type, with stainless-steel trim, rated for continuous-duty service, direct or pilot operated, provided with manual lift stem and designed for or use with the type of refrigerant used. Valves shall have a safe working pressure of 2750 kPa (400 psi) and a maximum operating pressure differential of at least 1375 kPa (200 psi) at 85 percent of rated voltage. Valves shall have an operating pressure differential suitable for the refrigerant used. Valves shall have adequate capacity for the installation at a pressure drop suitable for the refrigerant used. Solenoids shall have moisture proof insulation and shall be UL approved.

(6) Expansion valves (sweat fitting) shall be designed for use with the type of refrigerant used and with a pressure rating suitable for the pressure encountered. The valves shall be of the thermostatic type, diaphragm or bellows operated, with external super heat adjustment set at the factory for 5 degrees C (10 degrees F) super heat. Power elements and valve size shall be as recommended by the manufacturer for the service intended. Multi range expansion valves are not acceptable.

2.11 REFRIGERATION PIPING INSULATION:

a. Refrigerant Suction Lines:

(1) Suction lines operating above -18 degrees C (0 degrees F) saturated suction temperature (SST) shall be insulated with elastomeric pipe insulation with wall thickness of 25 mm (1").

(2) Suction lines operating at a -18 degrees C (0 degrees F) and lower shall be insulated with elastomeric pipe insulation of 1 ½ inch wall thickness.

(a) This additional insulation shall not be required in tunnels or below cases in the sales area but will be required above ceilings, in soffits above cases, and in all non-air conditioned spaces. Wall thickness in these areas shall be 1”.

b. Refrigerant Liquid Lines: Liquid lines shall be insulated with elastomeric pipe insulation with 15 mm (1/2") wall thickness. Liquid lines in return air tunnels, ducts, refrigerated cases, and walk-in boxes do not require insulation.

c. Drains on Unit Coolers in Refrigerated Rooms: In refrigerated rooms that operate at less than 0 degrees C (32 degrees F), drains shall be insulated with elastomeric pipe insulation with 15 mm (1/2") wall thickness.

d. Elastomeric Pipe Insulation Standard: Elastomeric flexible pipe insulation. Flame-spread rating not greater than 25 and a smoke-developed rating not greater than 50. Insulation shall have a K factor of .28 or less at 24 degrees C (75 degrees F) mean temperature. Insulation shall have a water vapor permeability of .10 or less and a water absorption by volume of 1% or less. Insulation shall be assembled with all-temperature adhesive (Armstrong 520 or equivalent). Splitting of joints of insulation is not allowed except for the outer layer of two layer pipe insulation where the total thickness exceeds 1 inch. Butt joints of insulation shall not be sealed until pressure tests and leak tests are completed. Insulation installed outdoors and subject to water damage shall be provided with an additional 0.5 mm (0.016”) aluminum jacket with lock seam longitudinal joint and stainless steel “Bandit” straps for butted joints as required for a water-tight installation.

e. Refrigerant Hot Gas Lines: Hot gas lines from the compressor systems to heat recovery coils shall be insulated with 25 mm (1") of fiberglass. Outlet lines on heat recovery coils do not require insulation. Fiberglass insulation shall be installed after pressure and leak tests are completed. Refrigerant line leaving heat reclaim coil does not require insulation.

f. Fiberglass Insulation Standard: Fiberglass insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to the insulation) fire rating of 25 and smoke hazard rating of 50 as tested by procedure ASTM E-84, NFPA 225 or UL 723. Insulation material should have a maximum K factor of 0.28 or less at 24 degrees C (75 degrees F) mean temperature with factory-applied fire retardant vapor barrier jacket. Jacking materials installed in exposed locations (mechanical equipment rooms, exposed in finished areas, etc.) shall be Owens-Corning ASJ or pre-sized glass cloth, neither requiring painting but suitable or direct application of finish without surface preparation. Jackets furnished for installation in concealed locations (in chases, above ceiling, etc. may be ASJ or FRJ. ASJ and RFJ jackets shall have self-sealing joints. Insulation shall be provided with a vapor barrier having vapor permeability rating suitable for the service intended, and joints shall be properly sealed.

g. Insulation installed outdoors shall be provided with an additional 0.5 mm (0.016") aluminum jacket with lock seam longitudinal joint and stainless steel "Bandit" straps for butted joints as required for a water-tight installation.

PART 3 - EXECUTION/INSTALLATION REQUIREMENTS

3.1 QUALITY ASSURANCE

a. Manufacturer Responsibility: The manufacturer of the refrigerated display cases or the compressor system shall:

(1) Furnish the refrigeration compressor units, condensers, heat recovery coils, heat reclaim hot water heaters, diverting valves for heat recovery, unit coolers, display cases and RMCS.

(2) Coordination: Coordinate the installation of the total refrigeration system.

(3) Submittal: Shall review the construction project electrical Drawings and Specifications and provide electrical power and control wiring and refrigeration piping not specifically provided for in the Drawings and Specifications.

(4) Factory Testing: Shall factory mount, install, and test the control system for each compressor system.

(5) Interim Inspections/Reports: An employee of the Display Case Manufacturer (not a dealer employee) shall conduct inspections of the installation of the product refrigeration systems every 60 days beginning upon delivery of the first piece of refrigeration equipment. Within 5 days after each inspection by the manufacturer, an inspection report shall be submitted to the Contracting Officer. The inspection report shall detail whether or not the product refrigeration equipment is being installed in accordance with the Manufacturer's recommendations. All items of non-compliance shall be noted on this report. Failure to provide these reports in a timely manner may result in the Contracting Officer's attainment of a manufacturer inspection visit and subsequent deduction of payment from the Contractor. The representative shall have been employed by the same manufacturer's which furnished the display cases, for a minimum of two years and shall have a minimum of 5 years journeyman refrigeration "hands on" experience.

(6) Piping Certifications: A letter signed by the manufacture of the display cases certifying the piping is installed in accordance with the manufacturer's requirements shall be submitted to the contracting officer prior to charging the systems with refrigerant. All items of non-compliance shall be noted in this report.

(7) Startup: Display case manufacturer's technical representatives (not a dealer employee) shall be provided to "fine tune" and commission the system prior to conducting the five day performance test. For projects where the equipment is installed in phases, the manufacture's representative shall inspect each major phase of refrigeration work.

(8) Final Certification: A letter signed by the manufacture of the display cases certifying the systems are installed in accordance with the manufacturer's requirements shall be submitted to the contracting officer prior to final acceptance of the systems. All items of non-compliance shall be noted in this letter.

(9) The contractor installing the equipment must be an installer who is approved by the display case manufacturer.

b. Contractor Experience: The installer shall have successfully completed not less than three installations of equal or greater size and complexity within the past three years.

c. Mechanic's Experience: The installing contractor or subcontractor shall employ EPA certified refrigeration mechanics to install the system. The mechanics installing the system shall have a minimum of three years experience installing supermarket refrigeration systems. As part of the submittal, the installing contractor shall furnish resumes and EPA certification of the key refrigeration mechanics and field superintendent responsible for installation of the refrigeration piping and components.

d. Testing: Provide water tightness test(s) and pressure test(s) and performance test(s) per paragraph 3.2, prior to stocking fixtures.

3.2 INSTALLATION, GENERAL

a. Product Delivery/Storage: The contractor shall coordinate delivery of materials and equipment with the construction schedule. Materials and equipment stored on site must be protected from damage. Display cases, unit coolers, and compressor racks must be stored in a covered storage area and be kept clean and dry until installed in the commissary.

b. System Identification: Compressor systems, unit coolers, condensers, heat reclaim coils, and refrigerated display cases shall have a permanent metal or laminated plastic identification tag to identify compressor system, refrigerant circuit numbers, and alarm probe. The identification scheme must be coordinated with and match the RMCS system identification scheme. Letters on tag shall be 6 to 10mm (1/4" to 3/8") in height. Permanently attach the tag.

c. Supports/Penetrations: Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted without written approval. Supports shall be attached only to structural framing members and concrete slabs. Supports shall not be anchored to metal decking unless a means is provided and approved for preventing the anchor from puncturing the metal decking. Where supports are required between structural framing members, suitable intermediate metal framing shall be provided and detailed. Necessary supports shall be provided for equipment, appurtenances and pipe. These include frames or supports for compressors, condensers, evaporators, and other similar items requiring supports.

d. Filter & Oil Change: Upon completion of the performance test, the Contractor shall perform the following on each refrigeration system and show the removed filter-drier to the Government's Designated Inspector:

(1) Change liquid line filter-drier cores.
(2) Change suction filter-drier cores.
(3) Change oil filter.

e. Refrigerant Charge: Provide refrigerant charge to maintain not less than 30% receiver level with heat reclaim "ON".

3.3 ELECTRICAL INSTALLATION AND DESIGN

a. Comply with Division 16 especially paragraph 16130.3.2.2 limiting the number of conductors per conduit.

b. Scope: Provide all wiring for product refrigeration system including wiring necessary for operation of system which is not specifically shown on drawings. All equipment shall have disconnect switches.

c. Design Scope: In accordance with the drawings and this section of the specification, the contractor shall have the electrical power wiring for the refrigeration system designed by the engineering department of the display case manufacturer.

d. Material: Electric wiring shall be copper and installed in conduit.

e. Grounding: Provide a grounding conductor in all branch circuit conduits. Do not use conduit as the only means of grounding for the refrigeration electrical system.

f. General: Wire sizes shall be in accordance with NEC Latest Edition.

g. Conductor Temperature Design Standard: All power wiring in the refrigeration compressor rooms shall be designed for 5 degrees C (9 degrees F) higher than the 1% ambient summer design temperature.

h. Transformer Temperature Design Standard: All transformers provided for the refrigeration shall have copper windings and shall be rated for 80 degrees C (144 degrees F) temperature rise.

i. Breaker Ir Standard: Minimum interrupting rating (Ir, RMS) for refrigeration electrical feeders and branch circuits circuit breakers shall be as follows:

j. Circuit Breaker:

Voltage	Interrupting Rating
****NOTE 4 (A-E to Edit)**	
480V	Main Building Transformer 500 KVA, Ir = 12,000
480V	Main Building Transformer 750 KVA, Ir = 18,000
480V	Main Building Transformer 1000 KVA, Ir = 24,000
480V	Main Building Transformer 1500 KVA, Ir = 35,000
480V	Main Building Transformer 2000 KVA, Ir = 48,000
208V	Refrigeration Power Transformer 225 KVA, Ir = 15,000
208V	Refrigeration Power Transformer 300 KVA, Ir = 20,000

k. Defrost Feeder Design Loading: The minimum size of feeder for 208V defrost panels shall be as follows:

(1) On multiplex compressor systems with 5 or less refrigeration circuits the feeder shall be sized for the following combined loads: largest defrost load, control circuit on compressor system, and unit cooler fan motor loads.

(2) On multiplex compressor systems with more than 5 refrigeration circuits the feeder shall be sized for the following combined loads: largest defrost load plus one other defrost load, control circuit on compressor system, and unit cooler fan motor loads.

l. Penetrations: Seal electrical penetrations in walk-in boxes and display cases with silicon sealant inside and outside of conduits. See Sectin 13060.3.02 and Electrical details.

3.4 REFRIGERATION PIPING INSTALLATION AND DESIGN

a. Brazing Material: Copper joints shall be brazed with AWS BCUP5 (14.5-15.5% Silver) Silver Braze and copper to brass or steel shall be brazed with AWS BAG4 (40% Silver).

b. Purging: During brazing operations, the tubing and fitting being brazed shall have a continuous purge of dry nitrogen at a rate which will preclude oxidation of the tubing and fitting. Tubing and fittings shall be properly cleaned prior to brazing. Copper tubing joints that are assembled on the job site shall be assembled with fittings.

c. Cutting: Joints in copper tubing shall be cut square with tubing cutter, ends shall be reamed, and fillings and dust removed from interior of pipe

d. Piping Design: Refrigeration piping shall be sized by the refrigeration equipment manufacturer and shall be based on the following:

(1) Pressure Drop Liquid & Discharge: Pressure drop in the liquid and discharge line shall not be greater than 20 kPa (3psi).
(2) Pressure Drop Suction line: Pressure drop in the suction line shall not be greater than 20 kPa (2 psi).
(3) Velocity Suction line: Minimum gas velocity for horizontal suction line shall be 3.5 m/s (700 FPM) and 7.6 m/s (1500 FPM) for vertical suction line.
(4) Maximum velocity for liquid line from condenser to receiver line shall be 0.5 m/s (100 FPM).
(5) Traps/Risers: Every suction riser shall have an oil trap sized the same as the horizontal suction line. The oil trap shall be long radius wrought copper manufactured for use as a trap. Traps constructed of several 90° elbows are not permitted. For risers exceeding 5 meters (16.feet) a second trap shall be installed at the mid-point of the riser. Suction and discharge horizontal lines shall be continuously pitched a minimum of 1/2 inch per 10 feet in the direction of flow.
(6) The first three support points from the compressor racks of each piping circuit shall have hydrazorb or equal clamps securing both suction and liquid lines to trapeze hangers with other circuits. See DeCA detail “clamp assembly for uninsulated refrigeration line or electrical conduit”.

(7) Condenser Piping: 50%/ 50% split:

(a) Hot Gas Lines: Parallel and equivalent, hot gas lines shall be installed to accommodate condensers which are indicated for 50% / 50% condenser split. See this section and or contract drawings.
(b) Liquid Lines: Parallel and equivalent, liquid lines shall be installed to accommodate condensers which are indicated for 50% / 50% condenser split. See this section and or contact drawings.
(8) Provide risers, traps, offsets, and drops as required to coordinate with the building structure and the work of other trades.

e. System Cleanliness: Pipes, strainers, and valves shall be cleaned free of scale and thoroughly flushed of foreign matter. Strainers and valves shall be thoroughly cleaned. The interior and exterior (tubes and fins) of air-cooled condensers, evaporative condensers, unit coolers, and display cases shall be thoroughly cleaned of debris and blown free of small particles of rubbish and dust. Equipment shall be wiped clean, with oil, dust, dirt, and-or paint spots removed. It shall be the responsibility of the Contractor to maintain the system in this clean condition until final acceptance.

f. Copper Piping/Tubing: Refrigeration tubing/piping delivered to the job site or found on the job site without capped ends, shall be tagged and rejected from installation on this project.

g. Fitting: Pipes shall be cut accurately to measurements established at the job site and worked into place without springing or forcing, and properly clearing windows, doors, and other openings. Pipes shall be installed to permit free expansions and contraction without damage to joints or hangers. Changes in direction shall be made with fittings. Bent pipe showing kinks, wrinkles, flattening or other malformations will not be accepted. Open ends of pipes or equipment shall be properly capped or plugged during installation to keep dirt and other foreign material out of the system.

h. Isolation Valves: Hand valves shall be installed on each side of each piece of equipment such as compressors, heat recovery coils, hot water heater, heat exchanges, condensers, receivers, and other similar items, and at other points indicated or required for maintenance, isolation, charging, or sectionalizing purposes. Additional valves necessary for safe and proper operation of the refrigeration system shall be included in the installation. Valves are not required on the outlet of evaporators in cases and unit coolers.

i. Hangers: Pipe supports and hangers shall conform to the requirements of the Specifications. Hangers shall be located within 1000 mm (3 feet) of the ends of each run out, not over 30 mm (1 foot) from each change of direction, and at intervals indicated on the Drawings in the table entitled "Pipe Support Spacing for Refrigerant Piping."

3.5 UNIT COOLER INSTALLATION:

a. Drains:

(1) Union: Unit cooler drains shall be piped to be easily disconnected and to allow the drain pan to be easily dropped for service.
(2) Piping material shall be type L or M hard-drawn copper.
(3) Traps: Traps are required on unit cooler condensate drains where the drains are extended to a floor drain outside the room. Drains for unit coolers in frozen food and carcass rooms storage shall be trapped outside of the room.
(4) Heat tape: Heat tape and 15 mm (1/2 inch) unicellular plastic insulation is required on condensate drains in rooms where temperature is maintained at 0 degrees C (32 degrees F) or lower. Heat tape shall be the type that regulates its own heat output as its temperature changes (FreezGard or equivalent). Avoid piping drain lines above doorways. Maximum length of a drain line shall be 15 meters (50 feet).
(5) Heat Exchanger: Provide a heat exchanger for each unit cooler.
(6) Valves: Unit coolers shall have a liquid line shutoff valve (sweat type). Provide Schrader type valve with cap on suction outlet of unit cooler. Provide balanced port thermal expansion valve (sweat fitting) for each unit cooler, properly sized and designed for use with the type of refrigerant indicated.
(7) See unit cooler mounting detail.

3.6 DISPLAY CASE INSTALLATION:

a. Install in accordance with the manufacturer's recommendations and supervision as specified.
b. Valves: Each refrigerated case having a remote compressor system shall have a liquid line hand shutoff valve (solder type). Balanced port thermostatic expansion valve (sweat fitting). At each TX valve bulb location, provide a Schrader type valve with cap.
c. Heat Exchanger: Provide a heat exchanger in each display case.
d. Shims: Shim cases level using galvanized steel shims.
e. Sensors: Probes for the alarm and monitoring system shall be pre-wired at the factory. Mount probes in the discharge air at the center of the cases.
f. Each refrigerated display case shall have a decal or metal tag marking the location of the thermal expansion valve, thermostat, and solenoid valve. The decal or metal tag shall be placed on the lower part of the case or on the kick plate.
g. Close Off Panels: Provide close-off panels as necessary to ensure return air is only drawn from the front of the display cases. Back to back display cases must be sealed with closure panels at the top and sides of the display cases. Use stainless steel or other visually appealing material for closure panels in visible locations.
h. Condensate piping: Case drain piping shall be sized as recommended by the case manufacturer. Drains shall be accessible for ease of maintenance. Except for seafood and rear roll-in dairy case(s), drain pipe may be schedule 40 PVC or type M hard-drawn copper. On seafood and roll-in dairy cases, use type M or L hard-drawn copper.

(1) Accessible: Drains shall be accessible for ease of maintenance.

i. Condensate Drain Strainer: Provide a 1/4" mesh stainless steel strainer inside the case at each drain. Secure strainer to drain.
j. Stat Location: When display case thermostats are required, install so that set-point adjustments can be made without unloading or removing panels from the cases.
k. Partitions: Provide and install a plexiglass partition between display cases with electric defrost which are connected to different refrigeration circuits. Seal the edge joints.
l. Defrost requirements will be as indicated on drawings.
m. Anti Condensate fans: Where back to back display cases occur without floor level return air pulled from under the cases; provide ventilation fans to circulate store air through this area.
n. Light Tube Covers: All lights in display cases require protective shields.

o. Produce Water Connection: Provide quick connect domestic cold water connection: Provide and install quick connections for spraying water on the produce. Provide connection in every 1P02 produce case.

3.7 TESTING

a. Entire System. Upon completion of each refrigeration system, and at a time designated by the Contracting Officer, refrigerant piping fabricated at the job site shall be pressure-tested for leaks and the entire system shall be tested as hereinafter specified. The tests shall be conducted in the presence of the Government's Designated Inspector. The Contractor shall furnish instruments, test equipment, and personnel who are required for the tests.

b. Piping.

(1) Pressure Test: After components of the refrigerant system have been installed and the piping connected, the total product refrigeration system shall be subjected to a pneumatic test. The pneumatic testing shall be done by charging system with a sufficient amount of anhydrous carbon dioxide or dry nitrogen to bring the pressure to 2000 kPa (300 psi) for high side and 1000 kPa (150 psi) for low side. The system shall be proven tight and free of leaks by testing joints with a halide or electronic leak detector and by allowing the leak test pressure to remain on the system for 12 hours with no drop in pressure. Correction of 2 kPa (.3 psi) will be allowed for each degree change in the initial and final temperature of the surrounding air, plus for an increase and minus for a decrease.

(2) Evacuation Test: After the foregoing tests have been satisfactorily completed and the pressure relieved, the system shall be evacuated to an absolute pressure of 500 microns. During evacuation of the system the ambient temperature shall be higher than 1 degree C (34 degrees F). No more than one system shall be evacuated at one time by one vacuum pump. When a vacuum of 500 microns is obtained, close off vacuum pump for 30 minutes and observe the magnitude and rate of pressure rise. If pressure continues to rise, check the system for leaks, repair them, and repeat the evacuation procedure. If pressure rises to a point and holds, but rises above 1000 microns, repeat the evacuation and close off procedure until the rise is small enough to indicate that the system is dry. The Contractor shall maintain records of test pressures and vacuum reading on each system and shall indicate length of time test pressures and vacuums were maintained. This record shall be submitted to the Contracting Officer at the completion of the pressure and leak tests.

(3) Electronic Leak Test: Upon completion of the evacuation test, the vacuum shall be broken by completely charging with dry refrigerant for which the system is designed and shall be subjected to the performance tests and halide torch or electronic leak-detector tests herein specified. Upon satisfactory completion of the tests, charge the systems with adequate refrigerant to maintain a minimum of 20% receiver capacity reserve during all operating conditions including simultaneous heat reclaim and condenser flood back during cold weather operation. Loss of refrigerant during the warranty period shall be guaranteed and refrigerant required shall be Contractor-furnished.

c. Case Water Tightness Test: Test the water tightness of all display cases joints and refrigeration line penetrations with a hose stream of water. Conduct this test prior to cases start up and in the presence of the Government's Designated Inspector. Provide written copy of test witnessed by Government's Designated Inspector prior to turning cases over to government.

d. Performance Test: After the pressure tests have been completed, systems are operational, and before the total product refrigeration system is accepted, performance tests to demonstrate the capacity specified and general operating characteristics of equipment shall be conducted in the presence of the Government's Designated Inspector, by a competent, experienced engineer from the display case manufacturer who will attest the reliability of the results. The operational test shall cover a period of not less than 5 days for each system and shall demonstrate that the entire system is functioning in accordance with the Drawings and Specifications. Corrections and adjustments shall be made as necessary to produce specified conditions. The Contractor shall assure full responsibility for satisfactory operation of the integrated system. Typed, tabulated data taken during the performance tests that indicate that the system will produce the required capacity, shall be

provided. Performance tests shall include the following specific information in the report and conclusions regarding the adequacy of the system:

(1) Time, dates, and duration of test.
(2) Dry-bulb temperatures maintained inside each of the refrigerated rooms and display cases during every hour of the test. The digital display on the refrigeration monitoring system shall be used to determine these temperatures.
(3) Outside and sales area dry-bulb and wet-bulb conditions every 6 hours as determined with a sling psychrometer or with refrigeration monitoring system.
(4) Compressor suction and discharge pressures taken every hour with the compressor in operation; compressor model and manufacturer, and type of refrigerant employed.
(5) The Contractor shall furnish instruments, test equipment, and test personnel required for the tests. Four copies of the test report shall be submitted to the Contracting Officer.

3.8 PHASE COMPLETION/ACCEPTANCE:

a. Prior to Phase completion and government usage of any piece of new refrigeration equipment, the following shall be accomplished:

(1) Temperatures Maintained: Equipment shall be maintaining contract specified control.
(2) Certification of Installation Received: Certification of proper installation of that piece of equipment shall have been received by the government, from the Display Case Manufacturer (see 1.3.9.11).
(3) Test Report: Provide written copies of witnessed water tightness tests and pressure tests, for the equipment being turned over for government use.
(4) Interim Inspection Reports: Inspection reports from the Display Case Manufacturer shall have been received by the government for that phase of equipment. (see Quality Assurance this Section)

3.9 PREFINAL INSPECTION:

a. Prior to prefinal inspection, the following shall be accomplished.

(1) Temperatures Maintained: All equipment shall be maintaining contract specified control.
(2) O&M Info Received: All O&M information shall have been received by the government.
(3) Warranty Received: Warranty letters from the RMCS and Display case manufacturers shall have been received by the government.
(4) Test Reports: Provide written copies of witnessed water tightness tests, and pressure tests. Provide these prior to turning over cases for use
(5) Certification of Refrigeration System Installation Received: Certification of installation letter from the Display Case Manufacturer shall have been received by the government (see Quality Assurance this section).
(6) Certification of RMCS System Installation Received: Certification of installation letter from the RMCS manufacturer has been received by the government. (See 15971.)
(7) Interim Inspection Reports: Inspection reports from the Display Case Manufacturer shall have been received by the government for that phase of equipment. (See Quality Assurance this Section.)

3.10 OPERATING AND MAINTENANCE INSTRUCTIONS

a. Distribution:

(1) Provide one (1) copy to DeCA/PMF 2250 Foulois St. Suite 2, Lackland AFB TX 78236-1039.
(2) Provide one (1) copy to HQ DeCA/ENFS Ft. Lee VA. 2301-1800.
(3) Provide two (2) copies to the Contracting Officer (to be forwarded to commissary).

b. Contents: Each set shall have the following contents.

(1) Cover: The following identification shall be inscribed on the covers: "OPERATING AND MAINTENANCE INSTRUCTIONS," the location of the building, the name of the installer, and the contract number. A fly sheet shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8-1/2" by 11", with large sheets of drawings folded in. The instructions shall include, but shall not be limited to, the following:

(a) Notebook: Each set shall be in bound notebooks.
(b) CAD drawings of system layout showing equipment locations on the floor plan, piping, valves, and controls. Provide three (3) copies. One shall be provided for local engineer files, one set shall to go to DeCA/PMF, one set to DeCA/ENFS. Each set of drawings shall be one hard copy and one on CD..
(c) Approved wiring and control diagrams with data to explain the detailed operation and control of each component. Include interface and connection to the refrigeration monitoring control system (RMCS).
(d) In each set of instructions provide a copy of refrigeration system drawings. Drawings shall include refrigeration schedules, refrigeration circuit layout, and refrigeration electrical wiring.
(e) Operating and maintenance (including lubrication) instructions for each piece of equipment.
(f) Display case manufacturer's bulletins, catalogue cuts and descriptive data, installation and operation data.
(g) Parts lists and recommended spare parts.
(h) Warranty certificates for compressors, display cases, etc., including procedures for getting warranty items replaced.
(i) Approved pressure control settings, refrigeration schedule and refrigeration circuit layout drawings of the entire system and layout drawings on RMCS, framed under laminated plastic, shall be posted, in the Refrigeration Equipment Room where directed by the Contracting Officer. Drawings shall be fixed so that they will not fade. The framed drawings shall be posted before acceptance testing of the systems. Each set shall be in bound notebooks.

3.11 TRAINING OF MAINTENANCE PERSONNEL:

a. Training of DeCA's contracted maintenance personnel shall be conducted by the Case Manufacturer’s employee (not a dealer’s employee) within 45 days after final acceptance of the system. The instruction (8 hrs) shall be conducted at the commissary by the display case manufacturer. Instruction shall be given to personnel who will be responsible for maintenance and operation of the refrigeration system after the contractor completes the contract. Coordinate this meeting in advance with DeCA/ENFS @ Fort Lee VA to schedule attendance by contracted maintenance personnel. A written list of personnel attending instruction shall be provided by the Contractor to the Contracting Officer.

3.12 FINAL ACCEPTANCE:

a. Prior to final acceptance, the following shall be accomplished.

(1) Temperatures Maintained: All equipment shall be maintaining contract specified control.
(2) Punch List Complete: All pre final and final punch list items shall have been corrected by the contractor and their correction approved by DeCA/PMF Lackland AFB TX.
(3) O&M Info Received: All O&M information shall have been received by the government.
(4) Warranty Received: Warranty letters from the RMCS and Display case manufacturers shall have been received by the government.
(5) Certification of Installation Received: Certification of installation letters from the Display Case Manufacturers shall have been received by the government (see Quality Assurance this Section)
(6) Test Reports: Provide written copies of witnessed water tightness tests, and pressure tests.

(7) Training: Training of Maintenance Personnel has been completed.

3.13 WARRANTY GUARANTEES AND SERVICE

a. The manufacturer shall guarantee that the equipment furnished shall operate without excessive noise or vibration; deliver the specified capacities indicated in the schedule and nameplate ratings without overloading; and shall satisfactorily operate for a period of 1 year from the date of final acceptance of the units by the Contracting Officer.

b. Work and equipment shall be guaranteed by the installing contractor to be free from defects in the materials or workmanship for a period of one year from date of final acceptance of the total construction project by the Contracting Officer. The refrigeration systems shall be guaranteed to perform satisfactorily for 1 year from date of final acceptance of the total construction project by the Contracting Officer. Satisfactory performance shall mean that the refrigerated cases and insulated cold storage rooms shall maintain the design discharge air temperature while operating at design conditions. Design conditions and temperatures shall be based on ASHRAE Standard No. 72-83.

c. Emergency Repair Warranty: In addition to the warranty of construction, the following repair service is a part of the specifications and shall be binding on the installing contractor:

(1) The manufacturer of the equipment shall guarantee that the equipment shall operate without failure for the periods indicated below beginning on the date of final acceptance of the total construction contract by the contracting officer.

(2) FIRST 90 DAYS: During the first 90 days of the warranty, the Manufacturer shall provide 24 hours a day, 7 days per week (including holidays), service to the Commissary. A technician shall arrive at the Commissary within 2 hours of receipt of a telephone call for warranty service. All parts and labor shall be provided by the Manufacturer at no cost to the government during this period.

(3) 91 TO 365 DAY: During the 91st day through the 365 day of the warranty, the Manufacturer shall provide free exchange of parts within 24 hours of notification. Shipping costs shall be paid by the Manufacturer. These parts will be installed by the installing contractor and billed to the manufacturer.

3.14 RECOVERY OF REFRIGERANT

a. Recover all refrigerant in accord with all State, Local, and Federal regulations regarding the recover, handling, and storage of refrigerants.

3.15 REFRIGERANT HANDLING

a. General: All work shall be accomplished in accordance with current regulatory requirements established by the Environmental Protection Agency, including final regulations to implement the Clean Air Act.

b. Refrigerant to be Added to Equipment: All refrigerant added to equipment shall be contractor furnished, contractor installed and shall be new non-recycled.

c. Contractor Responsibilities for Safe Removal: The contractor is responsible for safe handling of all refrigerant that is removed as part of this work. Procedures shall be in accordance with paragraph 1 above. All refrigerant removed from equipment must be recovered for recycling by transferring to an approved external recovery vessel of certified recycling or recovery machine.

d. All recovered refrigerant shall become the property of the contractor and disposed of or recycled in accordance with EPA requirements.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15672

DUCTLESS SPLIT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Outdoor unit package.
b. Charge of refrigerant and oil.
c. Controls and control connections.
d. Ductless indoor unit.
e. Precharged refrigerant piping.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15140 - Supports and Anchors.
e. Section 15240 - Vibration Isolation and Seismic Restraints.
f. Section 15790 - Air Coils.
g. Section 15935 - Building HVAC Systems Controls.
h. Section 15997 - Commissioning
i. Division 16 - Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
c. ASHRAE 14 - Methods of Testing for Rating Positive Displacement Condensing Units.
d. ASHRAE 15 - Safety Code for Mechanical Refrigeration.
e. ASHRAE 90A – Energy Conservation in Building Design.
f. UL 207 - Refrigerant-Containing Components and Accessories, Non-Electrical.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Section 01400 – Quality Assurance: Procedures for submittals.

b. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.
c. Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. .
d. Operation and Maintenance data.

1.4 DELIVERY, STORAGE, AND PROTECTION

a. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
b. Protect units on site from physical damage. Protect coils.

1.5 REGULATORY REQUIREMENTS

a. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 GENERAL

a. Units shall be manufactured in the USA.
b. Basis of Design product: EMI America series.

2.2 REFRIGERANT

a. R410A

2.3 CONDENSING UNITS

a. Units: Self-contained, packaged, factory assembled and pre-wired cooling units suitable for outdoor use consisting of cabinet, compressors, outdoor coil and fans, integral sub-cooling coil, controls, liquid receiver, and screen guards with separate indoor ductless fan and coil.
b. Construction and Ratings: In accordance with ARI 210/240 and UL 207 and UL 303. Testing shall be in accordance with ASHRAE 14.
c. Performance Ratings: Energy Efficiency Rating (EER) and Coefficient of Performance (COP) not less than prescribed by ASHRAE 90A.
d. Casing:

(1) House components in welded steel frame with galvanized steel panels with weather resistant, baked enamel finish.
(2) Mount starters, and controls in weatherproof panel provided with full opening access doors.
(3) Provide removable access doors or panels with quick fasteners.

e. Condenser Coils:
(1) Coils: Copper fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits. Air test under water to 425 psig (2900 kPa), and vacuum dehydrate. Seal with holding charge of refrigerant.
(2) Coil Guard: Expanded metal, Louvered, or PVC coat steel wire.

f. Fans and Motors:

(1) Direct driven propeller type condenser fans with fan guard on discharge.
(2) Weatherproof motors suitable for outdoor use, single phase permanent split capacitor with built in thermal overload protection.

g. Compressors:

(1) Compressor: Hermetic reciprocating or rotary type.

(2) Mounting: Statically and dynamically balance rotating parts and mount on vibration isolators.
(3) Motor: Constant speed 3600 rpm suction gas cooled with winding over temperature protection.
(4) Crankcase Heater: Evaporates refrigerant returning to crankcase during shut down. Energize heater when compressor is not operating.

2.4 INDOOR DUCTLESS FANCOIL UNIT

a. Four way discharge, ceiling recessed fan coil unit with condensate pump, electric heating coil outdoor air intake provision (to draw air from the adjacent ceiling space), and combination return air grille and adjustable supply air diffuser.
b. Wall mounted fan coil unit with condensate pump, electric heating coil and adjustable supply air diffuser.
c. Horizontal ceiling surface mounted with condensate pump, electric heating coil outdoor air intake provision (to draw air from the adjacent ceiling space), and return air grille and adjustable supply air diffuser.
d. The condensate pump shall have a minimum shut-off head of 15' or a separate condensate pump with reservoir, float switch and check valve shall be furnished. (Little Giant VCL-24ULS or equal.)

2.5 REFRIGERANT CIRCUIT

a. Provide each unit with one refrigerant circuit, factory supplied and piped.
b. For each refrigerant circuit, provide:

(1) Filter dryer.
(2) Thermal expansion device.
(3) Insulated suction line.
(4) Suction and liquid line service valves and gage ports.
(5) Charging valve.
(6) Compressor discharge service valve.
(7) Condenser pressure relief device.
(8) Precharged refrigerant piping.

2.6 CONTROLS

a. On outdoor unit, mount weatherproof steel control panel, containing power and control wiring, factory wired with single point power connection.
b. Provide compressor starter, control power transformer or terminal for controls power, and condenser fan starter relay.
c. Provide safety controls arranged so any one will shut down machine:

(1) High discharge pressure switch
(2) Low suction pressure switch
(3) Phase loss, Phase reversal, low voltage and voltage spike protection, factory or field installed on three phase units. (SymCom Inc., Motor Saver).

d. Provide one of the following controls to permit operation down to 0 degrees F ambient temperature:

(1) Head pressure switch to cycle fan motors in response to refrigerant condensing pressure.
(2) Solid state control to vary speed of one condenser fan motor in response to refrigerant condensing pressure.
(3) Electronic control consisting of mixing damper assembly, controlled to maintain constant refrigerant condensing pressure.

e. Wall mounted, hard wired, programmable microprocessor controller with room sensors and self diagnostic feature. Provide locking cover.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with manufacturer's installation instructions.
b. Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.
c. Provide connection to refrigeration piping system and evaporators. Comply with ASHRAE 15.
d. Furnish charge of refrigerant and oil.
e. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.
f. Provide control wiring between indoor and outdoor units.
g. Securely fasten condensing units to housekeeping pads on roof mounting rails to withstand wind and seismic loading specified in Section 01000.

3.2 OPERATION AND MAINTENANCE TRAINING

3.2.1. Provide operational and maintenance training as required by Section 15720.

3.2.2. Training: The startup technician give the following training sessions for the equipment specified in this section, each session shall be coordinated with the contracting officer:

3.2.3. Training Session: A four hour training session (to a minimum of four Commissary Store Personnel) within 14 days after final acceptance and all final inspection punch list items are resolved. This training session should be considered in conjunction with commissioning start up visit.

3.2.4. Videos: Provide each video described below:

3.2.5. User Video: This video should be tailored to equipment installed on this project and will explain to commissary management how to operate and maintain the equipment specified in this section. Video length should be from 15 to 25 minutes.

3.2.6. Service Video: Video training tape on "Basic Service Procedure": This video should be tailored to maintaining the installed on this project. The video should be on the level that would enable a journeyman mechanic to make most repairs to the system. Video length shall be 15 to 20 minutes.

3.3 STARTUP INSPECTION AND CERTIFICATION

3.3.1. Startup Technician Responsibilities:

a. The manufacturer approved Startup Technician shall personally be on site at the Commissary to perform operational checkouts of the system.
b. The Startup Technician shall personally inspect the installation of the system to ensure that the system is installed in accordance with the manufacturer's recommended methods.
c. The Startup Technician shall provide a "Startup Inspection Report" listing all incomplete work and incorrectly installed equipment. This list shall be provided to the Contracting Officer.

3.3.2. Certification of Installation: The following installation certifications shall be provided:

a. Startup Technician Certification: The Startup Technician shall provide a letter certifying that all items indicated in the "Startup Inspection Report" have been corrected. This letter shall be provided to the Contracting Officer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15781

PACKAGED ROOF TOP AIR CONDITIONING UNITS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Packaged roof top unit.
b. Unit controls.
c. Roof mounting curb and base.
d. Filters.
e. Navy Exchange central control system.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 01810 Building Commissioning.
e. Section 15140 - Supports and Anchors.
f. Section 15170 - Motors.
g. Section 15290 – Ductwork Insulation.
h. Section 15990 – Testing, Adjusting, and Balancing
i. Section 15997 - Commissioning
j. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ARI 210 - Unitary Air-Conditioning Equipment.
c. ARI 240 - Air Source Unitary Heat Pump Equipment.
d. ARI 270 - Sound Rating of Outdoor Unitary Equipment.
e. NFPA 70 - National Electrical Code.
f. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Submit under provisions of Section 01400.
b. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
c. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
d. Operation and Maintenance data.
e. Control system layouts and schedules.

1.3.2. Submittals for Project Closeout:

a. Submit under provisions of Section 01720 – Phased Turnover and Project Closeout.
b. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
c. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout

1.4 DELIVERY, STORAGE, AND PROTECTION

a. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.5 QUALITY ASSURANCE

a. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

a. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc.

1.7 WARRANTY

a. Provide a five year warranty to include coverage for refrigeration compressors and heat exchangers.

1.8 EXTRA MATERIALS

a. Provide one extra set of filters.

PART 2 - PRODUCTS

2.1 REFRIGERANT

a. Refrigerant shall be R410A.

2.2 EFFICIENCY

a. EER shall not be less than 12 for units 10 tons and less, or 10.5 for units 10 tons and above.

2.3 AIR CONDITIONING UNITS

a. General: Roof mounted units having gas burner and electric refrigeration, configured as scheduled on the drawings.
b. Disconnect Switch: Factory mount disconnect switch in control panel.
c. Central control system for HVAC units and selected other functions shall be provided by the manufacturer of the HVAC units.

2.4 FABRICATION

a. Cabinet: Galvanized steel with baked enamel finish, access doors or removable access panels with quick fasteners screwdriver operated flush cam type or locking door handle type with piano hinges. Structural members shall be minimum 18 gage (1.20 mm), with access doors or removable panels of minimum 20 gage (0.90 mm).
b. Insulation: 1/2 inch thick with neoprene or resin coated glass fiber with edges protected from erosion.
c. Supply Fan: Forward curved centrifugal type, resiliently mounted with V-belt drive and adjustable variable pitch motor pulley, and rubber isolated hinge mounted high efficiency motor or direct drive as indicated. Isolate complete fan assembly. Refer to Section 15240.
d. Roof Mounting Curb: 14 inches (350 mm) high galvanized steel, channel frame with gaskets, nailer strips, insulated, top to be level, designed in accord with Section 15140 SUPPORTS AND ANCHORS to withstand windloading indicated on structural drawings.

2.5 INDOOR COIL

a. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.
b. Provide capillary tubes or thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

2.6 FILTERS

a. Units shall be equipped with disposable roughing filters ahead of pleated disposable type filters with nonwoven pleated media held in place by a welded wire support grid. All filters shall be mounted such that air bypass is minimized. Pleated media filters shall be MERV 13 per ASHRAE Test Standard 52.2-2007

2.7 BURNER AND HEAT EXCHANGER

a. Gas Burner: Induced draft type minimum efficiency 80 percent. Burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot.
b. Stainless steel heat exchanger.

c. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.
d. High Limit Control: Temperature sensor with fixed stop at maximum permissible setting, de-energize burner on excessive bonnet temperature and energize burner when temperature drops to lower safe value.
e. Supply Fan Control: Temperature sensor sensing bonnet temperatures and independent of burner controls, with provisions for continuous fan operation.

2.8 COMPRESSOR

a. Provide hermetic scroll compressors, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter drier.
b. Five minute timed off circuit to delay compressor start.
c. Provide step capacity control where scheduled by cycling compressors and cylinder unloading.

2.9 OUTDOOR COIL

a. Provide copper tube copper fin coil or coated all aluminum microchannel coils (no copper aluminum coils permitted) assembly with subcooling rows and coil guard.
b. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.
c. Provide refrigerant pressure switches or outdoor thermostat to cycle condenser fans for operation to 0 degrees F.

2.10 MIXED AIR CASING

a. Dampers: Provide motorized outside air dampers for minimum outside air quantity as well as for the economizer cycle. Provide relief air fans where scheduled. Provide control of remote relief air dampers and exhaust fans where scheduled.
b. Damper Operator: 24 volt with gear train sealed in oil with spring return on units 7.5 ton (26 kw) cooling capacity and larger.

2.11 ECONOMIZER SECTION – INTEGRATED ECONOMIZER

a. Economizer shall be furnished and installed complete with outside air dampers and controls and relief air fan..
b. Economizer shall be a gear-driven parallel blade design with low-leakage, opposing damper blades, gear-driven dampers and UL approved gears.
c. Capable of introducing up to 100% outdoor air for minimum ventilation as well as free cooling.
d. Economizer shall be available for both field or factory installation.
e. Damper blades shall be low-leakage design, not to exceed 2% leakage at 1 in.wg pressure differential.
f. Shall include a 40 degree F compressor lockout sensor (opens at 35 deg. F, closes at 50deg F).
g. Shall include a single outdoor air enthalpy sensor.
h. Damper actuator:
(1) Shall be controlled by an electronic 4-20 mA/2 signal.
(2) Shall be a fully modulating actuator.
(3) Shall contain an internal spring to allow dampers to close during loss-of-power situations.
(4) Acutator shall be direct coupled to economizer gear, eliminating linkage arms and rods.

2.12 HUMIDIMIZER DEHUMIDIFICATION SYSTEM

a. The Humidi-MiZer dehumidification system shall be factory-installed in the rooftop units, and shall provide greater dehumidification of the occupied space by two modes of dehumidification operations beside its normal design cooling mode:

(1) Subcooling mode further subcools the hot liquid refrigerant leaving the condenser coil when both temperature and humidity in the space are not satisfied.

(2) Hot gas reheat mode shall mix a portion of the hot gas from the discharge of the compressor with the hot liquid refrigerant leaving the condenser coil to create a two-phase heat transfer in the system, resulting in a neutral leaving-air temperature when only humidity in the space is not satisfied.

b. The system shall consist of a subcooling/reheat dehumidification coil located downstream of the standard evaporator coil.

c. The system shall include belly band heater(s) for the scroll compressor(s).

d. The system shall include a low outdoor air temperature switch to lock out both subcooling and hot gas reheat mode when the outdoor-air temperature is below 40 F.

e. The system shall include a Motormaster low ambient control to ensure the normal design cooling mode capable of down to 0 degrees F low ambient operation.

f. The system shall include a low-pressure switch on the suction line to ensure low pressure start-up of hot gas reheat mode at lower outdoor temperature condition.

g. The system operation shall be controlled by a field-installed, wall –mounted humidistat. The dehumidification circuit will then operate only when needed. Field connections for the humidistat are made in the low-voltage compartment of the unit control box. The sensor can be set for any level between 55% and 80% relative humidity.

h. The system shall include a Thermal Expansion Valve (TXV) to ensure a positive superheat condition and a balance of pressure drop.

i. For units with two compressors, depending on the conditions required to maintain the space set points, one or both compressors can operate in subcooling mode, one compressor can operate in subcooling mode while the other operates in hot gas reheat mode, or one or both compressors can operate in hot gas reheat mode.

2.13 ENERGY RECOVERY VENTILATION UNIT

a. Description: Unit is an electrically controlled ventilation air pre-conditioner utilizing an AHRI 1060 certified energy recovery cassette to reduce the cooling and heating loads placed on the primary HVAC unit by untreated outdoor air. Building exhaust air shall be introduced to the EnergyX™ v2 unit through ductwork. Unit shall be designed as a factory-installed option to be used with the packaged rooftop units

b. Quality Assurance

(1) Unit shall be designed in accordance with UL Standard 1995.

(2) Energy Recovery unit shall be ETL tested and certified.

(3) Rooftop unit and Energy Recovery unit shall be ETL certified as one single system.

(4) Roof curb or curb extension shall be designed to conform to NRCA Standards.

(5) Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

(6) Unit casing shall be capable of withstanding ASTM No. 141 (Method 6061) 500-hour salt spray test.

(7) Unit shall contain ARI 1060 certified Energy Recovery Cassette.

(8) Unit EATR leakage rates shall be capable of meeting ASHRAE Standard 62.1 requirements for use of class-2 exhaust with class-1 ventilation air.

c. Equipment

(1) General: The unit shall be a factory assembled, single piece unit. Contained within the unit enclosure shall be all factory wiring with a single, pre-determined point of power input and a single point of 24-volt control wiring.

(2) Unit cabinet shall be constructed of galvanized steel coated with a prepainted baked enamel finish.

(3) Provide have hoods installed over outside air intake and exhaust openings. Outside air hood shall have aluminum water entrainment filters.

(4) Provide 1-in., 2 pound density fiberglass insulation.
(5) Provide hinged access doors with compression latches for access to fans and filters. Hinged doors shall be provided with at least one handle capable of being locked.
(6) Exhaust air stream shall have back-draft dampers to prevent air penetration during off cycles.
(7) Holes shall be provided in the base rails for rigging shackles to facilitate overhead rigging.

d. Blowers
(1) Blowers shall be direct drive with variable speed motors.
(2) Blower wheel shall be made from steel with a corrosion resistant finish. It shall be a dynamically balanced, double-inlet type with backward-curved blades mounted on neoprene vibration isolation pads.
(3) Motors shall be high efficiency and have thermal overload protection.

e. Filter Section: Shall accept commercially available, 2-in. pleated filter(s). Factory-installed exhaust and outdoor air filters shall be 2-in. pleated type with a MERV 13 minimum efficiency rating.

f. Controls and Safeties: Unit shall operate in conjunction with rooftop unit fan.

g. Electrical Requirements: All unit power wiring shall enter unit cabinet at a single location.

h. Energy Recovery Cassette
(1) The energy recovery media shall have a minimum of 70% effectiveness at nominal unit airflow.
(2) Energy wheel performance shall be ARI Standard 1060 Certified and bear the ARI Certified Product Seal.
(3) The energy recovery cassette shall be an UL Recognized component for electrical and fire safety.
(4) The wheel shall be coated with silica gel desiccant, permanently bonded without the use of binders or adhesives.
(5) Coated wheels shall be washable with detergent or alkaline coil cleaner and water.
(6) The silica gel shall not dissolve or deliquesce in the presence of water or high humidity.
(7) The substrate shall be made of a lightweight polymer and shall not degrade or require additional coatings for application in coastal environments.
(8) The wheel polymer layers shall be wound continuously with one flat and one structured layer in an ideal parallel plate geometry providing laminar flow and minimum pressure drop.
(9) The polymer layers shall be captured in a stainless steel wheel frame or aluminum and stainless steel segment frames that provide a rigid and self-supporting matrix
(10) Energy recovery wheels greater than 19 inches in diameter shall be provided with removable wheel segments.
(11) Wheel frame shall be a welded hub, spoke and rim assembly of stainless, plated, and or coated steel and shall be self supporting without the wheel segments in place.
(12) All wheels shall use removable wheel segment design, except 2-6 ton constant volume unit.
(13) Wheel segments shall be removable without the use of tools to facilitate maintenance and cleaning.
(14) Wheel rim shall be continuous rolled stainless steel and the wheel shall be connected to the shaft by means of taper locks.
(15) Wheel bearings shall provide an L-10 life of 400,000 hours.
(16) Drive belts of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.

i. Options and Accessories
(1) Supply and exhaust air frost control option: Factory-installed frost protection module shall sense pressure differential across the energy recovery cassette. Supply blower shall be shut-off if the pressure differential across the energy recovery cassette exceeds an adjustable set point. Blower shall remain off for an adjustable time period.
(2) Exhaust blower and wheel shall remain in operation in order to remove any frost build-up on the wheel.
(3) Maintenance indicator package: A factory-installed switch shall monitor the energy recovery blower and wheel motor amp draw and send a signal to field-supplied 24-v indicator upon amperage surge that maintenance required.
(4) Filter maintenance indicator: A factory-installed differential pressure switch shall measure pressure drop across the outside air filter and activate a field-supplied 24-v indicator when airflow is restricted. It shall not interrupt unit operation. Switch set point shall be adjustable.

(5) Free cooling with enthalpy and stop/jog control: An enthalpy sensor shall prevent the wheel from rotating if the outside air conditions are acceptable for free cooling. Both exhaust and supply blowers will remain on. Stop-Jog-Control shall energize the wheel periodically during the free cooling operation of the unit to prevent dirt build-up on the wheel.

(6) Economizer option: The economizer shall be integrated in the energy recovery module and shall allow air to bypass the energy recovery wheel for free cooling and fail-safe operation. Tilting wheel mechanisms shall not be allowed. The economizer damper shall be motorized with factory-installed, 24-volt Belimo actuator. The unit shall be capable of using the economizer in a free cooling mode of operation. The economizer shall utilize enthalpy sensor controls when in the economizer mode.

(7) CO2 Sensor: The modulating airflow energy recovery unit shall be capable of incorporating a CO2 sensor for use with Demand Control Ventilation. The CO2 sensor shall connect to the base rooftop unit's digital controller. The modulating airflow energy recovery unit shall use at a minimum, a high & low CFM airflow setpoints when a CO2 sensor is used.

j. Roof Curb:

(1) The energy recovery module shall use the standard rooftop unit roof curb.

(2) Roof curb extensions, support rails or other devices that come in contact with the roof surface to support the energy recovery module shall not be allowed.

2.14 CONTROLS

a. On unit, mount weatherproof steel control panel, NEMA 250, containing power and control wiring, factory wired with single point power connection.

b. Provide unit disconnect switch, compressor starter, control power transformer or terminal for controls power, and condenser fan starter relay.

c. Provide safety controls arranged so any one will shut down machine:

(1) High discharge pressure switch.

(2) Low suction pressure switch.

(3) Phase loss, Phase reversal, low voltage and voltage spike protection, factory or field installed on three phase units. (SymCom Inc., Motor Saver #500).

d. Provide one of the following controls to permit operation down to 30 degrees F (-1 degree C) ambient temperature:

(1) Head pressure switch to cycle fan motors in response to refrigerant condensing pressure.

(2) Solid state control to vary speed of one condenser fan motor in response to refrigerant condensing pressure.

(3) Electronic control consisting of mixing damper assembly, controlled to maintain constant refrigerant condensing pressure.

e. The RMCS, Section 15971, shall control heating, cooling, fan operation, and the outdoor air motorized damper in the Commissary. Provide a terminal strip for the 15971 connection. Coordinate with the 15971 contractor to perform the control functions specified in 15971.

f. The NAVY EXCHANGE CENTRAL CONTROL SYSTEM and VARIABLE VOLUME TEMPERATURE CONTROL SYSTEM specified below shall control the Rooftop HVAC units, exhaust fans and other functions in the Navy Exchange. Provide a terminal strip for the connection.

2.15 NAVY EXCHANGE CENTRAL CONTROL SYSTEM

2.15.1. SUMMARY

2.15.1.1. General: The system shall include and shall be based on a laptop computer with a communication bus to each controlled device and with software capable of performing the functions listed below. The computer shall be capable of receiving data from the unitary control devices, meters, etc. and shall be capable of:

a. Resetting all control parameters in each unitary control device.
b. Switching two levels of lighting in the Sales Area through contactors and/or dimming controls provided by Division 16. Lighting in Sales shall be limited to ½ level during closed hours.
c. Cycling exhaust fans as scheduled.
d. Monitoring gas, water, and electric consumption through pulsers provided on the meters.
e. Control exterior lighting- 3 contactors for patron parking, employee parking and receiving pole lights.
f. PANIC BUTTON: Provide a push button in the Store Manager's office to stop all controlled ventilation equipment bringing outdoor air into the building in the event of a contaminant event. Label the button "VENTILATION EMERGENCY STOP".

2.15.1.2. Compatibility

The system shall be compatible with and capable of communicating with the Naval Academy system by Internet communication for operation, maintenance, and monitoring.

2.15.1.3. Laptop computer

a. The personal computer shall have at least the following specifications :
   (1) 15' screen.
   (2) 2GHZ or greater processor speed.
   (3) 100 GB hard drive.
   (4) 3 GB memory.
   (5) Color printer.
   (6) Read write CD drive

2.15.1.4. Unitary controllers

a. The unitary controller shall be capable of controlling space demand in a single zone application by monitoring space temperature and determining the heating or cooling demand. The space temperature shall be controlled through individual heating and cooling setpoints. The space temperature sensor shall be capable of providing temperature read outs in .1°F degree increments and shall support both Fahrenheit and Celsius units as selected by the operator. The unitary controller shall have an on board LCD display capable of displaying the following information as a minimum:
   (1) Heating and Cooling Setpoints and demand summaries
   (2) Relative humidity setpoints
   (3) System Mode of Control
   (4) Space Temperature
   (5) DX Coil Temperature
   (6) Supply Temperature
   (7) Time of Day
   (8) Outside Air Temperature
   (9) Indoor Carbon Dioxide Level
   (10) Occupancy Model
   (11) Indoor Relative Humidity
   (12) Diagnostic Messages
   (13) Fan Status
   (14) Security Level
   (15) Filter Status
   (16) Configuration Data
   (17) Indoor Air Quality Condition
   (18) Remote Room Sensor(s)
   (19) Zone damper position actual
   (20) Zone damper position desired

(21) Compressor status
(22) Ventilation (outdoor air) damper position and set point

b. The unitary controller shall utilize and store the following setpoints as applicable:
(1) Occupied Heating Setpoint
(2) Heating Setpoint High Limit
(3) Occupied Cooling Setpoint
(4) Occupied humidity set point.
(5) Outside Air Cooling Lockout Setpoint
(6) Unoccupied Heating Setpoint
(7) Outside Air Heating Lockout Setpoint
(8) Unoccupied Cooling Setpoint
(9) Unoccupied humidity setpoint.
(10) Heat Mode Error Setpoint
(11) Cooling Setpoint Low Limit
(12) Cool Mode Error Setpoint
(13) Ventilation (outdoor air) position set point

c. The unitary controller shall be capable of providing the following information for monitoring of system parameters:
(1) Space temperature
(2) Filter Status
(3) Remote Space Temperature
(4) IAQ Status
(5) Space Temperature Averaging
(6) Occupancy Mode
(7) Supply Air Temperature
(8) Leaving Air Temperature Conditions
(9) DX Coil Temperature
(10) Heat/Cool Mode Conditions
(11) Return Air Temperature
(12) Optimized Staging
(13) Indoor Relative Humidity
(14) Power Consumption
(15) Outside Air Temperature
(16) HVAC Override Usage Meter
(17) Fan Status
(18) Timed Override Usage Meter
(19) Compressor status
(20) Carbon Dioxide Level

d. The system shall be capable of monitoring and providing total consumption over a period of one year or more:
(1) POWER MONITORING: Monitor the digital pulse meter provided under Division 16. Provide interface equipment and wiring.
(2) WATER AND GAS CONSUMPTION MONITORING: Connect to the digital pulse meters provided under Division 15, Section 15400.
(3) ELECTRICAL ENERGY CONSUMPTION: Provide split core current transformers with monitoring interface equipment and wiring to monitor each of the following

- Sales Area lighting – monitor panel feeder.
- Sales Area Accent Lighting – monitor panel feeder.
- .Merchandise Processing Area/Staging Area Lighting – monitor all lighting circuits.
- Food Court (all 900 series rooms) HVAC – monitor all lighting circuits.
- HVAC – monitor all rooftop HVAC unit feeder circuits.
- Refrigeration – monitor feeder circuit at the refrigeration panel.

- External lighting – monitor all circuits.,

2.15.1.5. Materials

a. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

2.15.1.6. Communication

a. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135-2004, BACnet.

b. Install new wiring and network devices as required to provide a complete and workable control network.

c. Use existing Ethernet backbone for network segments marked "existing" on project drawings.

d. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations

e. Internetwork operator interface and value passing shall be transparent to internetwork architecture.

(1) An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, and status shall be viewable and editable from each internetwork controller.

(2) Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.

(3) Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated controller via the internetwork. If applicable, system shall automatically adjust for daylight saving and standard time.

2.15.1.7. Operator Interface

a. Description. The control system shall be as shown and consist of a high-speed, peer-to-peer network of DDC controllers and a stand alone web server operator interface. Depict each mechanical system and building floor plan by a point-and-click graphic. A web server shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface. Operators with sufficient access level shall have an ability to make changes to all system and equipment graphics in the web server in addition to having full DDC system access to make configuration changes to the control system. Any tools required for making graphic changes shall be provided with web server.

b. Operator Interface. Furnish one Web server interface as shown on the system drawings. Operators shall be able to access all necessary operational information in the DDC system via client computer utilizing IE web browser. Client computer and IE web browsing software shall not be furnished under this section.

c. Web server shall connect via the LAN and be able to simultaneously serve up controller information to multiple operators connected via LAN with IE web browsers. Each client web browser connected to server shall be able to access all system information.

d. Web server shall be compatible with Wireless Access Protocol (WAP) enabled cellular telephone or personal digital assistant (PDA). The PDA/WAP interface may be text-based and shall provide a summary of the most important data.

e. With the use of a remote SMTP email server the operators interface web server shall be able to notify personnel of an alarm or record information about an alarm in the DDC system.

f. Web Server Hardware. Furnish one compact web server with Ethernet port for LAN or direct operator client computer access. The web server shall be capable of communicating to the peer to peer DDC controller network. Any required installation or commissioning software shall be pre-installed on the web server. Installation or commissioning of the web server shall be done through a client computer with a standard web browser.

g. Communication. Web server or workstation and controllers shall communicate using BACnet protocol. Web server or workstation and control network backbone shall communicate using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing as specified in ANSI/ASHRAE 135-2004, BACnet Annex J.

h. Operator Functions. Operator interface shall allow each authorized operator to execute the following functions as a minimum:

(1) Log In and Log Out. System shall require user name and password to log in to operator interface.

(2) Point-and-click Navigation. Operator interface shall be graphically based and shall allow operators to access graphics for equipment and geographic areas using point-and-click navigation.

(3) View and Adjust Equipment Properties. Operators shall be able to view controlled equipment status and to adjust operating parameters such as set points, PID gains, on and off controls, and sensor calibration.

(4) View and Adjust Operating Schedules. Operators shall be able to view scheduled operating hours of each schedulable piece of equipment on a weekly or monthly calendar-based graphical schedule display, to select and adjust each schedule and time period, and to simultaneously schedule related equipment. System shall clearly show exception schedules and holidays on the schedule display.

(5) View and Respond to Alarms. Operators shall be able to view a list of currently active system alarms, to acknowledge each alarm, and to clear (delete) unneeded alarms. Remote users shall be able to receive alarms via emails or cell phone text messages.

(6) View and Configure Trends. Operators shall be able to view a trend graph of each trended point and to edit graph configuration to display a specific time period or data range. Operator shall be able to create custom trend graphs to display on the same page data from multiple trended points.

(7) View and Configure Reports. Operators shall be able to run preconfigured reports, to view report results, and to customize report configuration to show data of interest.

(8) Manage Control System Hardware. Operators shall be able to view controller status, to restart (reboot) each controller, and to download new control software to each controller.

(9) Manage Operator Access. Typically, only a few operators are authorized to manage operator access. Authorized operators shall be able to view a list of operators with system access and of functions they can perform while logged in. Operators shall be able to add operators, to delete operators, and to edit operator function authorization. Operator shall be able to authorize each operator function separately.

2.15.1.8. System Software.

a. Operating System and required software. Web server operator interface shall be a self contained web server without the need for any type of maintenance. Any required operating system or software shall be factory loaded and maintenance free.

b. System Graphics. Operator interface shall be graphical and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using dynamic colors to represent zone temperature relative to zone setpoint.

(1) Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point-and-click navigation between zones or equipment, and to edit setpoints and other specified parameters.

(2) Animation. Graphics shall be able to animate by displaying different image files for changed object status.

(3) Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.

(4) Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Macromedia Flash).

2.15.1.9. System Tools. System shall provide the following functionality to authorized operators as an integral part of the operator interface or as stand-alone software programs. If furnished as part of the interface, the tool shall be available from each workstation or web browser interface. If furnished as a stand-alone program, software shall be installable on standard Windows compatible PCs with no limit on the number of copies that can be installed under the system license.

a. Automatic System Database Configuration. Each web server shall store internally store a copy of the current system database, including controller firmware and software. Stored database shall be automatically updated with each system configuration or controller firmware or software change.

b. Controller Memory Download. Operators shall be able to download memory from the system database to each controller.

c. System Configuration. Operators shall be able to configure the system.

d. Online Help. Context-sensitive online help for each tool shall assist operators in operating and editing the system.

e. Security. System shall require a user name and password to view, edit, add, or delete data.

(1) Operator Access. Each user name and password combination shall define accessible viewing, editing, adding, and deleting functions in each system application, editor, and object.

(2) Automatic Log Out. Automatically log out each operator if no keyboard or mouse activity is detected. Operators shall be able to adjust automatic log out delay.

(3) Encrypted Security Data. Store system security data including operator passwords in an encrypted format. System shall not display operator passwords.

f. System Diagnostics. System shall automatically monitor controller and I/O point operation. System shall annunciate controller failure and I/O point locking (manual overriding to a fixed value).

g. Alarm Processing. System input and status objects shall be configurable to alarm on departing from and on returning to normal state. Operator shall be able to enable or disable each alarm and to configure alarm limits, alarm limit differentials, alarm states, and alarm reactions for each system object. Configure and enable alarm points as specified in Points List. Alarms shall be BACnet alarm objects and shall use BACnet alarm services.

h. Alarm Messages. Alarm messages shall use an English language descriptor without acronyms or mnemonics to describe alarm source, location, and nature.

i. Alarm Reactions. Operator shall be able to configure (by object) actions workstation or web server shall initiate on receipt of each alarm. As a minimum, workstation or web server shall be able to log, print, start programs, display messages, send e-mail, send page, and audibly annunciate.

j. Alarm Maintenance. Operators shall be able to view system alarms and changes of state chronologically, to acknowledge and delete alarms, and to archive closed alarms to the workstation or web server from each workstation or web browser interface.

k. Trend Configuration. Operator shall be able to configure trend sample or change of value (COV) interval, start time, and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs. Controller shall sample and store trend data and shall be able to archive data to the hard disk. Configure trends as specified in Points List. Trends shall be BACnet trend objects.

l. Object and Property Status and Control. Operator shall be able to view, and to edit if applicable, the status of each system object and property by menu, on graphics.

m. Reports and Logs. Operator shall be able to select, to modify, to create, and to print reports and logs. Operator shall be able to store report data in a format accessible by standard spreadsheet and word processing programs.

n. Standard Reports. Furnish the following standard system reports:

(1) Reports shall be filtered based upon the selected equipment

- Alarm Reports

- Alarm Summary - Current alarms
- Alarm Sources – List of equipment and associated alarm conditions
- Alarm Actions – Configured alarm actions such as e-mail and alarm pop-up

(2) Schedule Reports
- Effective Schedules – Displays effective schedules for each equipment
- Schedule Instances – Displays all schedules entered

(3) Security Reports – Maintains audit of all actions taken through user interface

(4) Commissioning Reports – Provide equipment checkout status and notes

(5) Equipment Reports – Provide reports showing trended points and available network points

o. Custom Reports. Operator shall be able to create custom reports that retrieve data, including archived trend data, from the system, that analyze data using common algebraic calculations, and that present results in tabular or graphical format. Reports shall be launched from the operator interface.

p. Graphics Generation. Graphically based tools and documentation shall allow Operator to edit system graphics, to create graphics, and to integrate graphics into the system. Operator shall be able to add analog and binary values, dynamic text, static text, and animation files to a background graphic using a mouse.

q. Graphics Library. Complete library of standard HVAC equipment graphics shall include equipment such as chillers, boilers, air handlers, terminals, fan coils, and unit ventilators. Library shall include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers, and ductwork. Library graphic file format shall be compatible with graphics generation tools.

2.15.1.10. Portable Operator's Terminal. Provide all necessary software to configure an IBM-compatible laptop computer for use as a Portable Operator's Terminal. Operator shall be able to connect configured Terminal to the system network or directly to each controller for programming, setting up, and troubleshooting.

2.15.1.11. Timed override reporting

a. The DDC system shall track all push button timed override events during unoccupied periods. The system shall store time of the override event and time duration for each override event.

b. Web server shall allow operators to create custom reports detailing timed override events. Timed override reports shall allow the following options:

c. Minimum billing time. A minimum amount of time that each override event will last.

d. Billing rate. A monetary rate per hour or per minute of the override duration.

e. Exemption times. A defined block of time during each week that is exempt from detecting override events.

f. Allowances. A dollar amount of override usage that is allowed per tenant and is given at no charge. This allowance will be subtracted from the tenant’s total override usage.

2.15.1.12. Web services data exchange

a. System shall support Web services data exchange with any other system that complies with XML (extensible markup language) and SOAP (simple object access protocol) standards specified by the Web Services Interoperability Organization (WS-I) Basic Profile 1.0 or higher. Web services support shall as a minimum be provided at the workstation or web server level and shall enable data to be read from or written to the DDC system.

b. System shall support Web services read data requests by retrieving requested trend data or point values (I/O hardware points, analog value software points, or binary value software points) from any system controller or from the trend history database.

c. System shall support Web services write data request to each analog and binary object that can be edited through the system operator interface by downloading a numeric value to the specified object.

d. For read or write requests, the system shall require user name and password authentication and shall support SSL (Secure Socket Layer) or equivalent data encryption.

e. System shall support discovery through a Web services connection or shall provide a tool available through the Operator Interface that will reveal the path/identifier needed to allow a third party Web services device to read data from or write data to any object in the system which supports this service.

2.15.2. Controller Software

a. Building and energy management application software shall reside and operate in system controllers. Applications shall be configurable through the operator workstation, web browser interface, or engineering workstation.

b. Memory and System Time. All controllers shall have a Non-Volatile Memory providing indefinite storage of application and configuration data. The system must have an ability to maintain time, and automatically correct for daylight savings time and leap year adjustments. In the event of power failure or user generated power cycle, all system components must automatically updated with current time and date from a network Time Sync device. The controller shall also have the capability of changing occupancy mode by reading a set of discrete, dry contacts controlled by an external time clock.

c. Stand alone capability. All controllers shall be capable of providing all control functions of the HVAC system without the use of a computer. The controllers shall include the inherent capability to access the system control selections as well as to monitor system performance by means of a communicating network with a PC and EMS software program.

d. System Security.

(1) For Web server operator interface security options See Paragraph 2.3.G.5 (Security).

(2) Other hand held or wall mounted local interface device that allow configuration access shall be password protected with minimum of two levels of security. Level one shall provide limited access to controller operational parameters and level two shall provide full access to controller operational and configuration parameters.

e. Scheduling. For Web server operator interface scheduling See Paragraph 2.3.E.4 (View and Adjust Operating Schedules).

(1) System shall provide the following schedule options as a minimum:

(2) Weekly. Provide separate schedules for each day of the week. Each schedule shall be able to include up to 5 occupied periods (5 start-stop pairs or 10 events).

(3) Exception. Operator shall be able to designate an exception schedule for each of the next 365 days. After an exception schedule has executed, system shall discard and replace exception schedule with standard schedule for that day of the week.

(4) Holiday. Operator shall be able to define 24 special or holiday schedules of varying length on a scheduling calendar that repeats each year.

f. Binary and Analog Alarms. See Paragraph 2.3.G.7 (Alarm Processing).

g. Alarm Reporting. See Paragraph 2.3.G.9 (Alarm Reactions).

h. Remote Communication. System shall automatically contact operator workstation or server on receipt of critical alarms.

i. Demand Limiting.

(1) System shall monitor building power consumption from building power meter pulse generator signals or from building feeder line watt transducer or current transformer.

(2) When power consumption exceeds adjustable levels, system shall automatically adjust set points, de-energize low-priority equipment, and take other programmatic actions to reduce demand as specified in Sequence of Operations for HVAC Controls. When demand drops below adjustable levels, system shall restore loads as specified.

(3) The controller shall be capable of providing separate heating and cooling demand control utilizing two independent demand inputs.

j. PID Control. System shall provide direct- and reverse-acting PID (proportional-integral-derivative) algorithms. Each algorithm shall have anti-windup and selectable controlled variable, setpoint, and PID gains. Each algorithm shall calculate a time-varying analog value that can be used to position an output or to stage a series of outputs.

k. Staggered Start. System shall stagger controlled equipment restart after power outage. Operator shall be able to adjust equipment restart order and time delay between equipment restarts.

l. Anti-Short Cycling. Binary output objects shall be protected from short cycling by means of preconfigured minimum on-time and off-time settings, customized for the specific requirements of the application.

m. On and Off Control with Differential. System shall provide direct- and reverse-acting on and off algorithms with adjustable differential to cycle a binary output based on a controlled variable and setpoint.

n. Zoning system compatible with constant volume air source (Variable Volume/Variable Temperature) (VVT). The zoning system shall be compatible with constant volume air source and consist of programmable, multiple communicating Zone Controllers and a Bypass Controller. The system shall also include a complete array of input and output devices. The system shall provide full control of HVAC heating and cooling equipment in a multiple zone application. The zoning system shall be capable of operating as a stand-alone system or networked with multiple systems to communicating air source controllers.

(1) Zone control. Each zone shall be capable of monitoring space conditions and providing the correct amount of conditioned air to satisfy the space load. Each zone shall be capable of the following:

- Space temperatures control. To maintain individual heating and cooling set points.
- Relative Humidity/Air Quality (DCV). Each zone shall be capable of maintaining space relative humidity set point or air quality set point (zone level demand control ventilation) as defined in ASHRAE 62-1989 (including Addendum 62a-1990).
- Demand coordination. Each zone shall be capable of zone demand data coordination with other zones in the system.

(2) Static pressure control. The zoning system shall be capable of maintaining a user adjustable supply air duct static pressure set point.

- The Bypass controller shall additionally provide the capability to increase system airflow during conditions when the temperature of the supply air from the equipment is approaching the limits of operation. In these cases, the Bypass controller shall raise the static pressure setpoint to a user configurable maximum limit in order to increase the system airflow during these conditions.
- The Bypass control shall contain the ability to monitor the bypass damper movement (or VFD speed) and automatically adjust the setpoint control band and/or hysteresis in order to provide stability and prevent premature actuator failure.

(3) Air source control. Shall control all associated HVAC rooftop equipment functions, and be capable of stand-alone or networked operation. The resident algorithms shall use error reduction logic as designated in ASHRAE standard 90.1 to provide temperature control and lower energy usage. The Air source shall be capable of zone demand data coordination with the associated zones.

(4) System Terminal Modes. Each air terminal mode shall be based on the current air source mode, terminal type, space temperature, and the current temperature set points.

- Off:
- All terminal dampers will maintain a 65% open position. Fans shall be disabled.
- If the zone requirement is heating, all single duct terminals shall maintain their damper position at 65%. Any zone controller servicing a parallel box shall fully close their dampers while the fan is operating. If local heat is available, the parallel fans shall start and local heat shall be enabled to maintain its unoccupied heating set point. The damper shall be modulated open to 65% after heating is no longer required.

(5) Cooling and Night Time Free Cooling (NTFC):

- If the zone requirement is none, then the zone controllers shall modulate their dampers to maintain their minimum cooling damper position or damper ventilation position if the supply air temp is between 65 and 75 F. During the NTFC mode the zone controller shall control between its occupied heating and cooling set points. During the cooling mode, the zone controller shall modulate its damper to its appropriate (occupied or unoccupied) cooling set point.
- If the zone requirement is cooling, then the zone controllers shall modulate their air dampers between their minimum and maximum cooling damper position to maintain their cooling set point. Parallel fans shall be disabled unless the damper has closed below the user adjustable fan-on minimum position (optional). In that case, the fan shall be energized to mix return air with the cold primary air in order to prevent “cold air dumping” from the diffusers.
- If the zone requirement is heating, then the zone controllers shall modulate their dampers to maintain their minimum cooling damper position. Any zone controllers servicing single duct units with reheat capability shall maintain the greater of either the minimum cooling damper position or the specified reheat damper

position. Zone controllers servicing parallel units shall enable their fans while the damper shall maintain its minimum cooling damper position.

(6) Vent:
- If the air source equipment is operating in a fan only mode to provide ventilation without mechanical heating or cooling, then the zone controllers shall maintain the user configured ventilation damper position.

(7) Heat:
- If the zone requirement is none, then the zone controller shall maintain its minimum heating damper position. Parallel fans shall be disabled and their air damper shall be modulated to maintain their minimum heating damper position.
- If the zone requirement is cooling, then the zone controller shall modulate its damper to maintain its minimum heating damper position. Parallel fans shall be disabled.
- If the zone requirement is heating, then the zone controllers shall modulate their air dampers between their minimum and maximum heating damper position to maintain their heating set point.

(8) Pressurization:
- If the zone requirement is none or cooling, then the zone controller shall maintain its maximum cooling damper position. Parallel fans shall be disabled.
- If the zone requirement is heating, and the zone controller has been enabled to provide local heating, then the zone controller shall modulate its damper to its maximum cooling damper position and enable its auxiliary heat. If local heat is not available, the damper shall still be modulated to maintain its maximum cooling damper position.

(9) Evacuation:
- During the Evacuation mode all terminal fans shall be disabled and all dampers shall close.

(10) Air source interface. The zoning system shall be capable of zone demand data coordination with a communicating rooftop. Setpoint and zone temperature information from the zones shall be shared with the rooftop controller so that the rooftop controller's error reduction calculations can determine the proper number of heating or cooling stages to operate in order to satisfy the system load.
- The zoning system shall have the capability of linking up to 32 zones to a single air source and determining system heating and cooling requirements.
- The zoning system shall be capable of providing a communication check of all associated controls and display device type as well as error conditions.

(11) The zoning system shall coordinate and exchange the flowing data as minimum:
- Average zone temperature
- Average occupied zone temperature
- Average occupied and unoccupied heat/cool set points
- Occupancy status

(12) Space temperature and space temperature set points for use by the air source controller shall include a weighted factor, proportional to the size of the zone.

(13) Only those zones with valid temperature readings shall be included.

(14) The zoning system shall provide periodic updates to the air source.

(15) The zoning system shall obtain and support the following air source modes as a minimum:
- Off
- Cooling
- Heating
- Night Time Free Cooling
- Ventilation
- Pressurization
- Evacuation

(16) The air source controller shall, through the Air Distribution System, bias its occupancy time schedules to provide optimization routines and occupant override.

(17) For those zoning systems that do not include inherent air source interface capacity, each zone shall independently determine the operational mode of the equipment through its associated duct temperature

sensor mounted in the supply ductwork. If there is air source controller, then the system will assumed to be always On.

(18) HVAC Equipment Protection. The air sources controller shall be capable of monitoring the leaving air temperature to control stages in both the heating and cooling modes. It shall have the capability to shut down stages based on a rise or fall in leaving air temperature above or below adjustable or calculated values. Calculated supply air temperature requirements shall be based on error reduction calculations from reference zone data to determine the optimum supply air temperature to satisfy space requirements. The system shall provide protection from short cycling of heating and cooling by utilizing time guards and minimum run time configurations.

(19) Energy Conservation.

- Load balancing from error reduction calculations that optimize staging.
- The locking out of mechanical heating or cooling modes based on configurable outside air temperature limits.
- Staggered start. The system shall intelligently start all equipment in a stagger start manner after a transition from unoccupied to occupied modes as well as power failure to reduce high peak power consumption on start-up.
- Peak Demand Limiting. Controllers in the system shall have the capability of being overridden by separate heating and cooling Peak Demand Limiting signals. Option/General purpose controller existing on the communications bus shall be able to send a demand limiting broadcast to reduce overall energy consumption and control on and off peak time kW usage
- Temperature compensated start. The zone controller shall be capable of supporting temperature compensated start with the air source. Prior to occupancy the zone controllers and Air Source shall work together to provide zone-by-zone temperature compensated conditioning. The air source will track the time required for recovery report the optimal start bias time to the zones prior to each occupied period so that the zone can start conditioning the space prior to occupancy.

(20) Demand Control Ventilation (DCV). The zone shall be capable of reading an analog signal from a CO2 sensor or other sensor measuring volatile contaminants, or relative humidity and provide DCV at the zone by calculating a DCV damper position and participate in system DCV operation with the air source

- System DCV (System Level).The zoning system shall have the ability to collect the DCV value from any or all of the zone controllers in the system. These values may be the average or the highest sensor value which will be transmitted to an air source controller's analog DCV sensor input. The air sources configured DCV routine may perform the appropriate actions to reduce CO2 concentration at the reporting zones. The system shall be capable of maintaining a ventilation setpoint through a DCV algorithm in conjunction with zone to fulfill the requirements of ASHRAE standard, 62-1989 "Ventilation For Acceptable Indoor Air Quality" (including Addendum 62a-1990)..
- Local DCV (Zone Level). Each zone shall be capable of reading an analog signal from a CO2 sensor or other sensors measuring volatile contaminants and maintaining a ventilation setpoint through a DCV algorithm in conjunction with system controller to fulfill the requirements of ASHRAE standard, 62-1989 "Ventilation For Acceptable Indoor Air Quality" (including Addendum 62a-1990). The zone shall calculate a DCV damper position for the zone based on an error reduction calculation. When the DCV damper position value is greater than temperature control damper position the DCV damper position shall be used to position the damper. System heating and cooling and zone supplemental heat shall be allowed to operate.

(21) Abnormal Conditions. The proposed system shall include the ability to detect abnormal conditions, and to react to them automatically. A return to normal conditions shall also generate a return to normal notification and the system shall revert back to its original control scheme before the abnormal condition existed. The following abnormal terminal conditions shall automatically generate an alarm and the system shall take the following actions:

- If a space temperature sensor is determined by the zone controller to be invalid, the zone controller shall generate an alarm. During this condition, the zone damper will be positioned to either the minimum heating, minimum cooling or the configured ventilation damper position, based on the air source equipment operating mode.

- If a relative humidity sensor is determined by the zone controller to be invalid, the zone controller shall generate an alarm.
- If an indoor air quality sensor is determined by the zone controller to be invalid, the zone controller shall generate an alarm, and disable its IAQ algorithm.
- System level demand coordination. If an air source controller is participating in demand coordination with other zones and loses communication with the associated zones, it shall generate an alarm. Likewise, any zone detecting a communication failure, will generate an alarm.
- Zone level demand coordination. If the system looses communication with one of the zones associated with that system the zoning system shall remove that zone temperature from its weighted averages. The zone controller shall continue to operate in a stand-alone mode.
- If the zoning system if configured to interface with the air source for zone demand data coordination and that communication is broken, each zone controller shall determine the equipment operating mode based on the temperature of the primary air. The air source will be assumed to be always on.

2.15.3. Controllers

(1) General. The control system shall be available as a complete package with the required input sensors and devices readily available. Provide Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), and Sensors (SEN) as required to achieve performance specified in Paragraph 2.4.

(2) Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L. Unless otherwise specified.

(3) BACnet.

- Building Controllers (BCs). Each BC shall conform to BACnet Building Controller (B-BC) device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L and shall be listed as a certified B-BC in the BACnet Testing Laboratories (BTL) Product Listing.
- Advanced Application Controllers (AACs). Each AAC shall conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L and shall be listed as a certified B-AAC in the BACnet Testing Laboratories (BTL) Product Listing.
- Application Specific Controllers (ASCs). Each ASC shall conform to BACnet Application Specific Controller (B-ASC) device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L and shall be listed as a certified B-ASC in the BACnet Testing Laboratories (BTL) Product Listing.
- BACnet Communication.
- Each BC shall reside on or be connected to a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing.
- BACnet routing shall be performed by BCs or other BACnet device routers as necessary to connect BCs to networks of AACs and ASCs.
- Each AAC shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using the MS/TP Data Link/Physical layer protocol.

b. Each ASC shall reside on a BACnet network using the MS/TP Data Link/Physical layer protocol.

(1) Communication.

- Service Port. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal. Connection shall be extended to space temperature sensor ports where shown on drawings.
- Signal Management. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
- Data Sharing. Each BC and AAC shall share data as required with each networked BC and AAC.
- Stand-Alone Operation. Each piece of equipment shall be controlled by a single controller to provide stand-alone control in the event of communication failure. All I/O points specified for a piece of equipment shall be

integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network.

(2) Environment. Controller hardware shall be suitable for anticipated ambient conditions.

- Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -29°C to 60°C (-20°F to 140°F).
- Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).

(3) Keypad. Where specified provide a local keypad and display for each BC and ASC. Operator shall be able to use keypad to view and edit data. Keypad and display shall require password to prevent unauthorized use. If the manufacturer does not normally provide a keypad and display for each BC and ASC, provide the software and any interface cabling needed to use a laptop computer as a Portable Operator's Terminal for the system.

(4) Serviceability.

- Controllers shall have diagnostic LEDs for power, communication, and processor.
- Wires shall be connected to a field-removable modular terminal strip or to a termination card connected by a ribbon cable.
- All controllers in the system shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation. System shall continuously check controller network and generate alarm for each controller that fails to respond.

(5) Memory.

- Controller memory shall support operating system, database, and programming requirements.
- Each controller in the system shall use nonvolatile memory providing indefinite storage of BIOS, application programming, and all configuration data in the event of power loss.

(6) Immunity to Power and Noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).

(7) Zone Controller (ZC). Defined as Application Specific Controllers (ASC) shall be capable of independent zone control or function as part of the zoning system to achieve performance as specified for zone control in Paragraph 2.14.

- Input and output devices shall be wired to “quick-connect plug type” terminals to facilitate removal of the module without disconnecting wiring from the plug type terminal.
- ZC shall have an integrated brushless actuator and be capable of operating zone dampers as well as parallel fan powered terminal boxes.
- ZC shall be capable of controlling supplemental heat or auxiliary heat sources, including fan control, when required at the zone level.
- The zone controller shall have the capability to support adjustable minimum and maximum damper positions.
- ZC shall be capable of reading an analog signal from a CO2 sensor or other sensor measuring volatile contaminants, or relative humidity and provide DCV at the zone by calculating a DCV damper position and participate in system DCV operation with the air source.

(8) Bypass Controller. Defined as Application Specific Controllers (ASC) shall be capable of reading supply static pressure and controlling the bypass damper to maintain the supply static set point. This operation shall be provided when operating within a zoning system application, as specified for bypass control in Paragraph 2.14 or in a stand-alone mode.

- Input and output devices shall be wired to “quick-connect plug type” terminals to facilitate removal of the module without disconnecting wiring from the plug type terminal.
- The controller shall contain an onboard pressure sensor to measure duct static pressure. The sensor measuring range shall be from 0.0 to 2.0 inches H2O.
- Bypass Controller shall have an integrated brushless actuator providing a minimum of 35 in/lbs of torque and be capable of operating a bypass damper. The direction of rotation shall be reversible in the field to accommodate field supplied bypass damper assemblies.
- Bypass Controller shall provide an analog output signal for an external actuator or to control the speed of a variable frequency drive (VFD).

(9) Rooftop Unit Controller (RTC). Defined as Application Specific Controllers (ASC), shall control all associated HVAC Constant Volume rooftop equipment functions, this operation shall be provided when operating within a zoning system application, as specified for an air source control, in Paragraph 2.4 or in a stand-alone mode. The resident algorithms shall use error reduction logic as designated in ASHRAE standard 90.1 to provide temperature control and energy usage.

- Capacity control shall be based on the use of a conventional thermostat, or programmable thermostat, or alternatively, a constant volume unit may utilize its own internal time clock and setpoints (cooling and heating) coupled with a room (wired or network communicating) sensor for capacity control. The controls shall provide separate occupied and unoccupied cooling and heating setpoints – except if a conventional thermostat is used.
- RTC shall feature and maintain a 365-day Real-Time Clock/Calendar with holiday functions.
- RTC shall be capable of stand-alone or networked operation.
- In the stand alone mode, each RTC shall establish occupancy scheduling based on its own local occupancy schedule, the closure of a contact connected to an external time clock or EMS system, or by a timed override request (1 to 24 hours) through its space temperature sensor override button.
- When networked, RTC occupancy may be established by user interface or occupancy signal from other controller located in network.
- RTC shall utilize fan control, 2 stages of cooling, and up to 3 stages of heating to maintain zone temperature at setpoint.
- RTC shall provide analog output signal for enthalpy economizer control.

(10) General Purpose Controller. Defined as Advanced Application Controllers (AAC) the General Purpose Controller shall be a solid state micro-controller with pre-tested and factory configured software designed for controlling building equipment using DDC algorithms and facility management routines. The controller shall be capable of operating in either a stand-alone mode or as part of a network.

- Input and output devices shall be wired to “quick-connect plug type” terminals to facilitate removal of the module without disconnecting wiring from the plug type terminal.
- Inputs. Shall support the following input types as a minimum
- Dry or pulsed dry contacts
- 0-5 VDC
- 0–10 VDC
- 4–20 mA
- 10K thermistors
- 1000-ohm Nickel RTD
- Outputs. Shall support the following input types as a minimum
- Discrete types
- 0–10 VDC analog type
- 4–20 mA analog type
- Real-Time Clock. Shall feature and maintain a 365-day hardware clock/calendar with holiday functions.
- Direct digital control routines. The following types of direct digital control routines shall be provided as a minimum:
- Indoor/Outdoor Lighting Control
- Time Schedule with/without override
- Enthalpy/Analog Comparison
- Analog Comparison
- Interlock / Permissive Interlock
- Fan Control
- Time Schedule with/without override
- Unit Heater
- Constant Volume Air Source control

c. Electric Meter with Demand Limit

2.15.3.2. Input and Output Interface

(1) General. Hard-wire input and output points to BCs, AACs, or ASCs.

(2) Protection. Shorting an input or output point to itself, to another point, or to ground shall cause no controller damage. Input or output point contact with up to 24 V for any duration shall cause no controller damage.

(3) Binary Inputs. Binary inputs shall monitor the on and off signal from a remote device. Binary inputs shall provide a wetting current of at least 12 mA and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.

(4) Pulse Accumulation Inputs. Pulse accumulation inputs shall conform to binary input requirements and shall accumulate up to 10 pulses per second.

(5) Analog Inputs. Analog inputs shall monitor low-voltage (0-10 Vdc), current (4-20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.

(6) Binary Outputs. Binary outputs shall send an on-or-off signal for on and off control. Building Controller binary outputs shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation.

(7) Analog Outputs. Analog outputs shall send a modulating 0-10 Vdc or 4-20 mA signal as required to properly control output devices. Each Building Controller analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer, and status lights. Analog outputs shall not drift more than 0.4% of range annually.

(8) Universal Inputs and Outputs. Inputs and outputs that can be designated as either binary or analog in software shall conform to the provisions of this section that are appropriate for their designated use.

2.15.3.3. Power Supplies And Line Filtering

a. Power Supplies. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.

(1) DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.

- Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MILSTD 810C for shock and vibration.
- Line voltage units shall be UL recognized and CSA listed.

b. Power Line Filtering.

(1) Provide internal or external transient voltage and surge suppression for workstations and controllers. Surge protection shall have:

(2) Dielectric strength of 1000 V minimum

(3) Response time of 10 nanoseconds or less

(4) Transverse mode noise attenuation of 65 dB or greater

(5) Common mode noise attenuation of 150 dB or greater at 40-100 Hz

2.15.3.4. Auxiliary Control Devices

a. Zone Dampers. Each Zone Damper shall include:

(1) A motorized damper assembly constructed of 24 gage galvanized iron with blade of 20 gage.

(2) Blade operation providing full modulation from open to closed position.

(3) The ability to operate in a controlling/link arrangement, where the controlling damper is operated by the zone controller. The zone controller shall provide a separate 0-10 vdc output proportional to the controlling damper position (available only if no modulating heat is used) to be used to link additional zone dampers. These additional dampers will track the position of the controlling damper and modulate to the same position as the controlling damper. The number of additional dampers are dependent upon the load of each field supplied damper actuator and the external output drive capability.

(4) Round dampers shall have elliptical blades with a seal around the entire damper blade edge. Rectangular dampers shall have fully sealed edges.
(5) A duct temperature sensor shall be an integral part of the damper assembly.

b. Ventilation Sensors Wall-Mounted Carbon Dioxide Sensors. Carbon dioxide sensor (CO2) shall have integral programming to perform automatic baseline calibration without user interface. The recommended manual recalibration period shall not be less than five years. Sensors shall be equipped with an LED display. Other features of wall-mounted Carbon Dioxide sensors shall include:
(1) Operating conditions: 60 to 90ºF (15 to 32ºC), and 0 to 95% RH, non-condensing
(2) Power supply: 18-30 VAC, 50/60 Hz half-wave rectified [18-–42 VDC polarity protected]
(3) CO2 sensor output: 4 to 20 mA or 0 to 10-volt signal.
(4) CO2 measurement range: 0–2,000 PPM.
(5) Setpoint: adjustable.
(6) Sensitivity: ±20 PPM.
(7) Accuracy: ±100 PPM at 60 to 90ºF (15 to 32ºC); and 760 mmHg

c. Ventilation Sensors Duct-Mounted Carbon Dioxide Sensor.
(1) Carbon Dioxide (CO2) sensors for duct-mounted applications shall be identical to the wall-mounted sensors specified above except as described below.
(2) The CO2 sensor shall be mounted in an enclosed aspirator box that mounts directly to the duct. The aspirator box shall be equipped with an induction tube to direct a side-stream of air from the duct through the CO2 sensor. A hinged, clear access door shall be installed on the front of the aspirator box to permit access to the sensor and to permit viewing the sensor without opening the door.
(3) CO2 sensors for duct-mounted applications shall be designed for flow-through sampling.

d. Temperature Sensors.
(1) Type. Temperature sensors shall be nominal 10K ohm thermistor type.
(2) Duct Sensors. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m^2(10 ft^2) of duct cross-section.
(3) Space Sensors. Space sensors shall have setpoint adjustment, override switch, display, and communication port as shown.

e. Humidity Sensors.
(1) Duct and room sensors shall have a sensing range of 20%-80%.
(2) Duct sensors shall have a sampling chamber.
(3) Outdoor air humidity sensors shall have a sensing range of 20%-95% RH and shall be suitable for ambient conditions of 40°C-75°C (-40°F-170°F).
(4) Humidity sensors shall not drift more than 1% of full scale annually.

f. Voltage Transformers.

g. AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have built-in fuse protection.
(1) Transformers shall be suitable for ambient temperatures of 4°C-55°C (40°F-130°F) and shall provide ±0.5% accuracy at 24 Vac and 5 VA load.
(2) Windings (except for terminals) shall be completely enclosed with metal or plastic.

2.15.3.5. COMPATIBILITY: The installation shall be compatible with and communicate via the Internet the existing USNA system for operation, maintenance, and monitoring.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.

3.1.2. Verify that proper power supply is available.

3.2 INSTALLATION

3.2.1. Install in accordance with manufacturer's instructions.

3.2.2. Install in accordance with NFPA 90A.

3.2.3. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level. Secure to withstand wind and seismic loading specified in Section 01000.

3.3 MANUFACTURER'S FIELD SERVICES

3.3.1. Prepare and start systems.

3.3.2. Provide initial start-up and shut-down during first year of operation.

3.4 WIRING

3.4.1.1. All control wiring shall as a minimum meet the following requirements:

3.4.2. ROUTING:

3.4.2.1. All field installed wiring shall be in EMT and installed in accordance with Division 16.

3.4.2.2. Analog input (AI) and Analog output (AO) wiring shall not be routed in conduits with conductors which carry alternating current.

3.4.2.3. The wiring and EMT for space sensors shall be routed and concealed inside of stud walls.

3.4.2.4. WIRE SIZE: All field wiring shall be at a minimum #22 AWG stranded wire.

3.4.2.5. CONNECTIONS: All splices/connections shall be made in junction boxes and shall utilize either terminal strips or 3M scotch lock crimp connectors.

3.4.2.6. LABELING: Control cables shall be labeled at all junction boxes and at the origination and termination of each cable. The Cable number/letter indicated on the submittal drawings shall be specified on this label.

3.5 OPERATION AND MAINTENANCE TRAINING

Provide operational and maintenance training as required by Section 15720.

3.5.1. Training: The startup technician give the following training sessions for the equipment specified in this section, each session shall be coordinated with the contracting officer:

3.5.1.1. Training Session: A four hour training session (to a minimum of four Commissary Store Personnel) within 14 days after final acceptance and all final inspection punch list items are resolved. This training session should be considered in conjunction with 3 day commissioning start up visit.

3.5.2. Videos: Provide each video described below:

3.5.2.1. User Video: This video should be tailored to equipment installed on this project and will explain to commissary management how to operate and maintain the equipment specified in this section. Video length should be from 15 to 25 minutes.

3.5.2.2. Service Video: Video training tape on "Basic Service Procedure": This video should be tailored to maintaining the installed on this project. The video should be on the level that would enable a journeyman mechanic to make most repairs to the system. Video length shall be 25 to 70 minutes.

3.6 STARTUP INSPECTION AND CERTIFICATION

3.6.1.1. Startup Technician Responsibilities:

a. The manufacturer approved Startup Technician shall personally be on site at the Commissary to perform operational checkouts of the system.

b. The Startup Technician shall personally inspect the installation of the system to ensure that the system is installed in accordance with the manufacturer's recommended methods.

c. The Startup Technician shall provide a "Startup Inspection Report" listing all incomplete work and incorrectly installed equipment. This list shall be provided to the Contracting Officer.

3.6.1.2. Certification of Installation: The following installation certifications shall be provided:

a. Startup Technician Certification: The Startup Technician shall provide a letter certifying that all items indicated in the "Startup Inspection Report" have been corrected. This letter shall be provided to the Contracting Officer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15783

PACKAGED DUAL PATH DEHUMIDIFIERS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Packaged roof top unit.
b. Packaged indoor unit with remote air cooled condenser.
c. Unit controls.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout. .
d. Section 15140 - Supports and Anchors.
e. Section 15240 - Vibration Isolation and Seismic Restraints.
f. Section 15651 - Product Refrigeration System.
g. Section 15990 – Testing, Adjusting, and Balancing.
h. Section 15971 - Refrigeration Monitoring and Control System (RMCS).
i. Section 15997 – Commissioning Mechanical Systems.
j. Division 16 - Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. AMCA 210 – Fan Performance Testing
c. ANSI B3.16 – Roller Bearings, Load Rating and Fatigue Life
d. ARI 210 - Unitary Air-Conditioning Equipment.
e. ARI 270 - Sound Rating of Outdoor Unitary Equipment.
f. ARI 410 – Air Cooling and Heating Coils.
g. NFPA 70 - National Electrical Code.
h. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Section 01400 – Quality Control: Procedures for submittals.
b. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
c. Product Data: Submit manufacturer's specifications for dehumidifier units showing dimensions, weights, capacities, ratings, fan performance with operating point clearly indicated, motor electrical characteristics, gages and finishes of materials, and installation instructions.
d. Submittals shall include but shall not be limited to the following:

(1) Equipment schedule containing dehumidification, cooling and heating capacities, fan motor data, electrical power data and filtration schedule.
(2) Technical Data Sheet containing design operating inlet and outlet conditions, air flow indicator settings, electrical power requirements and fan motor data.
(3) A system flow diagram showing air volumes and conditions throughout the system.
(4) A General Arrangement Diagram showing three views of the dehumidifier units with overall dimensions, general utility connection locations, ductwork connection points and bolting patterns, total weight and required service or equipment removal clearances.
(5) Control Diagrams and Parts Lists showing all electric circuits component ratings and any applicable setpoints.
(6) Technical data sheet on the individual control unit (ICU) for the dehumidification system and electrical diagram showing how ICU is connected to the dehumidification system.
(7) Piping Circuit diagrams for all piping circuits supplied.

e. Operation and Maintenance data.

1.3.2. Submittals for Project Closeout:

a. Section 01720 – Phase Turnover and Project Closeout.
b. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair instructions, including lubrication instructions, desiccant filter replacement, motor and drive replacement, and spare parts lists. Include this data in maintenance manuals.
c. Recommended Spare Parts List with long and short term requirements.
d. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout

1.4 QUALITY ASSURANCE

a. Cooling coils shall be the ARI label.
b. Fans shall be AMCA certified.

1.5 QUALIFICATIONS

a. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

1.6 REGULATORY REQUIREMENTS

a. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. or ETL.

1.7 DELIVERY, STORAGE, AND PROTECTION

a. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.8 WARRANTY

a. Provide a five year warranty to include coverage for refrigeration compressors and heat exchangers.

1.9 EXTRA MATERIALS

a. Section 01720 – [Phased Turnover and] contract closeout.
b. Provide one set of filters.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

a. Seasons 4
b. DesChamps
c. AAON
d. Munters Cargocaire

2.2 REFRIGERANT

a. Refrigerant shall be R410A.

2.3 EFFICIENCY

a. EER shall not be less than 10.5.

2.4 DEHUMIDIFIERS

a. General: Packaged rooftop units having gas burner and electric refrigeration using non-ozone depleting refrigerant.

b. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, heat exchanger and burner, heat recovery coil. Heat Recovery coil provided under Section 15651 and factory installed under this section), controls, air filters, and refrigerant cooling coils. Coils shall be

arranged for reheat control with the cooling coils upstream followed by the heat recovery coil and finally the gas heating section. The cooling coils shall be arranged for cooling of return and outdoor air by separate refrigeration circuits (dual path) and for complete bypassing of a portion of return air.

2.5 CABINET

a. Aluminum or Stainless steel double wall panels with rigid internal stainless steel or aluminum channel frame, fully gasketed joints. Bottom of unit shall be panned with aluminum. Drain pans shall be stainless steel. Filter frames shall be aluminum extrusions. All internal and external surfaces, structural elements, and fasteners shall be aluminum or stainless steel.
b. Access doors with flush cam type or locking door handle type with piano hinges and gasketed heads jambs and sills with knife edge meeting gasket for positive seal. Access doors frames shall be a minimum 20 gage.
c. Exterior surface shall be cleaned and finished with an air dry enamel. All coils and controls shall be removable thorough the access doors.
d. Cabinet Insulation shall be 2 inch (50 mm) thick (R-7) for with full inner galvanized steel or aluminum panel.
e. Roof Mounting Curb: 14 inches (350 mm) high galvanized steel, channel frame with gaskets, nailer strips, insulated, top to be level, designed in accord with Section 15140 SUPPORTS AND ANCHORS to withstand wind loading indicated on the Structural drawings.

2.6 ROOF TOP MECHANICAL UNIT ROOF CURB ANCHORAGE BRACKETS

a. Provide mechanical unit manufacturer engineered galvanized metal brackets for anchorage of Roof Top Mechanical Units to manufactured roof curbs.
b. Design and fabricate brackets to anchor mechanical units to resist forces due to design wind pressure and seismic forces. Wind load design requirements are as indicated on structural drawing.

2.7 SUPPLY FANS

a. Backward inclined airfoil centrifugal type, enameled steel construction, resiliently mounted with V-belt drive and adjustable variable pitch motor pulley to be replaced with fixed pitch sheave after balancing, and rubber isolated hinge mounted premium efficiency open drip proof motor or direct drive as indicated.
b. Isolate complete fan assembly.
c. Refer to Section 15240 Motors.
d. All fans shall be vibration isolated and factory balanced such that maximum displacement in any plane does not exceed 1.5 mils for fans operating at or below 2000 RPM or 1.0 mils above 2000 RPM. Fans shall operate at 80% or less of their first critical speed.
e. Provide variable speed fan drive.
f. Fan construction shall be aluminum or epoxy coated steel.

2.8 FILTERS

a. Outside air inlets and return air plenums shall be equipped with 2” pleated roughing filters ahead of 4”MERV 13 pleated filters both with nonwoven pleated media held in place by a welded wire support grid. All filters shall be mounted such that air bypass is minimized.

2.9 DAMPERS

a. Provide manual balancing dampers with position indicating quadrants and locking hardware for balancing of the by pass air stream and motorized dampers for outdoor and return air service.

b. All dampers shall have heavy gauge aluminum blades and frames, plated steel axels with synthetic bushings and plated interconnecting linkage for smooth operation. Dampers shall be opposed blade type equipped with blade edge and end seals to minimize leakage. All motorized dampers shall be equipped with operators to provide automatic control operation.

2.10 HEAT EXCHANGER AND BURNER

a. Gas Burner: Two stage (**NOT MODULATING)** natural gas burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot. Burner shall have a forced draft or combustion blower to provide positive venting.
b. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.
c. High Limit Control: Temperature sensor with fixed stop at maximum permissible setting, de-energize burner on excessive bonnet temperature and energize burner when temperature drops to lower safe value.
d. Supply Fan Control: Temperature sensor sensing bonnet temperatures and independent of burner controls, with provisions for continuous fan operation.
e. Stainless steel heat exchanger of welded construction.

2.11 EVAPORATOR COILS

a. Maximum face velocity shall not exceed 400 fpm for outdoor air coils, 450 fpm for return air coils, to reduce supply fan horsepower requirement.
b. Provide copper tube aluminum fin coil assembly with stainless drain pan [and coil endplates]and connection for return air coil. Provide copper tube, copper fin coil with stainless steel drain pan for outdoor air coil.
c. Coils shall be direct expansion type constructed with ½ in or 5/8 in. OD seamless copper tubes mechanically expanded for a compression bond to fins. All evaporator coils shall be counter flow circuited and equipped with seamless copper tube pressure type distributors. DX coil will be designed for a maximum working pressure of 400 PSIG. Coil assemblies shall include 16 gage galvanized steel casings with a support mounting structure that permits coil removal through side access. Assemblies shall include an insulated drain pan complete with exterior trap.
d. All direct expansion coils shall be equipped with a thermostatic expansion valve with external equalization and liquid line solenoid valve. Provide capillary tubes or thermostatic expansion valves for units of 6 tons (21 kw) capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons (26 kw) cooling capacity and larger.

2.12 COMPRESSOR

a. Provide hermetic scroll compressors, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter drier.
b. Five minute timed off circuit to delay compressor start.
c. Provide step capacity control where scheduled by cycling compressors.

2.13 AIR COOLED CONDENSER

a. Integral air cooled condenser.
b. Provide copper tube copper fin coil assembly with stainless steel end plates sub cooling rows and coil guard.
c. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.
d. Provide refrigerant liquid temperature switches to cycle condenser fans for operation to 0 degrees F.
e. Maximum working pressure 600 psi.
f. Aluminum or Stainless steel panels with rigid stainless steel or aluminum channel frame, All internal and external surfaces, structural elements, and fasteners shall be aluminum or stainless steel. Fan blades and venturis shall be aluminum or powder coated steel.

2.14 MIXED AIR SECTION

a. Dampers: Provide motorized outside air dampers for fixed outside air quantity. Damper construction shall be specified in "DAMPERS" above.
b. Damper Operator: 24 volt with gear train sealed in oil with spring return on units 7.5 ton (26 kw) cooling capacity and larger.

2.15 HEAT RECOVERY COIL

a. Shall be provided under Section 15651. Under this section, provide a coil cabinet and mount the coil in the unit at the factory.
b. Coils shall be counterflow circuited. Face air flow velocities shall not exceed 550 FPM. Coils shall be designed for a maximum working pressure of 400 PSIG.
c. The heat reclaim coils shall be provided by the product refrigeration manufacturer and installed by the HVAC contractor.

2.16 OPERATING CONTROLS

a. Provide terminal strip on unit for connection of operating controls to the Section 15971 RMCS. See Section 15971 for control functions required. Install and wire the ICU provided by Section 15971.
b. Interface controls with Section 15971. Provide all controls or devices required to perform the control and monitoring functions specified in Section 15971, but not provided by 15971.

2.17 DESCRIPTION OF OPERATION

a. Space temperature and humidity shall be controlled by a minimum of three individual cooling stages utilizing two air paths. The outside air path will process all of the outside air (no bypass) and provide most of the dehumidification required for the space. An outdoor air precooling coil and dehumidification coils (6-row minimum) shall be used. The return air path will have a cooling coil to cool the return air as required to provide the remaining cooling required for the space. Some return air ~~will~~ may be bypassed.
b. The air paths will then mix heating will be accomplished by utilizing reclaimed refrigeration heat through heat reclaim coils, supplemented by a two stage gas fired power burner. The reclaimed heat will be used for reheat if required, and will provide the main heat as reclaimed heat is available. The gas heating will only be used if additional capacity is required.
c. Fan operation shall be continuous. Fan shall run at high speed (100%) in occupied mode and for cooling dehumidification operation and at low speed (50%) at all other times.
d. Compressors shall be sized to match the cooling/dehumidification requirements of the two paths with the evaporator coils.
e. Multiple Condenser fans shall be controlled from liquid temperature and shall be cycled to maintain a target liquid temperature.

f. Heat reclaim will be used for reheat and for initial stages of heat.
g. Control the gas heating section from space temperature only after maximum utilization of heat reclaim has been realized. Auxiliary heat shall not be used for reheat control.
h. The dehumidification coil in the outdoor air path is stage 1 and the outside air precooling coil is stage 2. The return air cooling coil is stage 3. Stage 1, 2 and 3 coils shall be controlled from space humidity in that order to maintain 52°F dewpoint. Precooling coil shall be locked out below an ambient temperature of 72 degrees F.
i. Outside air and return air motorized dampers shall be provided. The outside air (or night setback) damper shall be open during the occupied cycle and closed in the unoccupied cycle. The outside air (or night setback) damper shall be mechanically linked to the return air damper so the return air damper shall open when the outdoor air (or night setback) damper closes, allowing return air to follow both air paths.
j. To allow the specified air flow rates in the two paths, an array of static pressure probes shall be positioned to monitoring internal air pressure drops through key elements of the dual path system. Each air path shall have built-in balancing dampers for air volume adjustment.
k. Provide a differential pressure switch to monitor the operation of the main blower.
l. The temperature and humidity set points shall be:

Function	Day	Night
Heat	70 deg. F.	65 deg. F.
Cool	75 deg. F.	75 deg. F.
Humidity	52 deg. F. dew point	52 deg. F. dew point

m. Cooling operation shall be locked out below 45°F ambient.

2.18 ELECTRICAL

a. Unit shall be factory prewired with all controls necessary for complete and satisfactory operation.
b. Unit manufacturer shall mount and wire the ICU provided by the Section 15971 manufacturer.
c. Disconnect Switch: Factory mount disconnect switch in control panels of indoor and outdoor units.
d. Duplex Outlet: Provide a separately fused 120V duplex outlet at the air cooled condenser for service use.
e. Motor starters for motors 20 hp and above shall be reduced voltage solid state type.
f. Lights [and ventilation fan in compressor module and] in each module of the unit with a switch and pilot light on the exterior of the unit.

PART 3 - EXECUTION

3.1 EXAMINATION

a. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
b. Verify that proper power supply is available.

3.2 INSTALLATION

a. Examine areas and conditions under which dehumidifier units are to be installed. Do not proceed with work until satisfactory conditions have been corrected.

b. Install dehumidifier units where indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that units comply with requirements and serve intended purposes.
c. Coordinate with other work, including ductwork, floor construction, roof decking, and piping, as necessary to interface installation of dehumidifier units with other work.
d. Upon completion of installation of dehumidifier units, the services of a factory technician shall be provided to start-up and operate equipment to demonstrate capacity with requirements. Field correct malfunctioning units, then retest to demonstrate compliance.
e. Provide one spare set of belts for each belt-driven dehumidifier component, obtain receipt from Government that belts have been received. Install a fixed pitch motor sheave after balancing is completed.
f. Grounding: Provide positive equipment ground for dehumidifier unit components.
g. Install in accordance with manufacturer's instructions.
h. Install in accordance with NFPA 90A.
i. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level. Secure to withstand wind and seismic loading specified in Section 01000.
j. Provide control wiring between the indoor and outdoor units.

3.3 MANUFACTURER'S FIELD SERVICES

a. Prepare and start systems.
b. The manufacturer shall provide a factory field service technician for startup supervision and instruction of operating personnel.

3.4 OPERATION AND MAINTENANCE TRAINING

3.4.1. Provide operational and maintenance training as required by Section 15720.

3.4.2. Training: The startup technician give the following training sessions for the equipment specified in this section, each session shall be coordinated with the contracting officer:

3.4.2.1. Training Session: A four hour training session (to a minimum of four Commissary Store Personnel) within 14 days after final acceptance and all final inspection punch list items are resolved. This training session should be considered in conjunction with 3 day commissioning start up visit.

3.4.3. Videos: Provide each video described below:

3.4.3.1. User Video: This video should be tailored to equipment installed on this project and will explain to commissary management how to operate and maintain the equipment specified in this section. Video length should be from 15 to 25 minutes.

3.4.3.2. Service Video: Video training tape on "Basic Service Procedure": This video should be tailored to maintaining the installed on this project. The video should be on the level that would enable a journeyman mechanic to make most repairs to the system. Video length shall be 25 to 70 minutes.

3.5 STARTUP INSPECTION AND CERTIFICATION

3.5.1.1. Startup Technician Responsibilities:

a. The manufacturer approved Startup Technician shall personally be on site at the Commissary to perform operational checkouts of the system.

b. The Startup Technician shall personally inspect the installation of the system to ensure that the system is installed in accordance with the manufacturer's recommended methods.

c. The Startup Technician shall provide a "Startup Inspection Report" listing all incomplete work and incorrectly installed equipment. This list shall be provided to the Contracting Officer.

3.5.1.2. Certification of Installation: The following installation certifications shall be provided:

a. Startup Technician Certification: The Startup Technician shall provide a letter certifying that all items indicated in the "Startup Inspection Report" have been corrected. This letter shall be provided to the Contracting Officer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15790

AIR COILS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Refrigerant coils.
b. Electric coils.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Contract Closeout.
d. Section 15260 - Piping Insulation for HVAC and Plumbing.
e. Section 15515 - Hydronic Specialties.
f. Section 15890 - Ductwork: Installation of duct coils.
g. Division 16 - Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ARI 410 - Forced-Circulation Air-Cooling and Air- Heating Coils.
c. SMACNA - HVAC Duct Construction Standards, Metal and Flexible.
d. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS FOR REVIEW

a. Section 01300 - Submittals: Procedures for submittals.
b. Product Data: Provide coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
c. Shop Drawings: Indicate coil and frame configurations, dimensions, capacities, materials, rows, connections, and rough-in dimensions.
d. Operation and Maintenance data.

1.4 QUALITY ASSURANCE

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.5 REGULATORY REQUIREMENTS

a. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

a. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors.
b. Protect coils from entry of dirt and debris with pipe caps or plugs.

PART 2 - PRODUCTS

2.1 REFRIGERANT COILS

a. Tubes: 3/8, ½, or 5/8 inch (16 mm) OD seamless copper or brass arranged in parallel or staggered pattern, expanded into fins, brazed joints.
b. Fins: Copper continuous plate type with full fin collars.
c. Casing: Die formed channel frame of 16 gage (1.6 mm) galvanized steel. Provide tube supports for coils longer than 36 inches (900 mm).
d. Headers: Seamless copper or brass tubes with silver brazed joints.
e. Liquid Distributors: Brass or copper venturi type distributor with seamless copper distributor tubes, 5/16 inch (7.9 mm) OD for refrigerant R-12 and 1/4 inch (6.4 mm) OD for refrigerant R-22; maximum 12 circuits per distributor.
f. Testing: Air test under water at 300 psig (2070 kPa) for working pressure of 250 psig (1720 kPa); clean, dehydrate, and seal with dry nitrogen charge.
g. Fin Spacing: 14 fins per inch (1.8 mm on center).

2.2 ELECTRIC COILS

a. Assembly: ANSI/UL 1096 listed and labeled, with terminal control box and hinged cover, splice box, coil, casing, and controls.
b. Coil: Enclosed copper tube, aluminum finned element of coiled nickel-chrome resistance wire centered in tubes and embedded in refractory material or Exposed helical coil of nickel-chrome resistance wire with refractory ceramic support bushings as scheduled.
c. Casing: Die formed channel frame of 18 gage galvanized steel with. Provide tube supports for coils longer than 36 inches.
d. Controls: Automatic reset thermal cut-out, built-in magnetic, control circuit transformer and fuse, manual reset thermal cut-out, air flow proving device, unfused disconnect, load fuses.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with manufacturers written instructions.
b. Install in ducts and casings in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible.
(1) Support coil sections independent of piping on steel channel or double angle frames and secure to casings.
(2) Provide frames for maximum three coil sections.
(3) Arrange supports to avoid piercing drain pans.
(4) Provide airtight seal between coil and duct or casing.
(5) Refer to Section 15890.

c. Protect coils to prevent damage to fins and flanges. Comb out bent fins.
d. Install coils level. Install cleanable tube coils with 1:50 pitch.
e. Make connections to coils with unions and flanges.
f. Hydronic Coils:
(1) Hydronic Coils: Connect water supply to leaving air side of coil (counterflow arrangement).
(2) Provide shut-off valve on supply line and balancing valve with memory stop on return line.
(3) Locate water supply at bottom of supply header and return water connection at top.
(4) Provide manual air vents at high points complete with stop valve.
(5) Ensure water coils are drainable and provide drain connection at low points.
(6) Refer to Section 15515.
(7) For cooling coils where air velocity exceeds 500 ft/min. provide [three break] [six break] moisture eliminators of galvanized steel.
(8) Provide drain pan and drain connection for cooling coils. Fabricate drain pan from 20 gage galvanized steel. Extend 3 inches from face of coil entering air side 6 inches from face of coil leaving air side [,] [.] and 4 inches from face of eliminators. Pipe drain pans individually to floor drain[.] [with water seal trap.]

g. Wire electric duct coils in accordance with ANSI/NFPA 70. .
h. Refrigerant Coils: Provide sight glass in liquid line within 12 inches (300 mm) of coil. Refer to Section 15535.
i. Insulate headers located outside air flow as specified for piping. Refer to Section 15260.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15835

TERMINAL HEAT TRANSFER UNITS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Cabinet unit heaters.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 –Contract Closeout.
d. Section 15170 - Motors.
e. Section 15790 – Air Coils.
f. Section 15990 - Commissioning
g. Section 15935 – Building HVAC Systems Controls.
h. Division 16- Equipment Wiring Systems: Electrical characteristics and wiring connections.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Section 01400 – Quality Control: Procedures for submittals.
b. Product Data: Provide typical catalog of information including arrangements.
c. Shop Drawings:

(1) Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
(2) Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.

(3) Indicate mechanical and electrical service locations and requirements.

d. Operation and Maintenance data.

1.3.2. Submittals For Information:

a. Section 01400 – Quality Control: Procedures for submittals.
b. Manufacturer's Instructions: Indicate installation instructions and recommendations.

1.3.3. Submittals At Project Closeout:

a. Section 01720 – [Phased Turnover and] Project Closeout.
b. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valving.
c. Operation and Maintenance Data: Include manufacturers' descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
d. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout

1.4 REGULATORY REQUIREMENTS

a. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 CABINET UNIT HEATERS

a. Coils: Electric per section 15790 – Air Coils
b. Cabinet: 0.0598 inch (1.5 mm) steel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet and integral air outlet and inlet grilles where scheduled.
c. Finish: Factory applied baked enamel of color as selected on visible surfaces of enclosure or cabinet.
d. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
e. Motor: Tap wound multiple speed with sleeve bearings, resiliently mounted.
f. Control: Multiple speed switch, factory wired, located in cabinet.
g. Filter: Easily removed 1 inch (25 mm) thick glass fiber throw-away type, located to filter air before coil.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with manufacturer's instructions.
b. Install equipment exposed to finished areas after walls and ceiling are finished and painted. Avoid damage.
c. Protection: Provide finished cabinet units with protective covers during balance of construction.
d. Cabinet Unit Heaters: Install as indicated. Coordinate to assure correct recess size for recessed units.

3.2 CLEANING

a. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.
b. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

3.3 OPERATION AND MAINTENANCE TRAINING

3.3.1. Provide operational and maintenance training as required by Section 15720.

3.3.2. Training: The startup technician give the following training sessions for the equipment specified in this section, each session shall be coordinated with the contracting officer:

3.3.3. Training Session: A four hour training session (to a minimum of four Commissary Store Personnel) within 14 days after final acceptance and all final inspection punch list items are resolved. This training session should be considered in conjunction with 3 day commissioning start up visit.

3.3.4. Videos: Provide each video described below:

3.3.4.1. User Video: This video should be tailored to equipment installed on this project and will explain to commissary management how to operate and maintain the equipment specified in this section. Video length should be from 15 to 25 minutes.

3.3.4.2. Service Video: Video training tape on "Basic Service Procedure": This video should be tailored to maintaining the installed on this project. The video should be on the level that would enable a journeyman mechanic to make most repairs to the system. Video length shall be 25 to 70 minutes.

3.4 STARTUP INSPECTION AND CERTIFICATION

3.4.1. Startup Technician Responsibilities:
a. The manufacturer approved Startup Technician shall personally be on site at the Commissary to perform operational checkouts of the system.
b. The Startup Technician shall personally inspect the installation of the system to ensure that the system is installed in accordance with the manufacturer’s recommended methods.

c. The Startup Technician shall provide a "Startup Inspection Report" listing all incomplete work and incorrectly installed equipment. This list shall be provided to the Contracting Officer.

3.4.2. Certification of Installation: The following installation certifications shall be provided:

3.4.2.1. Startup Technician Certification: The Startup Technician shall provide a letter certifying that all items indicated in the "Startup Inspection Report" have been corrected. This letter shall be provided to the Contracting Officer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15870

POWER VENTILATORS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Power Roof Ventilators.
b. Inline Fans.
c. Upblast Fan.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15140 - Supports and Anchors.
e. Section 15170 - Motors.
f. Section 15240 - Vibration Isolation and Seismic Restraints.
g. Section 15890 - Ductwork.
h. Section 15910 - Duct Accessories.
i. Section 15997 – Commissioning Mechanical systems.
j. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. AMCA 99 - Standards Handbook.
c. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
d. AMCA 261 - Directory of Products Licensed to Bear the AMCA Certified Ratings Seal.
e. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
f. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.
g. NEMA MG1 - Motors and Generators.
h. NFPA 70 - National Electrical Code.
i. UL 705 - Power Ventilators.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Submit under provisions of Section 01400.
b. Product Data: Provide data on fans and accessories including sound power levels at rated capacity, and electrical characteristics and connection requirements.
c. Manufacturer's Installation Instructions.
d. Operation and Maintenance data.

1.3.2. Submittals at Project Closeout:

a. Section 01720 – Phased Turnover and Project Closeout.
b. Operation and Maintenance Data: Include manufacturers' descriptive literature, instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.
c. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout

PART 2 - PRODUCTS

2.1 ROOF VENTILATORS, PRV

a. Product Requirements:

(1) Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
(2) Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.
(3) Fabrication: Conform to AMCA 99.
(4) UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

b. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch (13 mm) mesh, 16 gage (2 mm) aluminum birdscreen; square base to suit roof curb with continuous curb gaskets.
c. Roof Curb: See Section 15140
d. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
e. Motorized Shutter: Motor actuated, aluminum multiple blade construction, felt edged with nylon bearings, factory wired line voltage motor.
f. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self aligning pre-lubricated ball bearings.

2.2 INLINE FANS

a. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing , resilient mounted motor, gravity backdraft damper in discharge.
b. Disconnect Switch: In housing for thermal overload protected motor .
c. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.3 UPBLAST FAN

a. Product Requirements:

(1) Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
(2) Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.
(3) Fabrication: Conform to AMCA 99.
(4) UL Compliance: UL listed and labeled, designed, manufactured, and tested and installed in accordance with UL 705 and 96.

b. Fan Unit: V-belt or direct driven as indicated, with upblast spun aluminum housing with grease tray, resilient mounted motor; ½ inch (13 mm) mesh, 0.62 inch (1.6 mm) thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.
c. Roof Curb: Ventilated double wall, hinged curb adapter, and factory installed nailer strip. See 3.1, g. below.
d. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor
e. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with manufacturer's instructions.
b. Secure roof exhausters with lag screws to roof curb structure.
c. Extend ducts to roof exhausters into roof curb.
d. Provide sheaves required for final air balance.
e. Install dampers on inlet to roof exhausters.
f. Do not operate fans for any purpose until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.
g. Range hood exhaust fans shall discharge 40” or more above roof and 3’ above intakes within 10 horizontally.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15888

KITCHEN HOODS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Kitchen hoods
b. Fire extinguishing equipment
c. Fuel shutoff devices

1.1.2. Related Sections:

1.1.2.1. Specified elsewhere:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Contract Closeout.
d. Section 15010 –General Provisions - Mechanical.
e. Section 15890 –Ductwork.
f. Section 15990 – Testing, Adjusting, and Balancing.
g. Section 15997 – Commissioning Mechanical Systems

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. NSF labeled
c. NFPA 96-Latest edition
d. UL 710 listed as complete system
e. NFPA 17A: Standard on Wet Chemical Extinguishing Systems
f. IMC – Latest edition.
g. UL 1570 and 1571 – Light Fixtures.
h. NFPA70.
i. SMACNA – “Kitchen Equipment Fabrication Guidelines”.
j. SMACNA – “Duct Construction Standards”.

1.3 SUBMITTALS

a. Submit under provisions of Section 01300.
b. Shop Drawings showing detailed dimensions and capacities and layout of fire extinguishing system.
c. Manufacturer's literature demonstrating compliance with this specification.
d. Catalog cuts of all components.
e. Operation and Maintenance data.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

a. Kitchen hoods:
(1) Greenheck
(2) Gaylord
(3) Seco
(4) Econovent
(5) Duo-Air
(6) Greasmaster

2.2 MATERIALS

2.2.1. Factory manufactured hoods:

a. Hoods shall be Type 1 for grease laden service unless noted.
b. All parts of hood shall be 18 gauge type 304 stainless steel with #4 finish where exposed, #2B where concealed. Exposed welds shall be polished to #4 finish.
c. UL listed stainless steel grease extractors (not filters).
d. Mounting hardware.
e. All joints shall be externally welded liquid-tight and ground smooth.
f. Provide internal structural steel framework consisting of channels and angles at 3 ft. 0 in. O.C. maximum.
g. Removable stainless steel drip pan.
h. Matching fascia panels to close space between hood and ceiling.
i. All welds shall be continuous, liquid-tight on exterior of hood.
j. Light switch and 4 hour timer by Division 16. Provide enclosure in front of front left corner of hood.

2.2.2. Fire suppression system:

a. The exhaust hood, entire exhaust duct system and all grease producing appliances under the hood shall be protected against fire by the wet chemical fire suppression system.
b. The system shall be designed and installed by a factory authorized distributor in accordance with Underwriter's Laboratories and Factory Mutual's listings and to conform to all local authorities having jurisdiction including NFPA #96.
c. Provide automatic gas and electric fuel shutoff devices (manual reset) to the Plumbing and Electrical Contractors for all cooking appliances wired to stop appliances upon the actuation of the system.

d. Nozzles located in the plenum and exhaust duct shall be of the spring loaded, self-closing type, capable of functioning with a heavy accumulation of grease.
e. Nozzles for deep fat fryer and other associated cooking equipment shall be either of the self-closing type or shall be fitted with nozzle covers as supplied by the manufacturer.
f. Entire system shall be self-purging.
g. The installer shall have regularly available contract maintenance of this type system plus 24 hour emergency service for same. He shall furnish as a part of this work a maintenance contract for one year from the date of Substantial Completion with inspection at least once each 6 months and 24 hour emergency service when required.
h. All exposed piping and devices shall be chrome plated, chrome sleeved or stainless steel.
i. Remote manual release at exit door (10 feet minimum from exhaust system, 4 ft. 6 in. AFF).
j. Furnish all required wiring to connect fire extinguishing system to building fire alarm system.
k. All wiring or cabling shall be concealed.

PART 3 - EXECUTION

3.1 PREPARATION

a. Field verify all dimensions.

3.2 INSTALLATION

a. Electrical contractor will provide all field wiring to do the following (upon fire extinguisher system actuation):
(1) Disconnect power and fuel to all appliances under hood.
(2) Signal fire alarm system

b. Electrical contractor will provide power wiring to lights. He will also furnish and install wall mounted light switch.
c. Section 15888 contractor shall do all other electrical wiring required, if any.
d. Coordinate work with that of the kitchen equipment installer.
e. Fabricate in accord with “Kitchen Equipment Fabrication Guidelines” and “Duct Construction Standards” unless specified in Section 05500.
f. Provide seismic restraints.
g. Coordinate with Division 5 “Metal Fabrications” for stainless steel wall panels required behind equipment item 1D09 chicken rotisserie.
h. Provide fire protection for the Bakery oven integral hood.

3.3 OPERATION AND MAINTENANCE TRAINING

3.3.1. Provide operational and maintenance training as required by Section 15720.

3.3.2. Training: The startup technician give the following training sessions for the equipment specified in this section, each session shall be coordinated with the contracting officer:

3.3.2.1. Training Session: A four hour training session (to a minimum of four Commissary Store Personnel) within 14 days after final acceptance and all final inspection punch list items are resolved. This training session should be considered in conjunction with 3 day commissioning start up visit.

3.3.3. Videos: Provide each video described below:

3.3.3.1. User Video: This video should be tailored to equipment installed on this project and will explain to commissary management how to operate and maintain the equipment specified in this section. Video length should be from 15 to 25 minutes.

3.3.3.2. Service Video: Video training tape on "Basic Service Procedure": This video should be tailored to maintaining the installed on this project. The video should be on the level that would enable a journeyman mechanic to make most repairs to the system. Video length shall be 25 to 70 minutes.

3.4 STARTUP INSPECTION AND CERTIFICATION

3.4.1.1. Startup Technician Responsibilities:

a. The manufacturer approved Startup Technician shall personally be on site at the Commissary to perform operational checkouts of the system.

b. The Startup Technician shall personally inspect the installation of the system to ensure that the system is installed in accordance with the manufacturer's recommended methods.

c. The Startup Technician shall provide a "Startup Inspection Report" listing all incomplete work and incorrectly installed equipment. This list shall be provided to the Contracting Officer.

3.4.1.2. Certification of Installation: The following installation certifications shall be provided:

a. Startup Technician Certification: The Startup Technician shall provide a letter certifying that all items indicated in the "Startup Inspection Report" have been corrected. This letter shall be provided to the Contracting Officer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15890

DUCTWORK

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Metal ductwork.
b. Casing and plenums.
c. Duct cleaning.

1.1.2. Related Sections:

a. Section 01115 - Sustainable Design Requirements.
b. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
c. Section 01400 - Quality Control.
d. Section 01720 – Closeout Procedures.
e. Section 15140 - Supports and Anchors.
f. Section 15290 - Duct Insulation.
g. Section 15910 - Ductwork Accessories.
h. Section 15940 - Air inlets and Outlets.
i. Section 15990 - Testing, Adjusting and Balancing.
j. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ASTM A 36 - Structural Steel.
c. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
d. ASTM A 366 - Steel, Sheet, Carbon, Cold Rolled, Commercial Quality.
e. ASTM A 525 - General Requirements for Steel Sheet, Zinc- Coated (Galvanized) by the Hot-Dip Process.
f. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.
g. ASTM A 568 - Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
h. ASTM A 569 - Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality.
i. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
j. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
k. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
l. NFPA 96 – Ventilation of Commercial Kitchens.
m. SMACNA - HVAC Air Duct Leakage Test Manual.
n. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

1.3 PERFORMANCE REQUIREMENTS

a. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.4 SUBMITTALS

1.4.1. Submittals During Construction:

a. Submit under provisions of Section 01400 – Quality Control.
b. Test Reports: Indicate pressure tests performed. Include date; section tested, test pressure, and leakage rate, following SMACNA HVAC Air Duct Leakage Test Manual.
c. Operation and Maintenance data.

1.4.2. Sustainable Design Submittals
a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."
(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.4.3. Submittals at Project Closeout:

a. Section 01720 – Closeout Procedures.
b. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.
c. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout.

1.5 QUALITY ASSURANCE

a. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible. and NAIMA Fibrous Glass Construction Standards.

1.6 REGULATORY REQUIREMENTS

a. Construct ductwork to NFPA 90A and NFPA 90B standards.

1.7 ENVIRONMENTAL REQUIREMENTS

a. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
b. Maintain temperatures during and after installation of duct sealants.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Sealants and Adhesives, Interior on-site applied only.

a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 MATERIALS

a. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of in conformance with ASTM A90.

b. Insulated Flexible Ducts:

(1) Two ply vinyl film supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.

(2) Pressure Rating: 4 inches WG (2.50 kPa) positive and 1.0 inches WG (250 Pa) negative.

(3) Maximum Velocity: 4000 fpm (20.3 m/sec).

(4) Temperature Range: -10 degrees F to 160 degrees F (-23 degrees C to 71 degrees C).

c. Kitchen exhaust ducts shall be black steel where concealed, stainless steel where exposed. Joints shall be welded or flanged and gasketed.

d. Sealant:

(1) Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.

(2) Low Volatile Organic Content (VOC).

e. Hanger Rod: ASTM A36; steel; threaded both ends, threaded one end, or continuously threaded.

2.3 DUCTWORK FABRICATION

a. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

b. Construct T's, bends, and elbows with radius of not less than 1 1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide air foil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.

c. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

d. All exposed round duct shall be spiral lock seam, double wall insulated with 1" minimum of K=.25, 3lb/sq.ft fiber glass insulation with cleanable, noneroding, antimicrobial coating, and galvaneal outer duct ready for painting. Fabricate round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch (100 mm) cemented slip joint, brazed or electric welded. Prime coat welded joints.. Package exposed duct so as to prevent shipping damage.

e. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with manufacturer's instructions.
b. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
c. Duct Sizes are inside clear dimensions. For lined ducts, maintain sizes inside lining.
d. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
e. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
f. Use crimp joints with or without bead for joining round duct sizes 8 inch (200 mm) and smaller with crimp in direction of air flow.
g. Use double nuts and lock washers on threaded rod supports.
h. Connect diffusers to low pressure ducts directly or with 10 feet (3.0 m) maximum length of insulated flexible duct held in place with strap or clamp.
i. Connect flexible ducts to metal ducts with draw bands and sheet metal screws.
j. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
k. Do not attach hangers to Roof Deck.
l. Kitchen exhaust ducts shall have access doors accessible from a 10’ step ladder in accordance with NFA96-2008.

3.2 TESTING

a. Test in accordance with SMACNA HVAC Air Duct Leakage Test Manual.

3.3 CLEANING

a. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

3.4 SCHEDULES

3.4.1. DUCTWORK MATERIAL SCHEDULE

AIR SYSTEM	MATERIAL
Low Pressure Supply	Steel
Return and Relief	Steel
General Exhaust	Steel
Outside Air Intake	Steel
Combustion Air	Steel

3.4.2. DUCTWORK PRESSURE CLASS SCHEDULE

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AIR SYSTEM	PRESSURE CLASS
Supply (System with Cooling Coils)	2 inch (500 Pa)
Return and Relief	1 inch (250 Pa)
General Exhaust	1 inch (250 Pa)
Outside Air Intake	1 inch (250 Pa)
Combustion Air	1/2 inch (125 Pa)

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15910

DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Air turning devices.
b. Fire Dampers.
c. Duct access doors.
d. Duct test holes.
e. Flexible duct connections.
f. Volume control dampers.
g. Motorized dampers.
h. Damper motors.

1.1.2. Related Sections:

a. Section 01115 - Sustainable Design Requirements.
b. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
c. Section 01400 - Quality Control.
d. Section 01720 - Closeout Procedures.
e. Section 15140 - Supports and Anchors.
f. Section 15240 - Vibration Isolation and Seismic Restraints.
g. Section 15890 - Ductwork.
h. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
c. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
d. UL 555 – Fire Dampers and Ceiling Dampers.
e. UL 33 – Heat Responsive Links for Fire Protection Services.

1.2.2. Sustainable Design Submittals

a. Materials shall comply with the requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit manufacturer's product data or certification information for each of the following materials per Division 1 Section "Sustainable Design Requirements."

(1) Adhesive and sealant MSDS for each material applied on-site in the interior.
(2) Paint and coating MSDS for each material applied on-site in the interior.

1.3 DELIVERY, STORAGE, AND HANDLING

a. Protect dampers from damage to operating linkages and blades.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS:

2.1.1. General

a. Materials: Comply with the requirements of Division 1 Section "Sustainable Design Requirements."

2.1.2. Sealants and Adhesives, Interior on-site applied only.
a. Products: Meet the VOC limits of the South Coast Air Quality Management District Rule #1168, January 7, 2005.

2.2 AIR TURNING DEVICES

a. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

2.3 FIRE DAMPERS

a. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
b. Horizontal Dampers: Galvanized steel, 22 gage (0.76 mm) frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.
c. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations closure under air flow conditions. Configure with blades out of air stream.
d. Multiple Blade Dampers: 16 gage (1.5 mm) galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x ½ inch (3.2 x 12.7 mm) plated steel concealed linkage, stainless steel closure spring, blade stops and lock.
e. Fusible Links: UL 33, separate at 212 degrees F with adjustable link straps for combination fire/balancing dampers.

2.4 DUCT ACCESS DOORS

a. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
b. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch (25 mm) thick insulation with sheet metal cover.

(1) Less Than 12 Inches (300 mm) Square: Secure with sash locks.
(2) Up to 18 Inches (450 mm) Square: Provide two hinges and two sash locks.

(3) Up to 24 x 48 Inches (600 x 1200 mm): Three hinges and two compression latches [with outside and inside handles].
(4) Larger Sizes: Provide an additional hinge.
(5) Sash Lock
(6) Hinge

c. Access doors with sheet metal screw fasteners are not acceptable.

2.5 DUCT TEST HOLES

a. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
b. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.6 FLEXIBLE DUCT CONNECTIONS

a. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
b. Connector: Fabric crimped into metal edging strip.

(1) Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd (1.0 kg/sq m).
(2) Net Fabric Width: Approximately 6 inches (150 mm) wide.
(3) Metal: 3 inch (75 mm) wide, 24 gage (0.6 mm thick) galvanized steel.

2.7 VOLUME CONTROL DAMPERS.

a. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
b. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch (150 x 760 mm).
c. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch (200 x 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
d. End Bearings: Except in round ductwork 12 inches (300 mm) and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
e. Quadrants:

(1) Provide locking, indicating quadrant regulators on single and multi-blade dampers.
(2) On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
(3) Where rod lengths exceed 30 inches (750 mm) provide regulator at both ends.

2.8 MOTORIZED DAMPERS

a. Dampers shall be as VOLUME CONTROL DAMPERS above except that parallel blade dampers may be used for two position service and dampers shall have blade edge and jamb gaskets.

2.9 DAMPER MOTORS

a. Operators: UL listed and labeled spring return type electric type suitable for 120 volts, single phase, 60 Hz. Locate damper operator on exterior of duct and link to damper operating shaft.

PART 3 - EXECUTION

3.1 PREPARATION

a. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

a. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 15890 for duct construction and pressure class.
b. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
c. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Review locations prior to fabrication.
d. Provide duct test holes where indicated and required for testing and balancing purposes.
e. Provide fire dampers and smoke dampers at locations indicated. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
f. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92A.
g. Demonstrate re-setting of fire dampers to Owner's representative.
h. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment, and supported by vibration isolators.
i. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
j. Use splitter dampers only where indicated.
k. Provide balancing dampers on high velocity systems where indicated. Refer to Section 15930 - Air Terminal Units.
l. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15935

BUILDING HVAC SYSTEMS CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Thermostats.
b. Miscellaneous accessories.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15625 – Fuel Fired Heaters.
e. Section 15672 – Ductless Split Systems.
f. Section 15870 – Power Ventilators.
g. Section 15910 – Ductwork Accessories.
h. Section 15971 – Refrigeration Monitoring and Control System (RMCS).
i. Section 15997 – Commissioning Mechanical Systems.
j. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. NEMA DC 3 - Low-Voltage Room Thermostats.
c. NFPA 70 - National Electrical Code.
d. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Section 01400 – Quality Control: Procedures for submittals.
b. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
c. Operation and Maintenance data.

1.3.2. Submittals At Project Closeout:

a. Section 01720 – Phased Turnover and Project Closeout.
b. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
c. The Contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at contract closeout

1.4 QUALIFICATIONS

a. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.5 PREINSTALLATION MEETING

a. Section 01300 – Administration Requirements.
b. Convene one week before starting work of this section.
c. Attendees shall be Section 15971 Sub-contractor, Section 15935 Sub-contractor, Owner's Representative, and General Contractor's Representative.

1.6 REGULATORY REQUIREMENTS

a. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.7 MAINTENANCE SERVICE

a. Section 01720 – Phased Turnover and Contract Closeout.
b. Provide service and maintenance of control system for one year from date of Substantial Completion.
c. Provide complete service of controls systems, including call backs. Make minimum of 4 complete normal inspections of approximately 42 hours duration in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports.

1.8 EXTRA MATERIALS

a. Section 01720 – Phased Turnover and Contract Closeout.
b. Provide two of each type of thermostat.

PART 2 - PRODUCTS

2.1 THERMOSTATS

a. Room Thermostat Accessories: Thermostat Covers:

(1) Insulating Bases: For thermostats located on exterior walls.

(2) Thermostat Guards: Locking transparent plastic mounted on separate base.
(3) Adjusting Key: As required for device.

b. Electric Room thermostats:

(1) Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
(2) Service: Cooling or Heating as required.
(3) Covers: Locking with set point adjustment, setpoint indication, concealed setpoint,and with thermometer.

2.2 DAMPERS

a. See Section 15910.

2.2.1. Damper Operators:

a. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.

2.2.2. Electric Operators:

a. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch minimum position potentiometer and 24 V dc, 24 va transformer.
b. Number: Sufficient to achieve unrestricted movement throughout damper range. Provide one damper operator for maximum 36 sq. ft damper section.
c. Verify that operators are compatible with Section 15971.

PART 3 - EXECUTION

3.1 ROOFTOP HVAC UNITS

a. Commissary
(1) Section 15971 shall furnish the controls for these units. Units 30,000 B/hr and larger: provide wiring, relays, etc. to interface with Section 15971 Contact Closures.
(2) Units larger than 30,000 B/hr shall be controlled as follows:
(a) Provide a programmable thermostat with the following features:
- One stage cooling and one stage heating.
- Night set back.
- Supply air fans shall only operate during heating or cooling demand.
- Shall have a schedule for user to select on/off hours.
- Close outdoor air dampers in unoccupied mode.

b. Navy Exchange
(1) See Section 15781.

3.2 DUCTLESS SPLIT SYSTEMS

a. Mount and wire the thermostat furnished with the unit. Provide control wiring between indoor and outdoor units.

3.3 GAS FIRED UNIT HEATERS, RADIANT HEATERS, ELECTRIC CABINET HEATERS, AND ROOF MOUNTED DUCT FURNACE

a. Mount and wire the thermostat furnished with the unit.

3.4 EXHAUST FANS

a. Provide control wiring to perform the functions scheduled on the drawings.

(1) D/N - Enable fan to run in Day mode of the air conditioning unit indicated- by Section 15971
(2) Stat - Start fan on temperature rise above 85 deg. F. – by section 15935.
(3) MS - Manual switch by division 16 in series with Section 15935 control.
(4) 2S - two speed control.
(5) MS/D - Motorized shutter/damper furnished prewired with fan.
(6) Intake MD - Intake motorized damper - control to open when fan runs. Provide power to intake damper motor from fan motorized damper circuit.

3.5 HUMIDOR MOTORIZED DAMPERS

a. Provide a switch in the humidor room to open and close the supply and return air motorized dampers. Label the switch “Air conditioning ON-OFF”.

3.6 WIRING

3.6.0.1. All control wiring shall as a minimum meet the following requirements:

3.6.1. ROUTING:

3.6.1.1. All field installed wiring shall be in EMT and installed in accordance with Division 16.

3.6.1.2. Analog input (AI) and Analog output (AO) wiring shall not be routed in conduits with conductors which carry alternating current.

3.6.1.3. The wiring and EMT for space sensors shall be routed and concealed inside of stud walls.

3.6.1.4. WIRE SIZE: All field wiring shall be at a minimum #22 AWG stranded wire.

3.6.1.5. CONNECTIONS: All splices/connections shall be made in junction boxes and shall utilize either terminal strips or 3M scotch lock crimp connectors.

3.6.1.6. LABELING: Control cables shall be labeled at all junction boxes and at the origination and termination of each cable. The Cable number/letter indicated on the submittal drawings shall be specified on this label.

3.7 OPERATION AND MAINTENANCE TRAINING

3.7.0. Provide operational and maintenance training as required by Section 15720.

3.7.1. Training: The startup technician give the following training sessions for the equipment specified in this section, each session shall be coordinated with the contracting officer:

3.7.2. Training Session: A four hour training session (to a minimum of four Commissary Store Personnel) within 14 days after final acceptance and all final inspection punch list items are resolved. This training session should be considered in conjunction with 3 day commissioning start up visit.

3.7.3. Videos: Provide each video described below:

a. User Video: This video should be tailored to equipment installed on this project and will explain to commissary management how to operate and maintain the equipment specified in this section. Video length should be from 15 to 25 minutes.

b. Service Video: Video training tape on "Basic Service Procedure": This video should be tailored to maintaining the installed on this project. The video should be on the level that would enable a journeyman mechanic to make most repairs to the system. Video length shall be 25 to 70 minutes.

3.8 STARTUP INSPECTION AND CERTIFICATION

3.8.0. Startup Technician Responsibilities:

a. The manufacturer approved Startup Technician shall personally be on site at the Commissary to perform operational checkouts of the system.

b. The Startup Technician shall personally inspect the installation of the system to ensure that the system is installed in accordance with the manufacturer’s recommended methods.

c. The Startup Technician shall provide a "Startup Inspection Report" listing all incomplete work and incorrectly installed equipment. This list shall be provided to the Contracting Officer.

3.8.1. Certification of Installation: The following installation certifications shall be provided:

a. Startup Technician Certification: The Startup Technician shall provide a letter certifying that all items indicated in the "Startup Inspection Report" have been corrected. This letter shall be provided to the Contracting Officer.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15940

AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Registers/grilles.
b. Louvers.
c. Roof hoods.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15140 - Supports and Anchors.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. ADC 1062 - Certification, Rating and Test Manual.
c. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
d. ARI 650 - Air Outlets and Inlets.
e. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
f. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
g. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

1.3 SUBMITTALS

1.3.1. Submittals for Review:

a. Submit under provisions of Section 01400.
b. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit room by room schedule of outlets and inlets showing type, size, location, application, and noise level.
c. Operation and Maintenance data.

1.4 QUALITY ASSURANCE

a. Test and rate air outlet and inlet performance in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
b. Test and rate louver performance in accordance with AMCA 500.

1.5 QUALIFICATIONS

a. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

PART 2 - PRODUCTS

2.1 ROUND CEILING DIFFUSERS

a. Type: Round, triple cone adjustable diffuser.
b. Fabrication: Steel or aluminum with baked enamel finish.
c. Accessories: Radial opposed blade damper as detailed on the drawings with damper adjustable from diffuser face.

2.2 VARIABLE VOLUME CEILING DIFFUSERS

a. Type: Lay in style with louvered face, fully adjustable pattern, and removable face.
b. Fabrication: Steel with baked enamel finish.
c. Accessories: Radial opposed blade damper and microprocessor based volume controller for variable volume heating and cooling with automatic changeover. Where multiple diffusers occur in one space, provide master-drone controls. Provide one remote controller for each room and one additional controller.

2.3 PERFORATED FACE CEILING DIFFUSERS

a. Type: Perforated face with fully adjustable pattern and removable face.
b. Fabrication: Steel with steel or aluminum frame and baked enamel finish.
c. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.4 WALL SUPPLY REGISTERS/GRILLES

a. Type: Streamlined and individually adjustable blades, 3/4 inch (19 mm) minimum depth, 3/4 inch (19 mm) maximum spacing with spring or other device to set blades, horizontal face, double deflection.
b. Frame: One inch (25 mm) margin with concealed mounting and gasket.

c. Fabrication: Steel with 20 gage (0.90 mm) minimum frames and 22 gage (0.80 mm) minimum blades, steel and aluminum with 20 gage (0.90 mm) minimum frame, or aluminum extrusions, with factory baked enamel, color to be selected.

d. Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face.

2.5 WALL EXHAUST AND RETURN REGISTERS/GRILLES

a. Type: Streamlined blades, 3/4 inch (19 mm) minimum depth, 3/4 inch (19 mm) maximum spacing, with spring or other device to set blades, horizontal face.
b. Frame: One inch (25 mm) margin with concealed mounting.
c. Fabrication: Steel with 20 gage (0.90 mm) minimum frames and 22 gage (0.80 mm) minimum blades, with factory baked enamel finish, color to be selected.
d. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.6 CEILING SLOT DIFFUSERS

a. Type: Continuous width and number of slots as scheduled with adjustable vanes for left, right, or vertical discharge.
b. Fabrication: Aluminum extrusions with factory off-white enamel.
c. Frame: Margin as scheduled with countersunk screw, concealed mounting or support clips for suspension system mounting and gasket, mitered end border.
d. Plenum: Integral, galvanized steel, insulated.

2.7 CEILING LINEAR EXHAUST AND RETURN GRILLES

a. Type: Streamline blades with 90 degree one-way or two-way deflection as scheduled sized and space as scheduled.
b. Frame: 1-1/4 inch margin concealed mounting.
c. Fabrication: Steel with 20 gage (0.90 mm) minimum frames and 22 gage (0.80 mm) minimum blades, steel and aluminum with 20 gage (0.90 mm) minimum frame, or aluminum extrusions, with factory off-white enamel, baked enamel finish.
d. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.8 LOUVERS

a. Type: 4 inch (100 mm) deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, birdscreen with 1/2 inch (13 mm) square mesh.
b. Fabrication: 12 gage (2.50 mm) thick extruded aluminum, welded assembly, with factory fluropolymer spray finish color to be selected by the contracting officer.
c. Mounting: Furnish with screw holes in jambs for installation.

2.9 ROOF HOODS

a. Fabricate air inlet or exhaust hoods in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
b. Fabricate of galvanized steel, minimum 16 gage (1.50 mm) base and 20 gage (0.90 mm) hood, or aluminum, minimum 16 gage (1.50 mm) base and 18 gage (1.20 mm) hood; suitably reinforced; with removable hood; birdscreen with 1/2 inch (13 mm) square mesh, and 1" (25 mm) internal neoprene faced insulation.
c. Mount unit on minimum 12 inch (300 mm) high curb base with insulation between duct and curb.
d. Make hood outlet area minimum of twice throat area.

PART 3 - EXECUTION

3.1 INSTALLATION

a. Install in accordance with manufacturer's instructions.
b. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
c. Install diffusers to ductwork with air tight connection.
d. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
e. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09910.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15971

REFRIGERATION MONITORING AND CONTROL SYSTEM (RMCS)

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Refrigeration Monitoring and Control System.

1.1.2. Related Sections:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15651 - Product Refrigeration System.
e. Section 15781 – Packaged Rooftop Air Conditioning Units.
f. Section 15783 - Packaged Dual Path Dehumidifiers.
g. Section 15835 – Terminal Heat Transfer Units.
h. Section 15935 – Building HVAC Systems Controls.
i. Section 15997 – Commissioning Mechanical Systems.
j. Division 16 – Electrical.

1.2 SCOPE OF WORK

1.2.1. General:

1.2.1.1. COMMISSARY:

a. Provide a monitoring and control system (RMCS) to monitor and control product refrigeration and HVAC equipment designated for control by RMCS. Items which shall be controlled by the RMCS include:

(1) Product Refrigeration System:

(a) COMPRESSORS: Each new multiplex compressor system compressor indicated in the contract drawings.
(b) CONDENSERS: Each new multiplex compressor system condenser fan indicated in the contract drawings.
(c) DEFROST CONTACTORS: Each new refrigeration defrost contactor.
(d) SOLENOID VALVES: Each new refrigeration liquid/suction solenoid.
(e) HEAT RECLAIM: Each new heat reclaim 3-way valve (both air and water).
(f) DISPLAY CASE LIGHTING: New display case lights.

(2) Heating Ventilation and Air Conditioning (HVAC): All HVAC devices indicated for control by RMCS on contract drawings M 1.1 thru M 3.1.
(3) Sales Area and outside Lighting: All lights indicated for control by RMCS on contract drawing C 7.1, E 1.2.1 and E 1.2.2, E 4.3.

1.2.1.2. NAVY EXCHANGE

a. Provide a monitoring system to monitor the Product Refrigeration System and to control the glass door antisweat heaters. Items which shall be monitored include:
(1) Compressors: Each compressor in each condensing unit.
(2) Display case and walk in cooler temperature.

1.2.1.3. COMMISSARY AND NAVY EXCHANGE
a. Provide:
(1) WARRANTY: Provide warranty service specified in paragraph 3.06 "Warranty"
(2) CLOSE OUT ITEMS: Provide close out items specified in paragraph 3.05 "Close Out Items".
(3) TRAINING: Provide training of commissary personnel as specified in paragraph 3.01 "General Requirement, Training".
(4) PARTS AND LABOR: All labor and equipment necessary for Contractor to meet the requirements stated herein this section shall be contractor furnished and contractor installed.
(5) COORDINATION: The refrigeration monitoring and control system and it's installation, shall be approved by and coordinated with the display case manufacturer and the RMCS manufacturer.

1.3 SUBMITTAL:

a. Furnish under the provisions of Section 01400 – Quality Control.
b. Contractor shall furnish a RMCS construction submittal for review and approval as herein indicated.

(1) DISTRIBUTION:

(a) One (1) copy of RMCS construction submittal to the Contracting Officer.
(b) Two (1) copy of submittal to HQ DeCA/DOFC Lackland AFB TX 78236-1039.
(c) Date Required: Within 30 days after receipt of Notice to Proceed.

(2) EQUIPMENT CUT SHEETS: Provide manufacturer's Cutsheets indicating contract compliance of the following system components:

(a) Thermistors, transducers, and dewpoint sensors.
(b) ICUs and DCU.
(c) Phase loss protector.

(3) INSTALLATION MANUALS: Provide system installation manual and instructions.
(4) DRAWINGS: Provide drawings showing; components locations in commissary and required wiring between components.
(5) USER MANUALS: Provide user's manual on system describing how to use the system and the software.
(6) RMCS MANUFACTURER'S RESUME: Provide resume of control system manufacturer's experience in supermarket refrigeration. A minimum of ten successful installations using hardware model being provided.
(7) STARTUP TECHNICIAN'S RESUME: Provide resume of Startup Technician(s) indicating participation in startup of a least 5 systems using the same hardware as that being provided.
(8) RMCS MANUFACTURER APPROVAL OF STARTUP TECHNICIAN: Provide letter from RMCS manufacturer indicating their approval of the proposed Startup Technician(s), or, their intent to provide their own startup technician for startup and certification of the RMCS.
(9) DISPLAY CASE/COMPRESSOR MANUFACTURER COORDINATION: Provide a letter from the manufacturer of the display cases and the manufacturer of the compressor systems, verifying their approval of the RMCS equipment selection and indicating their intent to review all operating setpoints for the RMCS.
(10) RMCS INSTALLER'S RESUME: Provide resume of lead on site technician's experience indicating that he has installed a minimum of 3 control systems of same brand and model as the one being installed on this project. Lead technician shall be on site during installation and shall install and or supervise all aspects of the RMCS field installation.

c. Operation and Maintenance data.

PART 2 - REQUIRED EQUIPMENT

2.1 REQUIRED HARDWARE QUANTITIES:

a. MODEM: quantity required (1) – Commissary only
b. LAPTOP COMPUTER WITH PADDED CARRYING CASE: quantity required (1) – Commissary and NEX
c. DESKTOP COMPUTER: quantity required (1) – Commissary only
d. PRINTER: quantity required (1) – Commissary and NEX
e. REFRIGERATION ALARM ANNUNCIATOR: quantity required (2) –Commissary and NEX
f. PHASE LOSS PROTECTOR: quantity required (2)-Commissary and NEX
g. INDIVIDUAL CONTROL UNIT(S): see paragraph 3.2 for quantity required.
h. DATA COLLECTION UNIT (DCU): quantity required (1) –Commissary and NEX
i. SENSORS: see paragraph 3.2 for quantity required.

2.2 HARDWARE DESCRIPTIONS:

a. MODEM: A fax capable telephone modem. 33K Baud Minimum.
b. LAPTOP COMPUTER: Laptop shall be compatible to communicate with RMCS and shall have the following minimum features: modem, read/write CD drive, 100GB hard disk.
c. DESKTOP COMPUTER: Desktop Computer monitor and keyboard with the following minimum features: R/W CD Drive, 100G Hard disk.
d. PRINTER: Sheet feed Ink jet printer.
e. REFRIGERATION ALARM ANNUNCIATOR: Shall have an audible alarm and reset button.
f. PHASE LOSS PROTECTOR:

(1) PHASE UNBALANCE TRIP: Shall be adjustable 5% to 10%.
(2) UNDER VOLTAGE TRIP: Shall be adjustable 10% to 20% of normal voltage.
(3) PHASE LOSS TRIP: Trip shall be within 50 msec.
(4) PHASE REVERSAL: Trip shall be within 50 msec.
(5) RESTART: Automatic restart upon return to normal.
(6) PRODUCT REFERENCE: TimeMark Model 2644 or approved equal.

g. ICU'S: Individual control units (ICUs) shall have the following minimum features:

(1) INDEPENDENT OPERATION: Each ICU shall operate independent of the other ICUs. If one ICU is taken out of operation, the other ICUs shall continue normal operation. The ICU unit shall retain all setpoints during a "power down" or "power up" and shall automatically reboot and commence normal operation.
(2) MEMORY STORAGE: System programs shall be stored in EPROM or CMOS memory. If CMOS memory is provided, the contents of memory shall be maintained for a minimum of 1 year by battery. The system shall have battery back up for retention of system clock of at least 1 year.
(3) VOLTAGE/SURGE PROTECTION: System shall operate from 100V AC to 130V AC 60 HZ power. Power supply to ICU shall have surge protection which meets the following.
(a) EMI/RFI filtering.
(b) Meets government and military specs for fire panel applications.
(c) User replaceable fusing.
(d) LEDs to indicate protection status, ground presence, ground fault indication, fuse status.
(e) Agency Approvals: UL 1449 3rd Edition, cUL, UL 1283
(f) 120 VAC, 20 amp continuous rating.

(g) 10 year limited warranty
(h) DITEK Model 120S20A or approved equal.

(4) ANALOG CONTROL FEATURES:

(a) The outputs shall be controlled by either; computer automatic operation or manual keyboard on/off (100%/0%).
(b) The power supply for the control voltage on the control relays shall be fused to protect it from overloading.
(c) The outputs shall be fused for over-current protection.

(5) DIGITAL CONTROL FEATURES:

(a) Control relays shall be controlled by either; computer automatic or manual keyboard control.
(b) The digital outputs shall be designed so that if high voltage is applied to the contacts of one control relay, then the other points are not damaged.
(c) The power supply for the control voltage on the control relays shall be fused to protect it from overloading.
(d) The contacts on the control relays shall be rated to carry at least 3 amps 220 VAC.
(e) The contacts on the control relay shall be fused to protect the relay from exceeding the current capacity of the contacts.
(f) Control relays on digital outputs shall have SPDT contacts with a; normally open, and normally closed terminal.

(6) COMMUNICATION: Shall be connected to the data collection unit (DCU) through an RS485 port.
(7) ACCEPTABLE MANUFACTURERS; Danfoss ZX series/NC 25 (Ft Myers FL) or approved equal.

h. DCU: Data Collection Unit (DCU) shall have the following minimum features:

(1) DATA MEMORY: The DCU shall collect data from the ICU unit and store data in CMOS RAM with battery backed up memory or Hard Disk Drive. The data for the DCU shall be collected from the ICU through an RS 485 port. The DCU memory for data storage shall be at least ***1MB.***
(2) PROGRAM MEMORY: The program for the DCU shall be stored in EPROM or CMOS RAM with battery backed up memory.
(3) The DCU shall retain all data and its program during a "power down" or "power up" and shall automatically reboot and start normal operation.
(4) MODEM COMMUNICATION: The DCU shall execute outgoing calls (alarms) and accept incoming calls on a voice grade phone line at 33000/300 BAUD, no parity, one stop bit, 8 data bits (not counting parity or stop bit), full duplex and echo received character back to sender.
(5) BATTERY BACKUP: The DCU shall execute outgoing calls (alarms) during power outage by means of battery backup system. Battery backup shall operate the DCU for a minimum of 30 minutes during a power outage.
(6) COMMUNICATION PORTS: The DCU shall have at least three Input/Output ports. There shall be at least two RS232 ports and at least one RS485 port. Each RS 232 port will be capable of communicating using the ASCII code. The following equipment shall be operated from the RS 232 ports:
(a) Direct connect modem for communication over telephone line.
(b) Direct connect Laptop computer.
(7) VOLTAGE/SURGE PROTECTION: System shall operate from 100V AC to 130V AC 60 HZ power. Power supply to DCU shall have surge protection which meets the following.
(a) EMI/RFI filtering.
(b) Meets government and military specs for fire panel applications.
(c) User replaceable fusing.
(d) LEDs to indicate protection status, ground presence, ground fault indication, fuse status.
(e) Agency Approvals: UL 1449 3rd Edition, cUL, UL 1283
(f) 120 VAC, 20 amp continuous rating.
(g) 10 year limited warranty

(h) DITEK Model dtk120sr or approved equal.

(8) ACCEPTABLE MANUFACTURERS; or Danfoss ZX series/NC 25 (Ft Myers FL) or approved equal.

i. SENSORS: RMCS sensors/inputs shall be furnished and shall meet or exceed the following required features:

(1) ANALOG INPUTS:

(a) Temperature sensors shall be thermistors.
The thermistor temperature probes shall be interchangeable in the field with no required calibration.
The thermistor temperature accuracy shall be + 1° C (2° F).
Analog dewpoint temperatures shall be measured from -1° to 26° C (30° to 79° F) with an accuracy of + 1° C (2° F).

(b) Pressure sensors shall be transducers.
The range for the compressor low pressure side shall be 0 kPa to 1400 kPa (0 psig to 200 psig) with + 7 kPa accuracy (+1 psig).
The range for the compressor high pressure side shall be 0 kPa to 3500 kPa (0 psig to 500 psig) with accuracy of +35 kPa (+5 psig)

(c) Dewpoint sensor shall e a lithium chloride saturated salt sensor.

(d) Refrigerant vapor detection sensors shall meet or exceed the following minimum requirements:
Shall measure 0 to 1000 parts per million of all refrigerants provided in this project.
Shall operate from 0°F to 120°F.
Shall not require maintenance more often than every 6 months in order to operate properly.

(e) Outdoor temperature light sensor module.

j. LIMIT SWITCHES: Provide rotary limit switches with mechanical arm to monitor walk-in freezer doors.

k. (3) PHASE KWHR TRANSDUCER/CT: (3) phase KWHR (pulse) transducer, with current transformers on building main power. Hawkeye Series H-8050 or approved equal. Veris Industries Inc. 1-800-354-8556.

2.3 SYSTEM CONTROL FEATURES/STRATEGY:

a. GENERAL: System software shall be furnished, installed, tested, and debugged to provide; control/functions described herein this specification section.

b. CONTROL VARIABLES/SETPOINTS: Setpoints shall be remote selectable by user via "laptop computer" on telephone line and modem. This portion of the software shall be resident on site in the RMCS ICU's. This software shall be protected from loss during power failure.

c. SOFTWARE CONFIGURATION: System software shall allow user to add/remove: digital outputs/inputs, analog inputs, schedules and programs. This software may be either transient or resident. If software is transient, it shall be compatible with an IBM PC and shall allow user to re configure software then downloaded the new configuration to the ICU's at the Commissary (Via phone line and modem).

d. DATA BASE FEATURES: Data base features of system software shall provide the following features:

(1) DOWNLOADING CAPABILITY: This database software shall allow downloading of on-site data base to an offside location via phone line and IBM PC. Data-base shall contain; setpoints, names, tables, etc.

(2) UNATTENDED PHONE LINE DISCONNECT FEATURE: DCU communication software shall force the modem to hang up the phone line if no data is transferred for 5 minutes. Also, when the modem on the RMCS cannot detect a carrier signal for a period of time (8 to 40 seconds), the RMCS software shall make the modem hang up the phone line.

(3) DOWNLOADING SOFTWARE: P.C. software on diskette shall be provided which shall allow the data base to be edited off-site then reloaded via phone line to commissary. This software shall be user friendly and shall have error checking features. This software shall take care of all output data formatting and shall be formatted for 80 column output. A copy of this software shall be provided to HQ DeCA/PMF Lackland AFB TX. and HQ DeCA/DOR Ft. Lee VA. along with a letter granting the government the right to use this software.

e. PHASE LOSS PROTECTOR FEATURES: When a phase loss/unbalance occurs, all RMCS controlled 3 phase loads shall be shutdown until power is restored. Systems shall automatically restart upon return of all three phases. Monitor power at panel "CP" on dedicated breaker.

f. ALARM FEATURES:

(1) TYPES OF ALARMS: RMCS shall provide for the following types of alarms:

(a) ALARM (A): When an alarm occurs, the audible buzzer in commissary sounds and the alarm dial out begins.
(b) ALARM LOGS (L): These are events that are recorded in the system and do not produce any dial out or buzzer.

(2) ALARM DIAL OUT SEQUENCE: The RMCS shall execute the following dial out actions upon each ALARM (A) event:

(a) ALARM TO PAGER: Dial microwave tower at phone address previously selected by user which in turn triggers a pager(s).
(b) ALARM TO PRINTER/MODEM: Dial to modem with printer at phone address previously selected by the user.
(c) ALARM TO FAX MACHINE: Dial facsimile machine (fax) at phone address previously selected by user.
(d) MESSAGE DESCRIPTION: The DCU shall send a message (store name, date, time, sensor name, and sensor number that caused alarm), to each printer and facsimile called during dial out.

(3) USER SELECTION/CONFIGURATION OF ALARM DIAL OUT ACTIONS: The RMCS software shall provide the user with the following alarm dial out configuration options:

(a) PHONE NUMBERS TO BE CALLED: Allow user (via keyboard) to enter a minimum of four separate phone numbers/addressees which shall be called during Alarm Dial Out Sequence.
(b) TYPE OF DEVICES TO BE CALLED: Allow user to select which devices (pager, fax, printer) are at the phone addresses selected in "PHONE NUMBERS TO BE CALLED"
(c) PAUSES DURING DIALING: Allow user to be able to select time delays to be entered into the phone address selected in "PHONE NUMBERS TO BE CALLED".
(d) ATTEMPTS TO REACH A NUMBER: Allow user to select the number (1-4) of times the DCU shall dial the phone number of each pager.
(e) ALARM TEST TIME: Allow user to select the time of day that the DCU shall dial out a test refrigerant alarm.)

g. HISTORY LOGGING FEATURES: The RMCS software shall collect data from the ICUs and shall provide the following features:

(1) ALARM HISTORY: Log the last ten alerts and last ten alarms.
(2) USER CONFIGURATION: Allow user (via keyboard) to, select items to: log, select logging interval (seconds or minutes), select number of samples. The items which shall be logged in this manner shall be all; analog inputs (AI), analog outputs (AO), digital outputs (DO), digital inputs (DI).
(3) COMPRESSOR RUNTIME: The compressor cycles per day and total run time per day shall be logged for a period of not less than 4 days.

(4) CONDENSER RUNTIME: The condenser fan cycles per day and total run time per day shall be logged for a period of not less than 4 days.

(5) REFRIGERATION RUNTIME: The refrigeration circuits defrost cycles per day and total run time per day; shall be logged for a period of not less than 4 days.

h. SECURITY/ACCESS FEATURES: Software shall require a password(s) in order to access the system. Password shall be for user identification and shall not be echoed on printer or terminal. The system shall be capable of using a password of 4 or more characters. At least four levels of access shall be provided. One level of access shall be provided to view data/setpoints. One password will only permit lighting override and lighting schedule changes. The other two levels shall provide access to change, setpoints and system programs.

i. COMPRESSOR CONTROL FEATURES: RMCS control of refrigeration compressors shall incorporate the following features:

(1) USER ACCESS: Software shall allow the user to select and adjust all setpoints.

(2) CONTROL STRATEGY: Software shall control the compressors on each multiplex compressor system by the following method:

(a) RATE OF CHANGE WITH TEMPERATURE MODIFICATION: As the refrigerated fixtures get colder than required, the target pressure is raised in increments so as to raise the compressor system operating suction pressure. The reverse takes place as refrigerated fixture temperature increases. For each compressor a minimum ON time and minimum OFF time shall be provided.

j. HVAC CONTROL FEATURES:

(1) SALES AREA DUAL PATH AIR HANDLING UNIT AHU1:

(a) Space temperature and humidity shall be controlled by a minimum of three individual cooling stages utilizing two air paths. The outside air path will process all of the outside air (no bypass) and provide most of the dehumidification required for the space. An outdoor air precooling coil and dehumidification coils (6-row minimum) shall be used. The return air path will have a cooling coil to cool the return air as required to provide the remaining cooling required for the space. Some return air ~~will~~ may be bypassed. The air paths will then mix heating will be accomplished by utilizing reclaimed refrigeration heat through heat reclaim coils, supplemented by a two stage gas fired power burner. The reclaimed heat will be used for reheat if required, and will provide the main heat as reclaimed heat is available. The gas heating will only be used if additional capacity is required.

(b) Fan operation shall be continuous. Fan shall run at high speed (100%) in occupied mode and for cooling dehumidification operation and at low speed (50%) at all other times.

(c) Compressors shall be sized to match the cooling/dehumidification requirements of the two paths with the evaporator coils.

(d) Multiple Condenser fans shall be controlled from liquid temperature and shall be cycled to maintain a target liquid temperature.

(e) Heat reclaim will be used for reheat and for initial stages of heat.

(f) Control the gas heating section from space temperature only after maximum utilization of heat reclaim has been realized. Auxiliary heat shall not be used for reheat control.

(g) The dehumidification coil in the outdoor air path is stage 1 and the outside air precooling coil is stage 2. The return air cooling coil is stage 3. Stage 1, 2 and 3 coils shall be controlled from space humidity in that order to maintain 52°F dewpoint. Precooling coil shall be locked out below an ambient temperature of 72 degrees F.

(h) Outside air and return air motorized dampers shall be provided. The outside air (or night setback) damper shall be open during the occupied cycle and closed in the unoccupied cycle. The outside air (or night setback) damper shall be mechanically linked to the return air damper so the return air damper shall open when the outdoor air (or night setback) damper closes, allowing return air to follow both air paths.

(i) To allow the specified air flow rates in the two paths, an array of static pressure probes shall be positioned to monitoring internal air pressure drops through key elements of the dual path system. Each air path shall have built-in balancing dampers for air volume adjustment.

(j) Provide a differential pressure switch to monitor the operation of the main blower.

(k) The temperature and humidity set points shall be:

Function	Day	Night
Heat	70 deg. F.	65 deg. F.
Cool	75 deg. F.	75 deg. F.
Humidity	52 deg. F. dew point	52 deg. F. dew point

(l) Cooling operation shall be locked out below 45°F ambient.

(2) OTHER CONDITIONED ROOMS: Air conditioning systems RT 1 & 5 indicated on drawings M 1.2 through M 3.1 and R1.2.1 through R 3.1, shall each have the following minimum software control functions:

(a) One stage cooling and one stage heating.

(b) Night set back.

(c) Fractional Horsepower AHU fans shall only operate during heating or cooling demand. AHU fans (1) horsepower and greater, shall operate continuously during daytime and on demand at night.

(d) Shall have a schedule for user to select on/off hours.

(e) Close outdoor air dampers in unoccupied mode.

(3) RT 2, 3, 4 and 6 shall stop when the "VENTILATION EMERGENCY STOP" switch is activated.

(4) MECHANICAL ROOM EXHAUST FANS: Exhaust fans EF in the refrigeration Mechanical Centers shall be controlled by the RMCS from room temperature. RMCS shall also control the respective inlet dampers of the exhaust fans being controlled additionally, when the refrigerant vapor sensor in the Mechanical Room senses an elevated vapor level, these fans shall run. An audible alarm shall sound in the room, and the RMCS shall generate an alarm.

(5) MISCELLANEOUS EXHAUST FANS: Exhaust fans serving multiple rooms and indicated on drawings M 1.2.1 through M 3.1 shall be controlled by the RMCS based on time of day.

(6) FAN ALARMS: Provide alarm indications for failure of EF 16 freezer floor ventilation and EF 15 Room 31E sub hub. The RMCS shall generate an alarm.

(7) PANIC BUTTON: Provide a push button in the Store Manager's office to stop all controlled ventilation equipment bringing outdoor air into the building in the event of a contaminant event. Label the button "VENTILATION EMERGENCY STOP".

k. LIGHTING CONTROL FEATURES:

(1) The RMCS shall provide control signal to the Sales Area lighting controls interface module and contact closures and wiring to the contactors for the following lighting functions:

(a) Sales Area Lighting:

1) RMCS will communicate with the Sales Area lighting control interface module to limit Sales Area lighting to 50% of maximum outside store open hours.

2) 3 contactors (Checkout area, Sales Area track, mass display, etc.) See the Sales Area Lighting Control, Detail Sheet E 4.1.

(b) Exterior Lighting: 3 contactors (Patron Parking, Receiving Pole Lights , and Security lighting.) See Exterior Lighting Control Details, Sheet E 4.3.

(c) Control the refrigerated case lighting, coordinate with section 15651. Control lighting in self contained cases, 1G24 and others.

(2) Section 15971 shall provide a 5 wall switch gang box in the Store Director's office, cover plate, and conduit to the nearest RMCS HVAC system ICU for Section 15971 to install 3 momentary contact override switches plus another momentary contact switch to cancel all of the overrides and the necessary wiring to connect these

switches to input terminals in the HVAC RMCS system. The momentary contact switch functions shall be as follows:

(a) Sales Area Lighting, .
(b) Checkout area.
(c) Refrigerated Case lighting and the Sales Area Mass Display, Track, Dairy, and Produce lighting.
(d) All outside lighting.
(e) Cancel override.

(3) Section 15971 shall program the system such that:

(a) When any of the momentary contact switches is closed for 6 seconds, the contactor controlled by that switch shall energize the lighting circuit controlled by that switch for 240 minutes. The Sales Area lighting shall go to 50% dimming output for 240 minutes and after 235 minutes go to 25% dimming output to provide an indication to the operators that the lights are about to be turned off so that they may be reset.
(b) When the "Cancel" switch is closed for 6 seconds, the contactors shall open and the control shall revert to the original program.
(c) Label all switches with the lighting control function, i.e. "Sales and Checkout lighting On," "Case lights and supplementary Lighting On," "Outside Lighting On. And "Cancel All Lighting Control Overrides."
(d) Outdoor lighting shall be turned off when the light sensor senses daylight.

l. CONDENSER CONTROL FEATURES: The RMCS shall provide the following refrigeration condenser control functions.

(1) CONTROL POINT: Shall cycle fans to meet target condenser pressure.
(2) PARALLEL FAN OPERATION: Parallel condenser fans shall come on together.
(3) "ON" "OFF" DELAYS: Pre delays and post delays shall be provided for each stage.
(4) 50% / 50% SPLIT: Shall control split condenser valves for condensers provided with such valves. Control shall be based on outdoor ambient setpoint and reset deadband.

PART 3 - EXECUTION/INSTALLATION REQUIREMENTS

3.1 GENERAL INSTALLATION REQUIREMENTS

a. GUIDE LINES: The entire system shall be installed in accordance with RMCS manufacturers' recommendations and the requirements of these specifications. Where the contract requirements are in conflict with those of the manufacturer, the more stringent requirement shall be followed.
b. N.E.C. The entire system shall be installed in accordance with the current National Electric Code and the requirements of these specifications.
c. Lead Technician: Lead technician shall be on site during installation and shall supervise install and or supervise all aspects of the RMCS field installation. Lead technician experience shall have installed a minimum of 3 control systems of same brand and model as the one being installed in this project.

3.1.2. INSPECTION/CERTIFICATION OF INSTALLATION:

a. STARTUP TECHNICIAN RESPONSIBILITIES:

(1) The manufacturer approved Startup Technician shall personally be on site at the Commissary for at least 3 days to perform operational checkouts of the system.
(2) The Startup Technician shall personally inspect the installation of the system to ensure that the RMCS system is installed in accordance with the RMCS manufacturer recommended methods.

(3) The Startup Technician shall provide a "Startup Inspection Report" listing all incomplete work and incorrectly installed equipment. This list shall be provided to the Contracting Officer, the RMCS manufacturer, and the display case manufacturer.

b. CERTIFICATION OF INSTALLATION: The following installation certifications shall be provided:

(1) STARTUP TECHNICIAN CERTIFICATION: The Startup Technician shall provide a letter certifying that all items indicated in the "Startup Inspection Report" have been corrected. This letter shall be provided to DeCA/PMF Lackland AFB TX. 78236-1039, the RMCS manufacturer, and the display case manufacturer.

(2) RMCS MANUFACTURER CERTIFICATION: The contractor shall submit a letter from the RMCS manufacturer certifying that the installation meets the manufacturer's recommendations. Letter shall be addressed to the Contracting Officer with a copy to DeCA/ DOFC, 2250 Foulois Ave, Lackland AFB TX 78236-1039.

(3) DISPLAY CASE MANUFACTURER CERTIFICATION: The Contractor shall submit a letter from the Display Case Manufacturer certifying that the installation is correct. The letter shall be addressed to the Contracting Officer with a copy to DeCA/ DOFC, 2250 Foulois Ave, Lackland AFB TX 78236-1039.

3.2 HARDWARE INSTALLATION REQUIREMENTS

a. INDIVIDUAL CONTROL UNITS (ICU's): ICU's shall be provided for the following equipment.

(1) COMMISSARY

(a) REFRIGERATION COMPRESSOR SYSTEMS: Provide on e dedicated ICU for each multiples refrigeration compressor system.

(b) HVAC: Provide at least one dedicated ICU for controlling of the HVAC. This ICU shall be mounted on the main air handler

(2) NAVY EXCHANGE

(a) Provide one ICU.

(3) INSTALLATION/TESTING: ICUs shall be installed and tested at the respective factory of the compressor system manufacturer or air handler manufacturer.

b. ANALOG TEMPERATURE SENSORS: Analog temperature sensors shall be furnished and installed at the following locations:

(1) STORAGE ROOMS: One temperature probe in each refrigerated walk-in box and refrigerated processing room. Probes shall be in the return air to the unit coolers.

(2) SALES AREA: One temperature and one dewpoint/~~relative humidity~~ probe for each sales area air handler being controlled. Mount these probes 0.6 meters (2') above store shelving product line. Also provide one temperature sensor in the return air stream and one in the supply and one on the suction line if system is a single compressor DX. Mount supply sensor downstream of all coils. Mount return sensor after outside air intake.

(3) DISPLAY CASES: Provide one Supply Air Temperature Sensor per evaporator coil in each refrigerated display case. Additionally, provide one Analog Defrost Termination Sensor in each Frozen or Ice Cream display case. Factory mount Defrost Termination Sensor on or near coil per case manufacturer's recommendations.

(4) PROBES ON COMPRESSOR SYSTEMS: On each compressor system, provide a temperature probe on the suction header and one on the drop leg to the receiver.

(5) LOW TEMP CIRCUITS: Provide one suction temperature sensor on each suction circuit operating below 10 degrees F SST. Install at compressor suction header.

(6) OUTDOOR TEMP: One temperature probe to measure outside air temperature. This probe shall be mounted on ACC-1 out of the sun, in the condenser air stream, and not more than 8" below the bottom of the condenser coil.

(7) REFRIGERATED CASES: FURNISHED UNDER DIVISION 11. Provide one temperature probe per evaporator coil in each refrigerated display case. Mount sensor in discharge air stream for each respective evaporator coil.

(8) OTHER CONDITIONED ROOMS, HVAC: Install Wall Mounted Zone temperature sensors 6' above finished floor. Also install supply and return air sensor and suction temperature sensors on all units indicated for RMCS control on drawings R 1.2.1 through R 1.2.2.

(9) MECHAINCAL ROOM EXHAUST FAN: Install wall mounted zone temperature sensors 6' above finished floor.

c. ANALOG PRESSURE SENSORS: Analog pressure sensors shall be furnished and installed at the following locations:

(1) MULTIPLEX SYSTEMS: On each multiplex compressor system, provide a pressure transducer for the following: system suction pressure, system discharge pressure, system condenser pressure, and suction pressure for any satellite or escort compressors.

(2) SINGLE SYSTEMS: On single compressor systems, provide a suction pressure transducer when indicated by drawing control notes.

d. ANALOG RECEIVER LEVEL SENSORS: Furnish and install one sensor in each product refrigeration multiple compressor receiver.

e. DIGITAL SENSORS: Digital inputs shall be furnished and installed to monitor the following electrical loads:

(1) COMPRESSORS: On each refrigeration compressor monitoring the compressor operation.

(2) FREEZER DOORS: on each walk-in freezer door.

(3) CONDENSER FANS: On each condenser fan motor monitoring the fan motor operation.

(4) AHU FANS: On each sales area, Air handler and Desiccant supply fan motors being controlled.

(5) POWER MONITORING: Monitor the digital pulse meter provided under Division 16. Provide interface equipment and wiring.

(6) PHASE LOSS PROTECTOR: Provide dedicated breaker in panel "CP". Connect protector sensor inputs to breaker. Connect N.C. output contacts in protector to RMCS input.

(7) WATER AND GAS CONSUMPTION MONITORING: Connect to the digital pulse meters provided under Division 15, Section 15400.

(8) ELECTRICAL ENERGY CONSUMPTION: Provide split core current transformers with monitoring interface equipment and wiring to monitor each of the following:

(a) Sales Area Lighting - monitor "Lighting –Sales Area" circuits in panel H1 section 1.

(b) Sales Area Accent Lighting - monitor "Truck lights-Décor" circuits in panel H1, section 1.

(c) Processing Area/Staging Area Lighting - monitor circuits 2, 4, 6, 8, 10 circuits in Panel H2.

(d) Sales Area HVAC – both indoor and outdoor units, DHU and ACCU – Monitor circuits 20, 23, 24 main switchboard..

(e) Refrigeration – monitor feeder circuit at the manual transfer switch.

(f) External Lighting – Monitor panel H feeder.

(g) Verify with the Division 16 contractor that these are the correct circuit numbers.

f. REFRIGERATION ALARM ANNUNCIATOR AND COMPUTER TERMINAL: Furnish and install in the Store Manager's office.

g. WIRING: All RMCS wiring shall as a minimum meet the following requirements.

(1) ROUTING:

(a) All field installed wiring shall be in EMT.
(b) Analog input (AI) and Analog output (AO) wiring shall not be routed in conduits with conductors which carry alternating current.
(c) The wiring and EMT for space sensors shall be routed and concealed inside of stud walls.

(2) WIRE SIZE: All field wiring shall be at a minimum #22 AWG stranded wire.
(3) CONNECTIONS: All splices/connections shall be made in junction boxes and shall utilize either terminal strips or 3M scotch lock crimp connectors.
(4) LABELING: Control cables shall be labeled at all junction boxes and at the origination and termination of each cable. The Cable number/letter indicated on the submittal drawings shall be specified on this label.

h. COMMERCIAL PHONE LINE: Before the refrigeration system is tested, the Contractor shall have a commercial (voice grade) telephone line installed for use with the RMCS system. Coordination for installation of the telephone line is as follows:

(1) INSTALLATION: Through the Contracting Officer, the Contractor shall coordinate the installation of the phone line with the base communication office.
(2) TRANSFER OF BILLING: Upon final acceptance of this system, the Contractor shall notify the Contracting Officer that the billing for the phone line needs to be transferred to the Commissary effective 30 days after the date of final acceptance. The Contractor shall pay all costs on the phone line up until 30 days after the date of final acceptance.

3.3 INITIAL SETPOINTS:

a. INITIAL SOFTWARE SETPOINTS: Initially, the RMCS shall be set to maintain the following setpoints:

(1) WALK-IN BOXES: Walk-in boxes shall be initially adjusted to maintain the temperatures indicated on the unit cooler schedule of the contract drawings.
(2) DISPLAY CASE TEMPERATURES: The display case discharge temperatures shall be initially adjusted to maintain the following:

CASE	ITEM	DISCHARGE TEMPERATURE	
		^{O}C	^{O}F
1B06	BAKE	1 to 3	4 to 38
1B08	FZBX	-22 to -20	-8 to -5
1D00	SVDL	1 to 3	34 to 38
1D01	MDDI	-2 to -1	28 to 30
1D02	MDGD	-1 to 1	30 to 34
1D03	MDDL	1 to 3	34 to 38
1F00	FISH	-1 to 1	30 to 34
1F01	FISH	-1 to 1	30 to 34
1G02	DYCS	-1 to 2	30 to 36
1G07/06	FZCS	-23 to -20	-10 to -5
1G10	FZGD	-22 to -20	-8 to -5
1G12/13	ICDG	-26 to -23	-15 to -20
1G14	MILK	-2 to -1	28 to 30
1M02	MTCS	-6 to -4	22 to 26
1M04	MDMT	-2 to -1	28 to 30
1M07	MDDI	-4 to -1	25 to 28
1M06	MDFF	-19 to -22	-3 to -8
1P02/03	PRCS	2 to 4	36 to 40

(3) HVAC SETPOINTS: The HVAC setpoints controlled by RMCS shall be initially set as follows:

(a) SALES AREA: Sales Area shall be set as follows:

DEHUMIDIFICATION "ON" at 51 degrees dewpoint "OFF" at 49 degrees.

	^{O}C	^{O}F
Cooling Stage 1	24/22	(75/73)
Cooling Stage 2	25/23	(76/74)
Ht Rec Stage 1	20/21	(69/70)
Ht Rec Stage 2	19/20	(68/69)
Aux Ht Stage 1	18/19	(66/67)
Aux Ht Stage 2	19/20	(65/66)

(b) BAKERY/DELI SETPOINTS:

	CUTIN/OUT ^{O}C	IN/OUT ^{O}F	
Cooling	24/22	(75/73)	5/5
Heating	20/21	(69/70)	5/5

(c) Administration areas and Breakrooms:

Cooling	25/24	(78/76)	5/5
Heating	20/21	(68/70)	5/5

(d) EXHAUST FANS: The Compressor Room exhaust fans shall be set as follows:

	CUTIN/OUT ^{O}C	IN/OUT ^{O}F
Ventilation Stage 1 (EF)	24/21	(75/70)
Ventilation Stage 2 (EF)	27/24	(80/75)
Ventilation Stages 1 & 2 (EF)	24/21	(75/70)
	27/24	(80/75)

(4) ALARM SETPOINTS: The RMCS alarm setpoints shall be initially set as follows with alarm inhibited during defrost:

ALARM SETTINGS AND ACTIONS				DEFROST SETTINGS		
ITEM		HIGH TEMP/TIME		LOW TEMP/ TIME	#PER/LENGTH/TERM	ABB.
RESULT				RESULT		
		^{O}F MIN		^{O}F MIN	A	*
1B06	BAKE	45°F/120	A	28°F/120	L	*
1B08	FZGD	10°F/90	A	-25°F/120	A	*
1B32	BAKE	45°F/120	A	28°F/120	A	*
1D00	SVDL	40°F/90	A	24°F/120	A	*
1D01	MDDI	40°F/90	A	24°F/120	A	*
1D02	MDGD	40°F/90	A	27°F/120	A	*

1D03	SDDL	40°F/90	A	25°F/120	A	*
1D13	SDDL	40°F/90	A	25°F/120	A	*
1D17	SDDL	40°F/90	A	25°F/120	A	*
1D24	MDDL	40°F/90	A	25°F/120	A	*
1F00	FISH	40°F/90	A	27°F/120	A	*
1F01	FISH	40°F/90	A	27°F/120	A	*
1G00	DYCS	40°F/60	A	25°F/120	A	*
1G02	DYCS	40°F/60	A	25°F/120	A	*
1G03	DYCS	40°F/60	A	25°F/120	A	*
1G06	FZCS	10°F/90	A	-25°F/120	L	*
1G07	FZCS	10°F/90	A	-25°F/120	L	*
1G08	FZCS	10°F/90	A	-25°F/120	L	*
1G09	FZCS	10°F/90	A	-25°F/120	L	*
1G10	FZGD	10°F/90	A	-25°F/120	L	*
1G11	MIGD	40°F/90	A	-32°F/120	A	*
1G15	DYCS	40°F/60	A	25°F/120	A	*
1G12	GDIC	5°F/90	A	-25°F/120	L	*
1G14	MILK	36°F/90	A	26°F/120	A	*
1G21	FZGD	10°F/90	A	-25°F/120	L	*
1G24	GDMT	45°F/90	A	32°F/120	L	*
1G25	FZGD	10°F/90	A	-25°F/120	L	*
1G26	GDMT	45°F/90	A	32°F/120	L	*
1M02	MTCS	34°F/90	A	15°F/120	A	*
1M03	MTCS	34°F/90	A	15°F/120	A	*
1M04	MDDI	34°F/90	A	15°F/120	L	*
1M05	MDDI	34°F/90	A	15°F/120	L	*
1M06	FZMT	10°F/90	A	-25°F/120	L	*
1M07	MDFM	34°F/90	A	15°F/120	A	*
1M08	MDFM	34°F/90	A	15°F/120	A	*
1M09	MDFM	34°F/90	A	15°F/120	A	*
1P02	PRCS	45°F/90	A	32°F/120	L	*
1P03	PRCS	45°F/90	A	32°F/120	L	*
1P06	PRCS	45°F/90	A	32°F/120	L	*
1P07	PRCS	45°F/90	A	32°F/120	L	*
1P09	PRCS	45°F/90	A	32°F/120	L	*
1P11	PRCS	45°F/90	A	32°F/120	L	*
1P17	PRCS	45°F/90	A	32°F/120	L	*
(ROOMS)						
BKBX		45°F/150	A	32°F/120	A	4/45
BKFZ		10°F/150	A	-25°F/120	L	3/45/50
PRBX		45°F/150	A	32°F/120	A	3/40
PRPR		70°F/150	A	32°F/120	A	1/70 “&”
DLBX		40°F/150	A	28°F/120	A	3/45
MTBX		40°F/150	A	25°F/120	A	3/45/50
POBX		40°F/150	A	25°F/120	A	3/45/50
HDBX		40°F/150	A	25°F/120	A	3/45/50
MTWR		55°F/120	A	40°F/120	L	1/60 “&”
MTPR		55°F/120	A	40°F/120	L	1/60 “&”
FRZV		40° F/120	A	25° F/120	L	1/60 “&”
FZBX		10°F/150	A	-25°F/120	L	3/45/50

DYBX		38°F/120	A	32°F/120	A	4/45
CTBX		72°F/180	A	32°F/120	A	1/70 “&”
Sales Temp		78°F/180	L	32°F/120	A	1/70 “&”
Sales DP		55°D/180	L			
FZDR		OPEN/30	A			
REC. LV.		40%/120	A			
PHASE LOSS		OFF/05	L			
MON PROOF		/05	L			
MT Suct PR		60PSI/30	A	30PSI/90	A	
LT Suct PR		25PSI/30	A	OPSI/90	A	
HIGH HEAD		270/03	A	125/120	L	
Vapor Detectors	Alarm on Sensing of Refrigerant vapor levels exceeding a preset value.					

NOTES:
A=Alarm
L=Log (Record Only)
*= Per manufacturer's published data.
"&"= Defrost between 10PM and 4AM

3.4 RMCS SENSORS:

a. The RMCS sensors shall be identified as follows:

(1) NAMES: The "Standard RMCS Point Names" shall be used/indicated in the system software (see list, item #5).

(2) INPUTS: All analog inputs shall have an identification tag at input sensor/transducer to identify input. Except for pressure transducers, tags shall be secured with fasteners (screws or rivets). On pressure transducers, tags can be secured with wire. Identification tags shall be metal or laminated plastic (minimum thickness of 1/16 inch) and the letters on the tag shall be 1/4 to 3/8 inch in height. Typical identification tags shall reflect "Standard RMCS Point Names", input example; MDFF__, for Analog Input on Multideck frozen food case #____. On display cases, the identification tags shall be mounted at locations shown on drawings.

(3) PROBE LAYOUT SHEET: Probe layout sheet shall indicate "Standard RMCS Point Names" which shall match software and analog input identification tags.

(4) CABINETS: All system panel/cabinets that contain microprocessor units or circuit boards shall have a tag on outside of panel/cabinet to identify the panel/cabinet number.

(5) The "STANDARD RMCS POINT NAMES" shall be as follows.

Refrigeration

Cases and Walk-In Boxes:

Cases/WIB	Abbreviations
Bakery Case	BAKE
Dairy Case	DYCS
Fish Case	FISH
Deli Case	DELI
Multi Deck Deli Case	MDDI
Single Deck Frozen Food	SDFF or FZCS
Multi Deck Frozen Food	MDFF
Frozen Food with Gl Dr	FZGD
Ice Cream with Gl Dr	ICGD
Milk Roll-In Case	MILK

Ice Cream Single Deck	ICRM or ICCS
Meat Case	MTCS
Produce Case	PRCS
Dairy Box	DYBX
Poultry Box	POBX
Freezer Vestibule	FRZV
Freezer Box	FZBX
Bakery Box	BKBX
Frozen Baked Box	FZBX
Controlled Temp (Candy)	CTBX
Carcass Box	MTBX
Meat Cutting Room	MTCU
Meat Wrapping Room	MTWR
Meat Holding Box	HDBX
Produce Box	PRBX
Produce Prep	PRPR
Deli Box	DLBX
Fish Box	FIBX
Compressor Systems	SYS##X (where ## is the system number and X is the compressor letter.)
Defrost	DEF## .XX (where ## is system numbered XX designates refr circuit number.)
Air Cooled Condensers	ACC##X (where ## is the condenser number and X is the stage number on the condenser.)
Liquid Line Solenoid	LLSV ## (where ## is the refr circuit number).

Heating, Ventilating and Air-Conditioning (HVAC) Names:

Names	Abbreviations
Main Air Handler	AHU ## (where ## is Air Handler 1, 2, etc. the AHU number)
Cooling Stages	Cool# (where # designates the stage number. When more than one AHU is present, designate as COOL### where ## is for AHU and the 2nd # is for stage.)
Heat Reclaim Stages (HR)	HR### (where ## is AHU number and # is the stag number.)
Auxiliary Duct Heat (AH)	AHEH### (electric) AHGH### (gas) AHOH### (oil) AHSH### (steam) AHWH### (water) (where ## is AHU number and # is stage number.)
Dehumidification	DHUM.## (where ## is the desiccant sys#)
Humidity	HUMD## (where ## is the AHU number.)
Dewpoint	DEWPT## (where ## is the AHU number.)
Condensing Water Temp	COND WTR
Mezzanine Room Temp	MEZ TMP
Outside Air Temperature	OTSD TMP
Pan Water Temperature	PAN WTR
Stock Room Temperature	STCK TMP
Store Temperature	INSD TMP (when only one zone) INSIDE X (where X =zone when more than one.)
Supply Air Temperature	SP## AIR (where X is AHU number)
Compressor Suction / Discharge Temperature	SYS##ST# or SYS##DT## (where ## is system number and # is compressor letter.)
Oil Pressure Monitor	OPMXXX (where ## is system number and # is compressor letter.)

Refrigerant Level	SYSXXLQD (where XX is the system number.)
Chill Water Supply	CWSTMP
Chill Water Return	CWRTMP
System Suction Pressure	SYS##SP (where ## is the system number.)
System Discharge Press	SYS##DP (where ## is the SYS number.)
System Condenser Press	SYS##CP (where ## is the SYS number.)

3.5 CLOSE OUT ITEMS

a. O & M MANUALS: Contractor shall furnish O&M manuals and information as herein indicated.

(1) DISTRIBUTION:

(a) Provide one (1) copy and 3 CD ROM copies to DeCA/ DOFC, 2250 Foulois Ave, Lackland AFB TX 78236-1039.
(b) Provide one (1) copy to HQ DeCA/ENFS Ft. Lee Virginia.
(c) Provide three (3) copies to the Contracting Officer (to be forwarded to commissary).

(2) DATE REQUIRED: Prior to final acceptance.
(3) BOUND NOTEBOOK: Each set shall be in bound notebooks.
(4) TABLE OF CONTENTS: Each set shall have a table of contents identifying the contents.
(5) CONTENTS: Each shall contain hardware and software information indicating the following:

(a) The names, addresses, and telephone numbers of; the manufacturer of the system and of the nearest service representatives for the system.
(b) Shall describe the specifications and capabilities of all equipment provided, including:
General description and specification.
Installation and checkout procedures.
Descriptions of maintenance and repair of defective components (temperature probes, humidity or dewpoint sensors, control relays, digital input sensors, power supplies, etc.).
Installation drawings and sketches indicating locations of: analog inputs, control relays, digital outputs, digital inputs, and panels.
Computer specifications and peripherals.
Use of: system and applications software.
Use of Alarm system.

b. CADD FILES: Provide CADD files (DWG and DXE format) on CD ROM indicating; analog probe locations, and point to point electrical interface drawings between RMCS connections and other equipment.

(1) DISTRIBUTION OF CADD CD: CD shall be mailed to HQ DeCA/PMF Lackland AFB TX 78236-1039.

c. CONTROL TASK MANUAL: Provide a booklet attached by chain to each ICU and one attached to the Desk Top Computer. Each manual shall contain the following:

(1) CONTROL TASK DESCRIPTION: Provide a written description of each and every control task. Description shall clearly describe at length, how each relay point is affected by changes in the input.
(2) WIRING DIAGRAM: Provide a drawing indicating physical location in store of all relays, relay boards, and sensors.

d. TRAINING: The startup technician give the following training sessions each of which shall be: coordinated with the commissary, scheduled during week days, scheduled at a minimum of 14 days in advance, and coordinated through the Contracting Officer. During these sessions, Commissary Store Personnel shall be instructed on accessing the RMCS temperatures and alarms using the laptop computer. Additionally during

these sessions, Commissary Personnel shall be instructed on changing the lighting schedules by means of using the lighting password.

(1) FIRST TRAINING SESSION: A four hour training session (to a minimum of four Commissary Store Personnel) within 14 days after final acceptance and all RMCS final inspection punch list items are resolved.
(2) SECOND TRAINING SESSION: A second four hour training session (to a minimum of four Commissary Store Personnel) at least 45 days after the final acceptance, but not more that 60 days after acceptance.

e. VIDEOS: Provide each video described below:

(1) USER VIDEO: This video should be tailored to equipment installed on this project and will explain to commissary management how to determine what causes a refrigeration alarm and how to change lighting schedules using the local ICU key pad. Video length should be from 15 to 25 minutes.
(2) SERVICE VIDEO: Video training tape on "Basic Service Procedure": This video should be tailored to repairing equipment (DCU, ICUs, and sensors) installed on this project. The video should be on the level that would enable a journeyman refrigeration mechanic to make most repairs to the system. Video length shall be 45 to 70 minutes.
(3) DISTRIBUTION OF VIDEOS: Provide one copy of each video to: HQ DeCA/PMF Lackland AFB TX 78236-1039.

f. DATABASE SOFTWARE: Provide the following items:

(1) CD ROM: Data base downloading software CD ROM described in 2.3-d (1).
(2) AUTHORIZATION OF USE: Letter granting government rights to use this software.
(3) DISTRIBUTION: Mail to DeCA/PMF, Lackland AFB TX, 78236-1039.

g. DATA BACKUP: Provide the following items:

(1) CD ROM: CD ROM containing backup of all RMCS name, and setpoints for site.
(2) DISTRIBUTION: Mail to DeCA/PMF, Lackland AFB TX, 78236-1039.

h. SPARE PARTS: The following spare parts shall be provided at least 30 days prior to final acceptance.

(1) PROBES: Four temperature sensing probes for each type.
(2) TRANSDUCERS: One pressure transducer for each type.
(3) BOARDS: One circuit board of each type; DI, AI, RO, AO, DCU communication.
(4) FUSES: Twenty fuses of each type.
(5) ICU: One spare individual control unit (ICU) complete with all printed circuit cards, circuit chips, and power supply.
(6) LOCATION FOR PARTS: These parts shall be located in the mechanical equipment room in a contractor furnished cabinet with lockable door.

i. FINAL ACCEPTANCE: Prior to final acceptance, the following shall be accomplished.

(1) TEMPERATURES MAINTAINED: All RMCS equipment shall be maintaining contract specified control.
(2) PUNCH LIST COMPLETE: All pre final and final punch list items shall have been corrected by the contractor and their correction approved by DeCA/PMF Lackland AFB TX.
(3) O&M INFO RECEIVED: All O&M information shall have been received by the government.
(4) WARRANTY RECEIVED: Warranty letters from the RMCS and Display case manufacturers shall have been received by the government.
(5) CERTIFICATION OF INSTALLATION RECEIVED: Certification of installation letters from the RMCS and Display Case Manufacturers shall have been received by the government (see 3.1.2-b).
(6) TRANSFER OF BILLING FOR PHONE LINE: (see 3.2-h (2)).

(7) ALARM MONITORING AND NOTIFICATION: Alarm monitoring and notifications service shall be activated.

j. ALARM MONITORING AND NOTIFICATION: Manufacturer shall provide a 24 hour a day Alarm monitoring and notification service during the first 90 days of the warranty after final acceptance. See 3.6 warranty.

(1) GENERAL: RMCS shall dial out alarms to a monitoring service using a toll free (1-800) phone number. Monitoring company shall evaluate all alarms and shall notify designated Commissary personnel as necessary to inform them of refrigeration problems which warrant the store's attention.

3.6 WARRANTY

a. Provide Warranty Guarantees and Services as follows:

(1) The manufacturer of the RMCS shall guarantee that the RMCS equipment/software, shall operate and provide specified control without failure for the periods indicated below beginning on the date of final acceptance.

(a) FIRST 90 DAYS: During the first 90 days of the warranty, the Manufacturer shall provide 24 hours a day, 7 days per week (including holidays), service to the Commissary. A technician shall arrive at the Commissary within 2 hours of receipt of a telephone call for warranty service. All parts and labor shall be provided by the Manufacturer at no cost to the government during this period. Additionally, manufacturer shall provide a 24 hour a day Alarm Monitoring and Notification service.

(b) 91 TO 365 DAY: During the 91st day through the 365 day of the warranty, the Manufacturer shall provide free exchange of parts within 24 hours of notification. Shipping costs shall be paid by the Manufacturer. These parts will be installed by a Maintenance Contractor whose services are provided for under a separate contract. No installation cost shall be paid by the RMCS Manufacturer for replacement of these parts. Additionally, manufacturer shall provide a 24 hour a day Alarm Monitoring and Notification service.

(c) FIRST FIVE YEARS: Additionally, during the 91st day through the first five years of the warranty, the manufacturer of the RMCS shall provide assistance (via telecon at no cost to the government nor Government Contractor) in helping the government or contractor personnel locate any problem with the RMCS system. During this warranty period, the manufacture of the RMCS shall unconditionally provide software maintenance at no cost to the government or Government Contractor.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15990

TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes:

a. Testing, adjustment, and balancing of air systems.

1.1.2. Related Work:

a. Section 01042 - Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.
b. Section 01400 - Quality Control.
c. Section 01720 – Phased Turnover and Project Closeout.
d. Section 15997 – Commissioning Mechanical Systems.
e. Division 16 – Electrical.

1.2 QUALITY CONTROL

1.2.1. The following publications form a part of this specification to the extent they are applicable:

a. Section 01400 – Quality Control.
b. AABC - National Standards for Total System Balance.
c. ADC - Test Code for Grilles, Registers, and Diffusers.
d. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.
e. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
f. SMACNA - HVAC Systems Testing, Adjusting, and Balancing.

1.2.2. Procedures:

a. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance.
b. Maintain one copy of document on site.
c. Provide certification of calibration of instruments indicating calibration not less than 6 months prior to date of use.

1.3 QUALIFICATIONS

a. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three experience certified by AABC.
b. Perform Work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor.

1.4 SUBMITTALS

a. Submit under provisions of Section 01400.
b. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.
c. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
d. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
e. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.

(1) Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
(2) Test Reports: Indicate data on AABC National Standards for Total System Balance forms containing information indicated in Schedules.
(3) Submit technician's field notes with the preliminary report.

f. Operation and Maintenance data.

1.5 QUALITY ASSURANCE

a. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance.
b. Maintain one copy of document on site.
c. Provide certification of calibration of instruments indicating calibration not less than 6 months prior to date of use.

1.6 QUALIFICATIONS

a. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three years documented experience certified by AABC.
b. Perform Work under supervision of NEBB Certified Testing, Balancing and Adjusting Supervisor.

1.7 SEQUENCING

a. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

a. Verify that systems are complete and operable before commencing work. Ensure the following conditions:

(1) Systems are started and operating in a safe and normal condition.
(2) Temperature control systems are installed complete and operable.
(3) Proper thermal overload protection is in place for electrical equipment.
(4) Final filters are clean and in place. If required, install temporary media in addition to final filters.
(5) Duct systems are clean of debris.
(6) Fans are rotating correctly.
(7) Fire and volume dampers are in place and open.
(8) Air coil fins are cleaned and combed.
(9) Access doors are closed and duct end caps are in place.
(10) Air outlets are installed and connected.
(11) Duct system leakage is minimized.
(12) Hydronic systems are flushed, filled, and vented.
(13) Pumps are rotating correctly.
(14) Proper strainer baskets are clean and in place.
(15) Service and balance valves are open.

b. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.
c. Beginning of work means acceptance of existing conditions.

3.2 PREPARATION

a. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Quality Control Representative to facilitate spot checks during testing.
b. Provide additional balancing devices as required.

3.3 INSTALLATION TOLERANCES

a. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
b. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
c. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.4 ADJUSTING

a. Ensure recorded data represents actual measured or observed conditions.
b. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
c. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
d. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
e. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
f. Check and adjust systems approximately six months after final acceptance and submit report.

3.5 AIR SYSTEM PROCEDURE

a. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
b. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
c. Measure air quantities at air inlets and outlets.
d. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
e. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
f. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
g. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
h. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
i. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
j. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
k. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
l. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches (12.5 Pa) positive static pressure near the building entries.
m. Record date, time, and conditions on all data sheets.
n. Test, adjust and balance Dual Path Dehumidifier at full fan speed and scheduled outdoor air quantity.
o. Test, adjust and balance variable volume system at maximum and minimum zone air quantities.
p. Test, adjust and balance units with economizer cycles at full and minimum outdoor air quantity.

3.6 SCHEDULES

3.6.1. Report Forms

3.6.1.1. Title Page:

Proposed Joint Commissary and Navy Exchange
NSA Annapolis, MD
TESTING, ADJUSTING, AND BALANCING
15990-4

a. Name of Testing, Adjusting, and Balancing Agency
b. Address of Testing, Adjusting, and Balancing Agency
c. Telephone number of Testing, Adjusting, and Balancing Agency
d. Project name
e. Project location
f. Project Architect
g. Project Engineer
h. Project Contractor
i. Project altitude
j. Report date

3.6.1.2. Summary Comments:

a. Design versus final performance
b. Notable characteristics of system
c. Description of systems operation sequence
d. Summary of outdoor and exhaust flows to indicate amount of building pressurization
e. Nomenclature used throughout report
f. Test conditions

3.6.1.3. Instrument List:

a. Instrument
b. Manufacturer
c. Model number
d. Serial number
e. Range
f. Calibration date

3.6.1.4. Electric Motors:

a. Manufacturer
b. Model/Frame
c. HP/BHP
d. Phase, voltage, amperage; nameplate, actual, no load
e. RPM
f. Service factor
g. Starter size, rating, heater elements
h. Sheave Make/Size/Bore

3.6.1.5. V-Belt Drive:

a. Identification/location
b. Required driven RPM
c. Driven sheave, diameter and RPM
d. Belt, size and quantity
e. Motor sheave diameter and RPM
f. Center to center distance, maximum, minimum, and actual

3.6.1.6. Air Moving Equipment:

a. Location
b. Manufacturer
c. Model number
d. Serial number
e. Arrangement/Class/Discharge
f. Air flow, specified and actual
g. Return air flow, specified and actual
h. Outside air flow, specified and actual
i. Total static pressure (total external), specified and actual
j. Inlet pressure
k. Discharge pressure
l. Sheave Make/Size/Bore
m. Number of Belts/Make/Size
n. Fan RPM

3.6.1.7. Return Air/Outside Air Data:

a. Identification/location
b. Design air flow
c. Actual air flow
d. Design return air flow
e. Actual return air flow
f. Design outside air flow
g. Actual outside air flow
h. Return air temperature
i. Outside air temperature
j. Required mixed air temperature
k. Actual mixed air temperature
l. Design outside/return air ratio
m. Actual outside/return air ratio

3.6.1.8. Exhaust Fan Data:

a. Location
b. Manufacturer
c. Model number
d. Serial number
e. Air flow, specified and actual
f. Total static pressure (total external), specified and actual
g. Inlet pressure
h. Discharge pressure
i. Sheave Make/Size/Bore
j. Number of Belts/Make/Size
k. Fan RPM

3.6.1.9. Duct Traverse:

a. System zone/branch
b. Duct size
c. Area
d. Design velocity
e. Design air flow
f. Test velocity
g. Test air flow
h. Duct static pressure
i. Air temperature
j. Air correction factor

3.6.1.10. Duct Leak Test:

a. Description of ductwork under test
b. Duct design operating pressure
c. Duct design test static pressure
d. Duct capacity, air flow
e. Maximum allowable leakage duct capacity times leak factor
f. Test apparatus

(1) Blower
(2) Orifice, tube size
(3) Orifice size
(4) Calibrated

g. Test static pressure
h. Test orifice differential pressure
i. Leakage

3.6.1.11. Air Distribution Test Sheet:

a. Air terminal number
b. Room number/location
c. Terminal type
d. Terminal size
e. Area factor
f. Design velocity
g. Design air flow
h. Test (final) velocity
i. Test (final) air flow
j. Percent of design air flow

3.7 DEMONSTRATION

3.7.1. Repeat up to 2.5% of measurements in the presence of the Section 01810 Commissioning team.

CONSTRUCTION ISSUE

END OF SECTION

CONSTRUCTION ISSUE

SECTION 15997

COMMISSIONING MECHANICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
1. Division 15 responsibilities in the commissioning process
2. Commissioning HVAC Systems
3. Commissioning Building HVAC Systems Automation Controls
4. Commissioning Plumbing Systems
5. Commissioning Fire Suppression Systems
6. Commissioning Refrigeration and RMCS
7. Commissioning Testing, Adjusting and Balancing (TAB)

B. Related Sections
1. Section 01810 - Commissioning Requirements.

1.2 DEFINITIONS

A. CA: Commissioning Agent.

B. CO: Contracting Officer.

C. GC: Contractor; General Contractor, not a Subcontractor.

D. O&M: Operations and Maintenance.

E. QC: Contractor's Quality Control Manager.

F. TI: Technical Inspector

1.3 DESCRIPTION

A. This Section describes commissioning requirements applicable to commissioned items and systems specified in Division 15 to ensure that all systems are operating in a manner consistent with the Contract Documents.

B. Conform to commissioning requirements and the commissioning plan.

1.4 RESPONSIBILITIES

A. Mechanical, Plumbing, Controls and TAB Contractors. The commissioning responsibilities applicable to each of the mechanical, controls and TAB contractors of Division 15 are as follows (all references apply to commissioned equipment only):
1. Construction and Acceptance Phases
Include the cost of commissioning in the contract price.
In each purchase order or subcontract written, include requirements for submittal data, commissioning documentation, O&M data and training.
Conduct a commissioning scoping meeting and other meetings necessary to facilitate the Commissioning process.
Provide requested documentation to the TI, developed for functional testing procedures.

Provide functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the prefunctional checklists for all commissioned equipment. Submit to QC for review prior to startup. TI will verify plan for compliance. Refer to Section 01810 for further details related to start-up.
During the startup and initial checkout process, execute the mechanical-related portions of the prefunctional checklists for all commissioned equipment.
Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the QC and TI.
Correct system deficiencies before functional testing. Air and water TAB shall be completed with discrepancies and problems remedied before functional testing of the respective air- or water-related systems.
Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
Assist the CA and TI in interpreting the monitoring data, as necessary.
Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, TI and A/E and retest the equipment.
Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).
Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

2. Operation Manuals shall include:
   A table of all setpoints and implications when changing them.
   Schedules.
   Instructions for operation of each piece of equipment for emergencies.
   Seasonal adjustment.
   Startup and shutdown.
   Instructions for energy savings operations and descriptions of the energy savings strategies in the facility (from O&M Manuals).
   Recommendations for recommissioning frequency by equipment type.
   Energy tracking recommendations.
   Recommended standard trend logs with a brief description of what to look for in them.
3. Warranty Period
   Execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
   Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

B. Mechanical Contractor. The responsibilities of the HVAC mechanical contractor, during construction and acceptance phases in addition to those listed in Paragraph A, above, are:
1. Commission the mechanical systems listed in Section 01810 and the Commissioning Plan.
2. Provide submittals as required by A/E and those listed on the pre-functional test sheets.
3. Provide startup for all HVAC equipment, except for the building automation control system. Clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.
4. Provide all test equipment necessary to fulfill specified testing requirements.
5. Assist and cooperate with the TAB contractor and CA by:

Putting all HVAC equipment and systems into operation and continuing the operation during each working day of TAB and commissioning, as required.
Including cost of sheaves and belts that may be required by TAB.
Providing test holes in ducts and plenums where directed by TAB to allow air measurements and air balancing. Providing an approved plug.
Providing temperature and pressure taps according to the Construction Documents for TAB and commissioning testing.

6. Install a P/T plug at each water and steam sensor which is an input point to the control system.
7. List and clearly identify on the as-built drawings the locations of all air-flow stations.
8. Prepare a preliminary schedule for Division 15 pipe and duct system testing, flushing and cleaning, equipment start-up and TAB start and completion for use by the CA. Update the schedule as appropriate.
9. Notify the GC when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and TAB will occur. Be responsible to notify the GC ahead of time, when commissioning activities not yet performed or not yet scheduled will delay construction. Be proactive in seeing that commissioning processes are executed and that the GCR has the scheduling information needed to efficiently execute the commissioning process.
10. Refer to Section 01810 for specific details on non-conformance issues relating to prefunctional checklists and tests and for issues relating to functional performance tests.
11. The training shall consist of a review of the O&M manuals and hands-on training. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment. The mechanical contractor shall fully explain and demonstrate the operation, function and overrides of any local packages controls, not controlled by the central control system. Training shall occur after functional testing is complete, unless approved otherwise by the Contracting Officer.

C. Plumbing Contractor. The responsibilities of the plumbing contractor, during construction and acceptance phases in addition to those listed in Paragraph A, above, are:

1. Commission the plumbing systems listed in Section 01810 and the Commissioning Plan.
2. Provide submittals as required by A/E and those listed on the pre-functional test sheets.
3. During the startup and initial checkout process, execute the plumbing-related portions of the prefunctional checklists for all commissioned equipment.
4. Provide all test equipment necessary to fulfill specified testing requirements.
5. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.
6. Refer to Section 01810 for specific details on non-conformance issues relating to prefunctional checklists and tests and for issues relating to functional performance tests.
7. The training shall consist of a review of the O&M manuals and hands-on training. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment. The plumbing contractor shall fully explain and demonstrate the operation, function and overrides of any local packages controls, not controlled by the central control system. Training shall occur after functional testing is complete, unless approved otherwise by the Contracting Officer.

D. Controls Contractor. The commissioning responsibilities of the controls contractor, during construction and acceptance phases in addition to those listed in Paragraph A, above, are:

1. Sequences of Operation Submittals. The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. They shall include:

An overview narrative of the system (1 or 2 paragraphs) generally describing its purpose, components and function.
All interactions and interlocks with other systems.

Detailed delineation of control between any packaged controls and the building automation system, listing what points the BAS monitors only and what BAS points are control points and are adjustable.
Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included, but will generally require additional narrative).
Start-up sequences.
Warm-up mode sequences.
Normal operating mode sequences.
Unoccupied mode sequences.
Shutdown sequences.
Capacity control sequences and equipment staging.
Temperature and pressure control: setbacks, setups, resets, etc.
Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
Effects of power or equipment failure with all standby component functions.
Sequences for all alarms and emergency shut downs.
Seasonal operational differences and recommendations.
Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
Schedules, if known.
To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. For a given system, numbers shall not repeat for different sequence sections, unless the sections are numbered.

2. Control Drawings Submittal

The control drawings shall have a key to all abbreviations.
The control drawings shall contain graphic schematic depictions of the systems and each component.
The schematics shall include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
Provide a full points list with at least the following included for each point:

1) Controlled system
2) Point abbreviation
3) Point description
4) Display unit
5) Control point or setpoint (Yes / No)
6) Monitoring point (Yes / No)
7) Intermediate point (Yes / No)
8) Calculated point (Yes / No)
9) Key:
10) Point description: DB temp, airflow, etc.
11) Control or setpoint: Point that controls equipment and can have its setpoint changed (OSA, SAT, etc.)
12) Intermediate point: point whose value is used to make a calculation which then controls equipment (space temperatures that are averaged to a virtual point to control reset).
13) Monitoring point: point that does not control or contribute to the control of equipment, but is used for operation, maintenance, or performance verification.
14) Calculated point: "virtual" point generated from calculations of other point values.
15) The controls contractor shall keep the CA informed of all changes to this list during programming and setup.

3. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.
4. Assist and cooperate with the TAB contractor in the following manner:

Meet with the TAB contractor prior to beginning TAB and review the TAB plan to determine the capabilities of the control system toward completing TAB. Provide the TAB contractor any unique instruments needed for setting terminal unit boxes and instruct TAB in their use (handheld control system interface for use around the building during TAB, etc.).

For a given area, have all required prefunctional checklists, calibrations, startup and selected functional tests of the system completed prior to TAB.

Provide a qualified technician to operate the controls to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.

5. Assist and cooperate with the CA in the following manner:

   Using a skilled technician who is familiar with the installed systems in this building, execute the functional testing of the controls system. Assist in the functional testing of all equipment.

   Provide two-way radios during the testing.

   Execute all control system trend logs.

6. The controls contractor shall prepare a written plan indicating in a step-by-step manner, the procedures that will be followed to test, checkout and adjust the control system prior to functional performance testing. At minimum, the plan shall include for each type of equipment controlled by the automatic controls:

   System name.

   List of devices.

   Step-by-step procedures for testing each controller after installation, including:

   1) Process of verifying proper hardware and wiring installation.
   2) Process of downloading programs to local controllers and verifying that they are addressed correctly.
   3) Process of performing operational checks of each controlled component.
   4) Plan and process for calibrating valve and damper actuators and all sensors.
   5) A description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.

   A copy of the log and field checkout sheets that will document the process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor or controller has "passed" and is operating within the contract parameters.

   A description of the instrumentation required for testing.

   Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the CA and TAB contractor for this determination.

7. Provide a signed and dated certification to the GC upon completion of the checkout of each controlled device, equipment and system prior to functional testing for each piece of equipment or system, that all system programming is complete as to all respects of the Contract Documents, except functional testing requirements.
8. Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points.
9. List and clearly identify on the as-built duct and piping drawings the locations of all monitoring and control sensors.
10. Provide all test equipment necessary to fulfill specified testing requirements.

E. TAB Contractor. The duties of the TAB contractor, in addition to those listed in Paragraph A, above, are:

1. Submit the outline of the TAB plan and approach for each system and component to the CA, CO, GC and the controls contractor six weeks prior to starting the TAB. This plan shall be developed after the TAB has met with the CC and become familiar with the control system.
2. The submitted plan shall include:

   Certification that the TAB contractor has reviewed the construction documents and the systems with the design engineers and contractors to sufficiently understand the design intent for each system.

   An explanation of the intended use of the building control system. The controls contractor shall comment on feasibility of the plan.

All field checkout sheets and logs to be used that list each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
Discussion of what notations and markings will be made on the duct and piping drawings during the process.
Final test report forms to be used.
Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch / submain proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc. Criteria for using air flow straighteners or relocating flow stations and sensors shall be discussed. Provide the analogous explanations for the waterside.
List of all airflow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
Details of how total flow will be determined (Air: sum of terminal flows via BAS calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations. Water: pump curves, circuit setter, flow station, ultrasonic, etc.).
The identification and types of measurement instruments to be used and their most recent calibration date.
Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and provide methods to verify this.
Confirmation that TAB understands the outside air ventilation criteria under all conditions.
Details of whether and how minimum outside air cfm will be verified and set, and for what level (total building, zone, etc.).
Details of how building static and exhaust fan / relief damper capacity will be checked.
Proposed selection points for sound measurements and sound measurement methods.
Details of methods for making any specified coil or other system plant capacity measurements.
Details of any TAB work to be done in phases (by floor, etc.), or of areas to be built out later.
Details regarding specified deferred or seasonal TAB work.
Details of any specified false loading of systems to complete TAB work.
Details of all exhaust fan balancing and capacity verifications, including any required room pressure differentials.
Details of any required interstitial cavity differential pressure measurements and calculations.
Plan for hand-written field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
Plan for formal progress reports (scope and frequency).
Plan for formal deficiency reports (scope, frequency and distribution).

3. The TAB field technicians shall keep a running log of events and issues. Submit hand-written reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests to the CA, GC and CO at least twice a week.
4. Communicate in writing to the controls contractor all setpoint and parameter changes made or problems and discrepancies identified during TAB which affect the control system setup and operation.
5. Provide a draft copy of the TAB report to the CA within two weeks of completion. The report shall contain a full explanation of the methodology, assumptions and the results in a clear format with designations of all uncommon abbreviations and column headings. The report should follow the latest and most rigorous reporting recommendations by AABC, NEBB or ASHRAE Standard 111.
6. Provide the CA with any updates as a result of A/E review.
7. Provide all test equipment necessary to fulfill specified testing requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 STARTUP

A. The mechanical, plumbing and controls contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section and in 01810. Division 15 has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the commissioning agent, technical inspector or Government.

B. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CO. Beginning system testing before full completion does not relieve the Contractor from fully completing the system, including all prefunctional checklists as soon as possible.

3.2 OPERATION AND MAINTENANCE (O&M) MANUALS

A. The following O&M manual requirements do not replace O&M manual documentation requirements elsewhere in these specifications.

B. Division 15 shall compile and prepare documentation for all commissioned systems covered in Division 15 and deliver this documentation to the GC for inclusion in the O&M manuals prior to the training of Government personnel.

C. Special Control System O&M Manual Requirements. In addition to documentation that may be specified elsewhere, the controls contractor shall compile and organize at a minimum the following data on the control system in labeled 3-ring binders with indexed tabs.

1. Three copies of the controls training manuals in a separate manual from the O&M manuals.
2. Operation and Maintenance Manuals containing:

Specific instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. These instructions shall be step-by-step. Indexes and clear tables of contents shall be included. The detailed technical manual for programming and customizing control loops and algorithms shall be included.

Full as-built set of control drawings.

Full as-built sequence of operations for each piece of equipment.

Full points list. A listing of all rooms shall be provided with the following information for each room:

1) Floor
2) Room number
3) Room name
4) Air handler unit ID
5) Reference drawing number
6) Air terminal unit tag ID
7) Heating and/or cooling valve tag ID
8) Minimum cfm
9) Maximum cfm

Full print out of all schedules and set points after testing and acceptance of the system.

Full as-built print out of software program.

Electronic copy on disk of the entire program for this facility.

Marking of all system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.

Control equipment component submittals, parts lists, etc.

Warranty requirements.
Copies of all checkout tests, other than commissioning tests, and calibrations performed by the Contractor.

3. The manual shall be organized and subdivided with permanently labeled tabs for each of the following data in the given order:
   Sequences of operation
   Control drawings
   Points lists
   Controller / module data
   Thermostats and timers
   Sensors and DP switches
   Valves and valve actuators
   Dampers and damper actuators
   Program setups (software program printouts)
4. Field checkout sheets and trend logs should be provided to the GC for inclusion in the on-site Commissioning filing system.

D. Special TAB Documentation Requirements. The TAB contractor shall compile and submit the following with other documentation that may be specified elsewhere in the Specifications.
   1. The TAB contractor shall mark on the drawings where all traverse and other critical measurements were taken and cross reference the location in the TAB report.

3.3 TRAINING OF GOVERNMENT PERSONNEL

A. The GC shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.

B. The QC shall be responsible for reviewing the content and adequacy of the training of Government personnel for commissioned equipment or systems. TI will verify compliance.

C. Mechanical and Plumbing Contractors. The mechanical and plumbing contractors shall have the following training responsibilities for their respective commissioned systems:
   1. Provide the TI with a training plan four weeks before the planned training.
   2. Provide designated Government personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of commissioned equipment.
   3. Training shall start with classroom sessions followed by hands-on training on each piece of equipment.
   4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system shall be repaired or adjusted as necessary and the demonstration repeated.
   5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the training.
   6. The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
   7. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
   8. Training shall include:
      Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
      A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The

training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
Discussion of relevant health and safety issues and concerns.
Discussion of warranties and guarantees.
Common troubleshooting problems and solutions.
Explanation of information included in the O&M manuals.
Discussion of any peculiarities of equipment installation or operation.
Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.

9. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
10. Fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
11. Training shall occur after functional testing is complete, unless approved otherwise by the Contracting Officer.
12. Minimum Duration of Training. In addition to training hours included in individual Division 15 sections, provide training on each system according to the following schedule:

SYSTEM	HOURS
Domestic Water Systems	8
Refrigeration Systems	24
Air Handling Supply and Exhaust Systems	24

D. Controls Contractor. The controls contractor shall have the following training responsibilities:

1. Provide the CA with a training plan four weeks before the planned training.
2. The controls contractor shall provide designated Government personnel training on the control system in this facility. The intent is to clearly and completely instruct the Government on all the capabilities of the control system.
3. Training manuals. The standard operating manual for the system and any special training manuals shall be provided for each trainee. In addition, copies of the system technical manual shall be demonstrated during training. Manuals shall include detailed description of the subject matter for each session. The manuals shall cover all control sequences and have a definitions section that fully describes all relevant words used in the manuals and in all software displays. Copies of audiovisuals shall be delivered to theGovernment.
4. The training sessions shall be tailored to the needs and skill-level of the trainees.
5. The trainers shall be knowledgeable on the system and its use in buildings.
6. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system shall be repaired or adjusted as necessary and the demonstration repeated.
7. The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
8. Provide three training sessions structured as follows:

Training I. Control System. The first training shall consist of 8 hours of actual training. This training may be held on-site or in the supplier's facility. If held off-site, the training may occur prior to final completion of the system installation. Upon completion, each student, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.

Training II. Building Systems. The second session shall be held on-site for a period of 24 hours of actual hands-on training after the completion of system commissioning. The session shall include instruction on:

1) Specific hardware configuration of installed systems in this building and specific instruction for operating the installed system, including HVAC systems, lighting controls and any interface with security and communication systems.

2) Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing setpoints and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.
3) All trending and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends. Trainees shall actually set-up trends in the presence of the trainer.
4) Every screen shall be completely discussed, allowing time for questions.
5) Use of keypad or plug-in laptop computer at the zone level.
6) Use of remote access to the system via phone lines or networks.
7) Setting up and changing an air terminal unit controller.
8) Graphics generation
9) Point database entry and modifications
10) Understanding DDC field panel operating programming (when applicable)

Training III. The third training will be conducted on-site six months after occupancy and consist of 16 hours of training. The session shall be structured to address specific topics that trainees need to discuss and to answer questions concerning operation of the system.

E. The TAB contractor shall have the following training responsibilities:

1. TAB shall meet for 8 hours with facility staff after completion of TAB and instruct them on the following:

Go over the final TAB report, explaining the layout and meanings of each data type.
Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
Discuss any temporary settings and steps to finalize them for any areas that are not finished.
Other salient information that may be useful for facility operations, relative to TAB.

END OF SECTION

CONSTRUCTION ISSUE

SECTION 16000

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.1.1 This Section includes the following:

1.1.1.1. Supporting devices for electrical components.

1.2.1.1. Concrete equipment bases.

1.2.1.2. Electrical demolition.

1.2.1.3. Cutting and patching for electrical construction.

1.2.1.4. Touchup painting.

1.3 SUBMITTALS

1.3.1 Product Data: For electricity-metering equipment.

1.3.2 Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.4 QUALITY ASSURANCE

1.4.1 Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.2 Comply with NFPA 70.

1.5 COORDINATION

1.5.1 Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1.5.1.1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

1.5.2 Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

1.5.3 Coordinate electrical service connections to components furnished by utility companies.

1.5.3.1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.

1.5.3.2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

1.5.4 Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

2.1.1 Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

2.1.2 Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

2.1.3 Slotted-Steel Channel Supports: Comply with Division 5 Section "Metal Fabrications" for slotted channel framing.

2.1.3.1. Channel Thickness: Selected to suit structural loading.

2.1.3.2. Fittings and Accessories: Products of the same manufacturer as channel supports.

2.1.4 Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

2.1.5 Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

2.1.6 Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

2.1.7 Expansion Anchors: Carbon-steel wedge or sleeve type.

2.1.8 Toggle Bolts: All-steel springhead type.

2.1.9 Powder-Driven Threaded Studs: Heat-treated steel.

2.2 EQUIPMENT FOR ELECTRICITY METERING BY OWNER

2.2.1 Meter: Refer to specification Section 16441.

2.3 CONCRETE BASES

2.3.1 Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete."

2.3.2 Concrete: 3000-psi, 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete."

2.4 TOUCHUP PAINT

2.4.1 For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

2.4.2 Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

3.1.1 Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

3.1.2 Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

3.1.3 Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

3.1.4 Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

3.2.1 Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

3.2.2 Dry Locations: Steel materials.

3.2.3 Support Clamps for PVC Raceways: Click-type clamp system.

3.2.4 Selection of Supports: Comply with manufacturer's written instructions.

3.2.5 Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

3.3 SUPPORT INSTALLATION

3.3.1 Install support devices to securely and permanently fasten and support electrical components.

3.3.2 Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

3.3.3 Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

3.3.4 Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

3.3.5 Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

3.3.6 Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.

3.3.7 Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

3.3.8 Simultaneously install vertical conductor supports with conductors.

3.3.9 Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.

3.3.10 Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

3.3.11 Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

3.3.12 Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

3.3.12.1. Wood: Fasten with wood screws or screw-type nails.

3.3.12.2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.

3.3.12.3. New Concrete: Concrete inserts with machine screws and bolts.

3.3.12.4. Steel: Welded threaded studs or spring-tension clamps on steel.

a. Field Welding: Comply with AWS D1.1.

3.3.12.5. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.

3.3.12.6. Light Steel: Sheet-metal screws.

3.3.12.7. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 FIRESTOPPING

3.4.1 Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

3.5 CONCRETE BASES

3.5.1 Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.6 CUTTING AND PATCHING

3.6.1 Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

3.6.2 Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.7 FIELD QUALITY CONTROL

3.7.1 Inspect installed components for damage and faulty work, including the following:

3.7.1.1. Supporting devices for electrical components.

3.7.1.2. Concrete bases.

3.7.1.3. Electrical demolition.

3.7.1.4. Cutting and patching for electrical construction.

3.7.1.5. Touchup painting.

3.7.2 Test Owner's electricity-metering installation for proper operation, accuracy, and usability of output data.

3.7.2.1. Connect a load of known kW rating, 1.5 kW minimum, to a circuit supplied by the metered feeder.

3.7.2.2. Turn off circuits supplied by the metered feeder and secure them in the "off" condition.

3.7.2.3. Run the test load continuously for eight hours, minimum, or longer to obtain a measurable meter indication. Use a test load placement and setting that ensure continuous, safe operation.

3.7.2.4. Check and record meter reading at end of test period and compare with actual electricity used based on test load rating, duration of test, and sample measurements of supply voltage at the test load connection. Record test results.

3.7.2.5. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

3.8 REFINISHING AND TOUCHUP PAINTING

3.8.1 Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."

3.8.1.1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.

3.8.1.2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

3.8.1.3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

3.8.1.4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.9 CLEANING AND PROTECTION

3.9.1 On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

3.9.2 Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 16000

CONSTRUCTION ISSUE

SECTION 16055

OVERCURRENT PROTECTIVE DEVICE COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1 This Section includes computer-based, fault-current and overcurrent protective device coordination studies, and the setting of these devices.

1.2.2 Coordination of series-rated devices is not permitted.

1.3 SUBMITTALS

1.3.1 Product Data: For computer software program to be used for studies.

1.3.2 Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.

1.3.3 Qualification Data: For coordination-study specialist.

1.3.4 Other Action Submittals (Due before final setting of overcurrent devices prior to energizing the service):

1.3.4.1. Coordination-study input data, including completed computer program input data sheets.

1.3.4.2. Coordination-study report.

1.3.4.3. Equipment evaluation report.

1.3.4.4. Setting report.

1.4 QUALITY ASSURANCE

1.4.1 Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.

1.4.2 Coordination-Study Specialist Qualifications: An organization experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1.4.3 Comply with IEEE 399 for general study procedures.

1.4.4 Comply with IEEE 242 for short-circuit currents and coordination time intervals.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

2.1.1 Available Computer Software Developers: Subject to compliance with requirements, companies offering computer software programs that may be used in the Work include, but are not limited to, the following:

2.1.2 Computer Software Developers: Subject to compliance with requirements, provide computer software programs developed by one of the following:

2.1.2.1. CYME International, Inc.

2.1.2.2. EDSA Micro Corporation.

2.1.2.3. Electrical Systems Analysis, Inc.

2.1.2.4. SKM Systems Analysis, Inc.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

2.2.1 Comply with IEEE 399.

2.2.2 Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399, Table 7-4.

2.2.3 Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices.

2.2.4 Optional Features:

2.2.4.1. Arcing faults.

2.2.4.2. Simultaneous faults.

2.2.4.3. Explicit negative sequence.

2.2.4.4. Mutual coupling in zero sequence.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1 Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.

3.1.2 Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices not submitted for approval with coordination study may not be used in study.

3.2 FAULT-CURRENT STUDY

3.2.1 Source Impedance: Assume an infinite bus on primary side of utility transformer.

3.2.2 Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project and use approved computer software program to calculate values. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.

3.2.3 Calculate momentary and interrupting duties on the basis of maximum available fault current.

3.2.4 Calculations to verify interrupting ratings of overcurrent protective devices shall comply with the following:

3.2.4.1. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.50.

3.2.4.2. Low-Voltage Fuses: IEEE C37.46.

3.2.4.3. Circuit Breakers: IEEE C37.13.

3.2.5 Study Report: Enter calculated X/R ratios and interrupting (5-cycle) fault currents on electrical distribution system diagram of the report. List other output values from computer analysis, including momentary (1/2-cycle), interrupting (5-cycle), and 30-cycle fault-current values for 3-phase, 2-phase, and phase-to-ground faults.

3.2.6 Equipment Evaluation Report: Prepare a report on the adequacy of overcurrent protective devices and conductors by comparing fault-current ratings of these devices with calculated fault-current momentary and interrupting duties.

3.3 COORDINATION STUDY

3.3.1 Gather and tabulate the following input data to support coordination study:

3.3.1.1. Product Data for overcurrent protective devices specified in other Division 16 Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.

3.3.1.2. Impedance of utility service entrance.

3.3.1.3. Electrical distribution system diagram showing the following:

a. Load current that is the basis for sizing continuous ratings of circuits for cables and equipment.

b. Circuit-breaker and fuse-current ratings and types.

c. Relays and associated power and current transformer ratings and ratios.

d. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.

e. Generator kilovolt amperes, size, voltage, and source impedance.

f. Cables. Indicate conduit material, sizes of conductors, conductor insulation, and length.

g. Busway ampacity and impedance.

h. Motor horsepower and code letter designation according to NEMA MG 1.

3.3.1.4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram:

a. Special load considerations, including starting inrush currents and frequent starting and stopping.

b. Magnetic inrush current overload capabilities of transformers.

c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.

d. Ratings, types, and settings of utility company's overcurrent protective devices.

e. Special overcurrent protective device settings or types stipulated by utility company.

f. Time-current-characteristic curves of devices indicated to be coordinated.

g. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.

h. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.

i. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

3.4 Perform coordination study and prepare a written report using the results of fault-current study and approved computer software program. Comply with IEEE 399.

3.5 Comply with NFPA 70 for overcurrent protection of circuit elements and devices.

3.6 Comply with IEEE 242 recommendations for fault currents and time intervals.

3.7 Transformer Primary Overcurrent Protective Devices:

3.7.1 Device shall not operate in response to the following:

3.7.1.1. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.

3.7.1.2. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

3.7.2 Device shall protect transformer according to IEEE C57.12.00, for fault currents.

3.8 Motors served by voltages more than 600 V shall be protected according to IEEE 620.

3.9 Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Verify adequacy of phase conductors at maximum three-phase bolted fault currents, equipment grounding conductors, and grounding electrode conductors at maximum ground-fault currents.

3.10 Coordination-Study Report: Prepare a written report indicating the following results of coordination study:

3.10.1 Tabular Format of Settings Selected for Overcurrent Protective Devices:

3.10.1.1. Device tag.

3.10.1.2. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.

3.10.1.3. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.

3.10.1.4. Fuse-current rating and type.

3.10.1.5. Ground-fault relay-pickup and time-delay settings.

3.10.2 Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between series devices, including power utility company's upstream devices. Show the following specific information:

3.10.2.1. Device tag.

3.10.2.2. Voltage and current ratio for curves.

3.10.2.3. Three-phase and single-phase damage points for each transformer.

3.10.2.4. No damage, melting, and clearing curves for fuses.

3.10.2.5. Cable damage curves.

3.10.2.6. Transformer inrush points.

3.10.2.7. Maximum fault-current cutoff point.

3.10.3 Completed data sheets for setting of overcurrent protective devices.

3.11 OVERCURRENT PROTECTIVE DEVICE SETTING

3.11.1 Manufacturer's Field Service: Engage a factory-authorized service representative, of electrical distribution equipment being set and adjusted**,** to set overcurrent protective devices within equipment.

3.11.2 After installing overcurrent protective devices and during energizing process of electrical distribution system, perform the following:

a. Verify that overcurrent protective devices meet parameters used in studies.

b. Adjust devices to values listed in study results.

3.11.2.2. Adjust devices according to recommendations in Chapter 7, "Inspection and Test Procedures," and Tables 10.7 and 10.8 in NETA ATS.

CONSTRUCTION ISSUE

END OF SECTION 16055

CONSTRUCTION ISSUE

SECTION 16060

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1 This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.2.2 Related Sections include the following:

1.2.2.1. Division 16 Section "Lightning Protection" for additional grounding and bonding materials.

1.3 SUBMITTALS

1.3.1 Product Data: For each type of product indicated.

1.4 Qualification Data: For firms and persons specified in "Quality Assurance" Article.

1.5 Field Test Reports: Submit written test reports to include the following:

1.5.1 Test procedures used.

1.5.2 Test results that comply with requirements.

1.5.3 Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.6 QUALITY ASSURANCE

1.6.1 Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6.1.1. Comply with UL 467.

1.6.2 Comply with NFPA 70; for overhead-line construction and medium-voltage underground construction, comply with IEEE C2.

1.6.3 Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1 Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Grounding Conductors, Cables, Connectors, and Rods:

a. Apache Grounding/Erico Inc.
b. Boggs, Inc.
c. Chance/Hubbell.
d. Copperweld Corp.
e. Dossert Corp.
f. Erico Inc.; Electrical Products Group.
g. Framatome Connectors/Burndy Electrical.
h. Galvan Industries, Inc.
i. Harger Lightning Protection, Inc.
j. Hastings Fiber Glass Products, Inc.
k. Heary Brothers Lightning Protection Co.
l. Ideal Industries, Inc.
m. ILSCO.
n. Kearney/Cooper Power Systems.
o. Korns: C. C. Korns Co.; Division of Robroy Industries.
p. Lightning Master Corp.
q. Lyncole XIT Grounding.
r. O-Z/Gedney Co.; a business of the EGS Electrical Group.
s. Raco, Inc.; Division of Hubbell.
t. Robbins Lightning, Inc.
u. Salisbury: W. H. Salisbury & Co.
v. Superior Grounding Systems, Inc.
w. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

2.2.1 For insulated conductors, comply with Division 16 Section "Conductors and Cables."

2.2.2 Material: Copper.

2.2.3 Equipment Grounding Conductors: Insulated with green-colored insulation.

2.2.4 Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

2.2.5 Grounding Electrode Conductors: Stranded cable.

2.2.6 Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

2.2.7 Bare Copper Conductors: Comply with the following:

2.2.7.1. Solid Conductors: ASTM B 3.

2.2.7.2. Assembly of Stranded Conductors: ASTM B 8.

2.2.7.3. Tinned Conductors: ASTM B 33.

2.2.8 Copper Bonding Conductors: As follows:

2.2.8.1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.

2.2.8.2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

2.2.8.3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2.8.4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2.9 Ground Conductor and Conductor Protector for Wood Poles: As follows:

2.2.9.1. No. 4 AWG minimum, soft-drawn copper conductor.

2.2.9.2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir, or cypress or cedar.

2.2.10 Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

2.3 CONNECTOR PRODUCTS

2.3.1 Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

2.3.2 Bolted Connectors: Bolted-pressure-type connectors, or compression type.

2.3.3 Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.4 GROUNDING ELECTRODES

2.4.1 Ground Rods: Copper-clad steel.

PART 3 - EXECUTION

3.1 APPLICATION

3.1.1 In raceways, use insulated equipment grounding conductors.

3.1.2 Exothermic-Welded Connections: Use for connections to structural steel and for underground connections.

3.1.3 Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

3.1.4 Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

3.1.4.1. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.

3.2 EQUIPMENT GROUNDING CONDUCTORS

3.2.1 Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

3.2.2 Install equipment grounding conductors in all feeders and branch circuits.

3.2.3 Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.

3.2.4 Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated. Install an additional insulated equipment grounding conductor connected to the receptacle outlet box, terminated on the system panel equipment ground bar.

3.2.5 Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

3.2.6 Air-Duct Equipment Circuits: Install an equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners and heaters. Bond conductor to each unit and to air duct.

3.2.7 Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate equipment grounding conductor to each electric water heater, heat-tracing, and antifrost heating cable. Bond conductor to heater units, piping, connected equipment, and components.

3.3 INSTALLATION

3.3.1 Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.

3.3.1.1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.

3.3.1.2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds. Make connections without exposing steel or damaging copper coating.

3.3.2 Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

3.3.3 Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

3.3.4 Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

3.3.5 Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

3.3.6 Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.

3.4 CONNECTIONS

3.4.1 General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

3.4.1.1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.

3.4.1.2. Make connections with clean, bare metal at points of contact.

3.4.1.3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

3.4.1.4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

3.4.1.5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.4.2 Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

3.4.3 Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

3.4.4 Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

3.4.5 Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.4.6 Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

3.4.7 Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 OVERHEAD-LINE GROUNDING

3.5.1 Comply with IEEE C2 requirements. Use 2 or more parallel ground rods if a single ground rod electrode resistance to ground exceeds 25 ohms.

3.5.2 Drive ground rods to a depth of 12 inches below finished grade in undisturbed earth.

3.5.3 Ground Rod Connections: Use clamp-type connectors listed for the purpose for underground connections and connections to rods.

3.5.4 Lightning Arresters: Separate arrester grounds from other grounding conductors.

3.5.5 Secondary Neutral and Tank of Transformer: Interconnect and connect to grounding conductor.

3.5.6 Protect grounding conductors running on surface of wood poles with molding extended from grade level up to and through communication service and transformer spaces.

3.6 FIELD QUALITY CONTROL

3.6.1 Testing: Perform the following field quality-control testing:

3.6.1.1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

3.6.1.2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.

3.6.1.3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

a. Equipment Rated 500 kVA and Less: 10 ohms.

b. Equipment Rated 500 to 1000 kVA: 5 ohms.

c. Equipment Rated More Than 1000 kVA: 3 ohms.

d. Substations and Pad-Mounted Switching Equipment: 5 ohms.

3.6.1.4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Contracting Officer promptly and include recommendations to reduce ground resistance.

3.7 GRADING AND PLANTING

3.7.1 Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Division 2 Section "Landscaping." Maintain restored surfaces. Restore disturbed paving as indicated.

END OF SECTION 16060

CONSTRUCTION ISSUE

SECTION 16071

SEISMIC CONTROLS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes seismic restraints and other earthquake-damage-reduction measures for electrical components. It complements optional seismic construction requirements in the various electrical component Sections.

1.3 DEFINITIONS

1.3.1. IBC: International Building Code

1.3.2. Seismic Restraint: A fixed device (a seismic brace, an anchor bolt or stud, or a fastening assembly) used to prevent vertical or horizontal movement, or both vertical and horizontal movement, of an electrical system component during an earthquake.

1.3.3. Mobile Structural Element: A part of the building structure such as a slab, floor structure, roof structure, or wall that may move independent of other mobile structural elements during an earthquake.

1.4 SUBMITTALS

1.4.1. Product Data: Illustrate and indicate types, styles, materials, strength, fastening provisions, and finish for each type and size of seismic restraint component used.

1.4.1.1. Anchor Bolts and Studs: Tabulate types and sizes, complete with report numbers and rated strength in tension and shear as evaluated by an agency approved by authorities having jurisdiction.

1.4.2. Shop Drawings: For anchorage and bracing not defined by details and charts on Drawings. Indicate materials, and show designs and calculations signed and sealed by a professional engineer.

1.4.2.1. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.

1.4.2.2. Details: Detail fabrication and arrangement. Detail attachment of restraints to both structural and restrained items. Show attachment locations, methods, and spacings, identifying components and listing their strengths. Indicate direction and value of forces transmitted to the structure during seismic events.

1.4.2.3. Preapproval and Evaluation Documentation: By an agency approved by authorities having jurisdiction, showing maximum ratings of restraints and the basis for approval (tests or calculations).

1.4.3. Product Certificates: Signed by manufacturers of seismic restraints certifying that products furnished comply with requirements.

1.4.4. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

1.5 QUALITY ASSURANCE

1.5.1. Comply with seismic restraint requirements in IBC, unless requirements in this Section are more stringent.

1.6 PROJECT CONDITIONS

1.6.1. Project Seismic Zone and Zone Factor – as Defined in structural specifications and drawings for this project.

1.6.2. Occupancy Category as Defined in structural specifications for this project.

1.6.3. Acceleration Factor: Refer to structural specifications for this project.

1.7 COORDINATION

1.7.1. Coordinate layout and installation of seismic bracing with building structural system and architectural features, and with mechanical, fire-protection, electrical, and other building features in the vicinity.

1.7.2. Coordinate concrete bases with building structural system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Amber/Booth Company, Inc.

2.1.1.2. B-Line Systems, Inc.

2.1.1.3. Erico, Inc.

2.1.1.4. GS Metals Corp.

2.1.1.5. Loos & Company, Inc.

2.1.1.6. Mason Industries, Inc,

2.1.1.7. Powerstrut.

2.1.1.8. Thomas & Betts Corp.

2.1.1.9. Unistrut Corporation.

2.2 MATERIALS

2.2.1. Use the following materials for restraints:

2.2.1.1. Indoor Dry Locations: Steel, zinc plated.

2.2.1.2. Outdoors and Damp Locations: Galvanized steel.

2.2.1.3. Corrosive Locations: Stainless steel.

2.3 ANCHORAGE AND STRUCTURAL ATTACHMENT COMPONENTS

2.3.1. Strength: Defined in reports by ICBO Evaluation Service or another agency acceptable to authorities having jurisdiction.

2.3.1.1. Structural Safety Factor: Strength in tension and shear of components used shall be at least two times the maximum seismic forces to which they will be subjected.

2.3.2. Concrete and Masonry Anchor Bolts and Studs: Steel-expansion wedge type.

2.3.3. Concrete Inserts: Steel-channel type.

2.3.4. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.

2.3.5. Welding Lugs: Comply with MSS SP-69, Type 57.

2.3.6. Beam Clamps for Steel Beams and Joists: Double sided. Single-sided type is not acceptable.

2.3.7. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings, and matched to the type and size of anchor bolts and studs used.

2.3.8. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to the type and size of attachment devices used.

2.4 SEISMIC BRACING COMPONENTS

2.4.1. Slotted Steel Channel: 1-5/8-by-1-5/8-inch cross section, formed from 0.1046-inchthick steel, with 9/16-by-7/8-inch slots at a maximum of 2 inches o.c. in webs, and flange edges turned toward web.

2.4.1.1. Materials for Channel: ASTM A 570, GR 33.

2.4.1.2. Materials for Fittings and Accessories: ASTM A 575, ASTM A 576, or ASTM A 36.

2.4.1.3. Fittings and Accessories: Products of the same manufacturer as channels and designed for use with that product.

2.4.1.4. Finish: Baked, rust-inhibiting, acrylic-enamel paint applied after cleaning and phosphate treatment, unless otherwise indicated.

2.4.2. Channel-Type Bracing Assemblies: Slotted steel channel, with adjustable hinged steel brackets and bolts.

2.4.3. Cable-Type Bracing Assemblies: Zinc-coated, high-strength steel wire rope cable attached to steel thimbles, brackets, and bolts designed for cable service.

2.4.3.1. Arrange units for attachment to the braced component at one end and to the structure at the other end.

2.4.3.2. Wire Rope Cable: Comply with ASTM 603. Use 49- or 133-strand cable with a minimum strength of 2 times the calculated maximum seismic force to be resisted.

2.4.4. Hanger Rod Stiffeners: Slotted steel channels with internally bolted connections to hanger rod.

PART 3 - EXECUTION

3.1 APPLICATION

3.1.1. Generator Sets: Comply with Division 15 Section "Mechanical Vibration Controls and Seismic Restraints."

3.2 INSTALLATION

3.2.1. Install seismic restraints according to applicable codes and regulations and as approved by authorities having jurisdiction, unless more stringent requirements are indicated.

3.3 STRUCTURAL ATTACHMENTS

3.3.1. Use bolted connections with steel brackets, slotted channel, and slotted-channel fittings to spread structural loads and reduce stresses.

3.3.2. Attachments to New Concrete: Bolt to channel-type concrete inserts or use expansion anchors.

3.3.3. Attachments to Existing Concrete: Use expansion anchors.

3.3.4. Holes for Expansion Anchors in Concrete: Drill at locations that avoid reinforcing bars.

3.3.5. Attachments to Solid Concrete Masonry Unit Walls: Use expansion anchors.

3.3.6. Attachments to Hollow Walls: Bolt to slotted steel channels fastened to wall with expansion anchors.

3.3.7. Attachments to Wood Structural Members: Install bolts through members.

3.3.8. Attachments to Steel: Bolt to clamps on flanges of beams or on upper truss chords of bar joists.

3.4 ELECTRICAL EQUIPMENT ANCHORAGE

3.4.1. Anchor rigidly to a single mobile structural element or to a concrete base that is structurally tied to a single mobile structural element.

3.4.2. Anchor panelboards, motor-control centers, motor controls, switchboards, switchgear, transformers, transfer switches, battery racks, static uninterruptible power units, power conditioners, communication system components, and electronic signal processing, control, and distribution units as follows:

3.4.2.1. Size concrete bases so expansion anchors will be a minimum of 10 bolt diameters from the edge of the concrete base.

3.4.2.2. Bushings for Floor-Mounted Equipment Anchors: Install to allow for resilient media between anchor bolt or stud and mounting hole in concrete.

3.4.2.3. Anchor Bolt Bushing Assemblies for Wall-Mounted Equipment: Install to allow for resilient media where equipment or equipment-mounting channels are attached to wall.

3.4.2.4. Torque bolts and nuts on studs to values recommended by equipment manufacturer.

3.5 SEISMIC BRACING INSTALLATION

3.5.1. Expansion and Contraction: Install to allow for thermal movement of braced components.

3.5.2. Cable Braces: Install with maximum cable slack recommended by manufacturer.

3.5.3. Attachment to Structure: If specific attachment is not indicated, anchor bracing to the structure at flanges of beams, upper truss chords of bar joists, or at concrete members.

3.6 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

3.6.1. Make flexible connections in raceways, cables, wireways, cable trays, and busways where they cross expansion and seismic control joints, where adjacent sections or branches are supported by different structural elements, and where they terminate at electrical equipment anchored to a different mobile structural element from the one supporting them.

3.7 FIELD QUALITY CONTROL

3.7.1. Testing Agency: Engage a qualified testing agency to perform the following field quality-control testing:

3.7.2. Testing: Test pull-out resistance of seismic anchorage devices.

3.7.2.1. Provide necessary test equipment required for reliable testing.

3.7.2.2. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.

3.7.2.3. Schedule test with Owner, through Contracting Officer, before connecting anchorage device to restrained component (unless post-connection testing has been approved), and with at least ten days' advance notice.

3.7.2.4. Obtain Contracting Officer's approval before transmitting test loads to the structure. Provide temporary load-spreading members.

3.7.2.5. Test at least four of each type and size of installed anchors and fasteners selected by Contracting Officer.

3.7.2.6. Test to 90 percent of rated proof load of device.

3.7.2.7. If a device fails the test, modify all installations of same type and retest until satisfactory results are achieved.

3.7.2.8. Record test results.

END OF SECTION 16071

CONSTRUCTION ISSUE

SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

1.3 SUBMITTALS

1.3.1. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

1.4.1. Comply with ANSI C2.

1.4.2. Comply with NFPA 70.

1.4.3. Comply with ANSI A13.1 and NFPA 70 for color-coding.

PART 2 - PRODUCTS

2.1 RACEWAY AND CABLE LABELS

2.1.1. Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

2.1.1.1. Color: Black letters on orange field.
2.1.1.2. Legend: Indicates voltage.

2.1.2. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl with legend overlaminated with a clear, weather- and chemical-resistant coating.

2.1.3. Pretensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the line it identifies and arranged to stay in place by pretensioned gripping action when placed in position.

2.1.4. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

2.1.5. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape.

2.1.5.1. Not less than 6 inches wide by 4 mils thick.

2.1.5.2. Compounded for permanent direct-burial service.

2.1.5.3. Embedded continuous metallic strip or core.

2.1.5.4. Printed legend indicating type of underground line.

2.1.6. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

2.1.7. Aluminum, Wraparound Marker Bands: Bands cut from 0.014-inch- thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.

2.1.8. Plasticized Card-Stock Tags: Vinyl cloth with preprinted and field-printed legends. Orange background, unless otherwise indicated, with eyelet for fastener.

2.1.9. Aluminum-Faced, Card-Stock Tags: Weather-resistant, 18-point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch thick, laminated with moisture-resistant acrylic adhesive, punched for fasteners, and preprinted with legends to suit each application.

2.1.10. Brass or Aluminum Tags: 2 by 2 by 0.05-inch metal tags with stamped legend, punched for fastener.

2.2 NAMEPLATES AND SIGNS

2.2.1. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.

2.2.2. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.

2.2.2.1. Engraved legend with black letters on white face.

2.2.2.2. Punched or drilled for mechanical fasteners.

2.2.3. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for the application. 1/4-inch grommets in corners for mounting.

2.2.4. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for the application. 1/4-inch grommets in corners for mounting.

2.2.5. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers.

2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

2.3.1. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.

2.3.1.1. Minimum Width: 3/16 inch.

2.3.1.2. Tensile Strength: 50 lb minimum.

2.3.1.3. Temperature Range: Minus 40 to plus 185 deg F.

2.3.1.4. Color: According to color-coding.

2.3.2. Paint: Formulated for the type of surface and intended use.

2.3.2.1. Primer for Galvanized Metal: Single-component acrylic vehicle formulated for galvanized surfaces.

2.3.2.2. Primer for Concrete Masonry Units: Heavy-duty-resin block filler.

2.3.2.3. Primer for Concrete: Clear, alkali-resistant, binder-type sealer.

2.3.2.4. Enamel: Silicone-alkyd or alkyd urethane as recommended by primer manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

3.1.2. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.

3.1.3. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.

3.1.4. Self-Adhesive Identification Products: Clean surfaces before applying.

3.1.5. Install painted identification according to manufacturer's written instructions and as follows:

3.1.5.1. Clean surfaces of dust, loose material, and oily films before painting.

3.1.5.2. Prime surfaces using type of primer specified for surface.

3.1.5.3. Apply one intermediate and one finish coat of enamel.

3.1.6. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with black letters on orange background. Install on exterior of door or cover.

3.1.7. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches below finished grade. Where width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches overall, use a single line marker. Install line marker for underground wiring, both direct-buried cables and cables in raceway.

3.1.8. Color-Coding of Secondary Phase Conductors: Use the following colors for service, feeder and branch-circuit phase conductors:

3.1.8.1. 208/120-V Conductors:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.

3.1.8.2. 480/277-V Conductors:

a. Phase A: Yellow.
b. Phase B: Brown.
c. Phase C: Orange.

3.1.8.3. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG:

a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1-inch- wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.

b. Colored cable ties applied in groups of three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.

3.1.9. Power-Circuit Identification: Metal tags or aluminum, wraparound marker bands for cables, feeders, and power circuits in vaults, pull and junction boxes, manholes, and switchboard rooms.

3.1.9.1. Legend: 1/4-inch- steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.

3.1.9.2. Tag Fasteners: Nylon cable ties.

3.1.9.3. Band Fasteners: Integral ears.

3.1.10. Apply identification to conductors as follows:

3.1.10.1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.

3.1.10.2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.

3.1.10.3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.

3.1.11. Apply warning, caution, and instruction signs as follows:

3.1.11.1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated

instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

3.1.11.2. Emergency Operation: Install engraved laminated signs with white legend on red background with minimum 3/8-inch- high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.1.12. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with 1/2-inch- high lettering on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high. Use black lettering on white field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:

3.1.12.1. Panelboards, electrical cabinets, and enclosures.
3.1.12.2. Access doors and panels for concealed electrical items.
3.1.12.3. Electrical switchgear and switchboards.
3.1.12.4. Emergency system boxes and enclosures.
3.1.12.5. Disconnect switches.
3.1.12.6. Enclosed circuit breakers.
3.1.12.7. Motor starters.
3.1.12.8. Push-button stations.
3.1.12.9. Power transfer equipment.
3.1.12.10. Contactors.
3.1.12.11. Remote-controlled switches.
3.1.12.12. Dimmers.
3.1.12.13. Control devices.
3.1.12.14. Transformers.
3.1.12.15. Power-generating units.
3.1.12.16. Telephone switching equipment.
3.1.12.17. TV/audio-monitoring master station.
3.1.12.18. Fire alarm master station or control panel.
3.1.12.19. Security-monitoring master station or control panel.

END OF SECTION 16075

CONSTRUCTION ISSUE

SECTION 16080

ELECTRICAL TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes general requirements for electrical field testing and inspecting. Detailed requirements are specified in each Section containing components that require testing. General requirements include the following:

1.2.1.1. Qualifications of testing agencies and their personnel.
1.2.1.2. Suitability of test equipment.
1.2.1.3. Calibration of test instruments.
1.2.1.4. Coordination requirements for testing and inspecting.
1.2.1.5. Reporting requirements for testing and inspecting.

1.3 QUALITY ASSURANCE

1.3.1. Testing Agency Qualifications: As specified in each Section containing electrical testing requirements and in subparagraph and associated subparagraph below.

1.3.2. Test Equipment Suitability: Comply with NETA ATS, Section 5.2.

1.3.3. Test Equipment Calibration: Comply with NETA ATS, Section 5.3.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 GENERAL TESTS AND INSPECTIONS

3.1.1. If a group of tests are specified to be performed by an independent testing agency, prepare systems, equipment, and components for tests and inspections, and perform preliminary tests to ensure that systems, equipment, and components are ready for independent agency testing. Include the following minimum preparations as appropriate:

3.1.1.1. Perform insulation-resistance tests.

3.1.1.2. Perform continuity tests.

3.1.1.3. Perform rotation test (for motors to be tested).

3.1.1.4. Provide a stable source of single-phase, 208/120-V electrical power for test instrumentation at each test location.

3.1.2. Test and Inspection Reports: In addition to requirements specified elsewhere, report the following:

3.1.2.1. Manufacturer's written testing and inspecting instructions.

3.1.2.2. Calibration and adjustment settings of adjustable and interchangeable devices involved in tests.

3.1.2.3. Tabulation of expected measurement results made before measurements.

3.1.2.4. Tabulation of "as-found" and "as-left" measurement and observation results.

END OF SECTION 16080

CONSTRUCTION ISSUE

SECTION 16120

CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2.2. Related Sections include the following:

1.2.2.1. Division 16 Section "Voice and Data Communication Cabling" for transmission media used for control and signal circuits.

1.2.2.2. Division 16 Section "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.

1.3 SUBMITTALS

1.3.1. Product Data: For each type of product indicated.

1.3.2. Field Quality-Control Test Reports: From Contractor.

1.4 QUALITY ASSURANCE

1.4.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.2. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

2.1.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 CONDUCTORS AND CABLES

2.2.1. Available Manufacturers:

2.2.1.1. American Insulated Wire Corp.; a Leviton Company.

2.2.1.2. General Cable Corporation.

2.2.1.3. Senator Wire & Cable Company.

2.2.1.4. Southwire Company.

2.2.2. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

2.2.3. Conductor Material: Copper complying with NEMA WC 70; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

2.2.4. Conductor Insulation Types: Type THW, THHN-THWN, and SO complying with NEMA WC 70.

2.2.5. Multiconductor Cable: Power and Control Tray Cable, Type TC; Metal-clad cable, Type MC**;** and Type SO with ground wire.

2.3 CONNECTORS AND SPLICES

2.3.1. Available Manufacturers:

2.3.1.1. AFC Cable Systems, Inc.

2.3.1.2. AMP Incorporated/Tyco International.

2.3.1.3. Hubbell/Anderson.

2.3.1.4. O-Z/Gedney; EGS Electrical Group LLC.

2.3.1.5. 3M Company; Electrical Products Division.

2.3.2. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

3.1.1. Service Entrance: Type THHN-THWN, single conductors in raceway.

3.1.2. Exposed Feeders: Type THHN-THWN, single conductors in raceway

3.1.3. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

3.1.4. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type THHN-THWN, single conductors in raceway.

3.1.5. Exposed Branch Circuits: In Crawlspaces and Casework - Type THHN-THWN, single conductors in raceway. In shelving - Metal-clad multi-conductor cable, Type MC. In cable trays, power poles and raceways - Power and Control Tray Cable, Type TC, or Metal-clad multi-conductor cable, Type MC.

3.1.6. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

3.1.7. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

3.1.8. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.

3.1.9. Fire Alarm Circuits: Type THHN-THWN, in raceway; Power-limited, fire-protective, signaling circuit cable, in raceway. .

3.1.10. Class 1 Control Circuits: Type THHN-THWN, in raceway.

3.1.11. Class 2 Control Circuits: Type THHN-THWN, in raceway; Power-limited cable, concealed in building finishes; Power-limited tray cable, in cable tray.

3.1.12. Unless otherwise noted, conductor sizes given on the drawings are for Type THWN (75°C) copper conductors, not more than 3 conductors in a raceway, in ambient temperature not exceeding 30°C. If other insulation types or conditions are proposed, conductor size shall be adjusted in accordance with requirements of the N.E.C. at no increase of cost to the Government; however size shall not be decreased without written approval of the Contracting Officer on advice of the engineer.

3.2 INSTALLATION

3.2.1. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

3.2.2. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

3.2.3. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

3.2.4. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

3.2.5. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."

3.2.6. Seal around cables penetrating fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."

3.2.7. Identify and color-code conductors and cables according to Division 16 Section “Electrical Identification."

3.3 CONNECTIONS

3.3.1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3.2. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

3.3.3. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.4 FIELD QUALITY CONTROL

3.4.1. Testing: Perform the following field quality-control testing:

3.4.1.1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.

3.4.1.2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

3.4.2. Test Reports: Prepare a written report to record the following:

3.4.2.1. Test procedures used.

3.4.2.2. Test results that comply with requirements.

3.4.2.3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 16120

CONSTRUCTION ISSUE

SECTION 16124

MEDIUM-VOLTAGE CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes cables and related splices, terminations, and accessories for medium-voltage electrical distribution systems.

1.3 SUBMITTALS

1.3.1. Product Data: For each type of cable indicated. Include splices and terminations for cables and cable accessories.

1.3.2. Qualification Data: For testing agency, and for cable splicing technician.

1.3.3. Source quality-control test reports.

1.3.4. Field quality-control test reports.

1.1 QUALITY ASSURANCE

1.1.1. Installer: Engage a cable splicer, trained and certified by splice material manufacturer, with not less than three years experience, to install, splice, and terminate medium-voltage cable.

1.1.2. Source Limitations: Obtain cables and accessories through one source from a single manufacturer.

1.1.3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.1.4. Comply with IEEE C2 and NFPA 70.

1.2 PROJECT CONDITIONS

1.2.1. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1.2.1.1. Notify Contracting Officer at least seven days in advance of proposed utility interruptions.

1.2.1.2. Do not proceed with utility interruptions without Contracting Officer's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Cables:

a. American Insulated Wire Corp.; a Leviton Company.

b. BICC Brand-Rex Company.

c. General Cable Corporation.

d. Kerite Co. (The); Hubbell Incorporated.

e. Okonite Company (The).

f. Pirelli Cables & Systems NA.

g. Rome Cable Corporation.

h. Southwire Company.

2.1.1.2. Cable Splicing and Terminating Products and Accessories:

a. Engineered Products Co.

b. G&W Electric Co.

c. MPHusky.

d. Raychem Corp.; Telephone Energy and Industrial Division.

e. RTE Components; Cooper Power Systems, Inc.

f. Scott Fetzer Co. (The); Adalet, Inc.

g. Thomas & Betts Corporation.

h. Thomas & Betts/Elastimold.

i. 3M Company; Electrical Products Division.

2.2 CABLES

2.2.1. Cable Type: MV-105.

2.2.2. Conductor: Copper.

2.2.3. Conductor Stranding: Compact round, concentric lay, Class B

2.2.4. Conductor Insulation: Ethylene-propylene rubber (EPR) complying with NEMA WC 74.

2.2.4.1. Voltage Rating: 15 kV.

2.2.4.2. Insulation Thickness: 133 percent insulation level.

2.2.5. Shielding: Copper tape, helically applied over semiconducting insulation shield.

2.2.6. Cable Jacket: Sunlight-resistant PVC.

2.3 SPLICE KITS

2.3.1. Connectors and Splice Kits: Comply with IEEE 404; type as recommended by cable or splicing kit manufacturer for the application.

2.3.2. Splicing Products: As recommended, in writing, by splicing kit manufacturer for specific sizes, ratings, and configurations of cable conductors. Include all components required for complete splice, with detailed instructions.

2.3.2.1. Premolded, cold-shrink-rubber, in-line splicing kit.

2.3.2.2. Premolded EPDM splicing body kit with cable joint sealed by interference fit of mating parts and cable.

2.4 SOLID TERMINATIONS

2.4.1.1. Cold-shrink sheath seal kit with preformed sleeve openings sized for cable and insulated conductors.

2.4.2. Shielded-Cable Terminations: Comply with the following classes of IEEE 48. Insulation class is equivalent to that of cable. Include shield ground strap for shielded cable terminations.

2.4.2.1. Class 1 Terminations: Modular type, furnished as a kit, with stress-relief tube; multiple, molded-silicone rubber, insulator modules; shield ground strap; and compression-type connector.

2.4.3. Nonshielded-Cable Terminations: Kit with compression-type connector. Include silicone-rubber tape, cold-shrink-rubber sleeve, or heat-shrink plastic-sleeve moisture seal for end of insulation whether or not supplied with kits.

2.5 SEPARABLE INSULATED CONNECTORS

2.5.1. Description: Modular system, complying with IEEE 386, with disconnecting, single-pole, cable terminators and with matching, stationary, plug-in, dead-front terminals designed for cable voltage and for sealing against moisture.

2.5.2. Load-Break Cable Terminators: Elbow-type units with 200-A load make/break and continuous-current rating; coordinated with insulation diameter, conductor size, and material of cable being terminated. Include test point on terminator body that is capacitance coupled.

2.5.2.1. Protective Cap: Insulating, electrostatic-shielding, water-sealing cap with drain wire.

2.5.2.2. Portable Feed-Through Accessory: Two-terminal, dead-front junction arranged for removable mounting on accessory stand of stationary terminal junction.

2.5.2.3. Grounding Kit: Jumpered elbows, portable feed-through accessory units, protective caps, test rods suitable for concurrently grounding three phases of feeders, and carrying case.

2.5.2.4. Standoff Insulator: Portable, single dead-front terminal for removable mounting on accessory stand of stationary terminal junction. Insulators suitable for fully insulated isolation of energized cable-elbow terminator.

2.5.3. Tool Set: Shotgun hot stick with energized terminal indicator, fault-indicator test tool, and carrying case.

2.6 SOURCE QUALITY CONTROL

2.6.1. Test and inspect cables according to NEMA WC 74 before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Install cables according to IEEE 576.

3.1.2. Pull Conductors: Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

3.1.2.1. Where necessary, use manufacturer-approved pulling compound or lubricant that will not deteriorate conductor or insulation.

3.1.2.2. Use pulling means, including fish tape, cable, rope, and basket-weave cable grips that will not damage cables and raceways. Do not use rope hitches for pulling attachment to cable.

3.1.3. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

3.1.4. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."

3.1.5. In manholes, handholes, pull boxes, junction boxes, and cable vaults, train cables around walls by the longest route from entry to exit and support cables at intervals adequate to prevent sag.

3.1.6. Install terminations at ends of conductors and seal multiconductor cable ends with standard kits.

3.1.7. Install separable insulated-connector components as follows:

3.1.7.1. Protective Cap: At each terminal junction, with one on each terminal to which no feeder is indicated to be connected.

3.1.7.2. Portable Feed-Through Accessory: Three.

3.1.7.3. Standoff Insulator: Three.

3.1.8. Seal around cables passing through fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."

3.1.9. Install fault indicators on each phase where indicated.

3.1.10. Ground shields of shielded cable at terminations, splices, and separable insulated connectors. Ground metal bodies of terminators, splices, cable and separable insulated-connector fittings, and hardware.

3.1.11. Identify cables according to Division 16 Section "Electrical Identification."

3.2 FIELD QUALITY CONTROL

3.2.1. Testing: Perform the following field quality-control testing:

3.2.1.1. After installing medium-voltage cables and before electrical circuitry has been energized, test for compliance with requirements.

3.2.1.2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.2. Certify compliance with test parameters.

3.2.2. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 16124

CONSTRUCTION ISSUE

SECTION 16130

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2.2. Related Sections include the following:

1.2.2.1. Division 16 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.

1.2.2.2. Division 16 Section "Seismic Controls for Electrical Work" for seismic restraints and bracing of raceways, boxes, enclosures, and cabinets.

1.2.2.3. Division 16 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.3 DEFINITIONS

1.3.1. EMT: Electrical metallic tubing.

1.3.2. FMC: Flexible metal conduit.

1.3.3. RMC: Rigid metal conduit

1.3.4. IMC: Intermediate metal conduit.

1.3.5. LFMC: Liquidtight flexible metal conduit.

1.3.6. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

1.4.1. Product Data: For raceways, wireways and fittings, outlet boxes, floor boxes, hinged-cover enclosures, and cabinets.

1.5 QUALITY ASSURANCE

1.5.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.2. Comply with NFPA 70.

1.6 COORDINATION

1.6.1. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, loudspeakers, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

2.1.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 METAL CONDUIT AND TUBING

2.2.1. Available Manufacturers:

2.2.1.1. AFC Cable Systems, Inc.

2.2.1.2. Alflex Inc.

2.2.1.3. Anamet Electrical, Inc.; Anaconda Metal Hose.

2.2.1.4. Electri-Flex Co.

2.2.1.5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.

2.2.1.6. LTV Steel Tubular Products Company.

2.2.1.7. Manhattan/CDT/Cole-Flex.

2.2.1.8. O-Z Gedney; Unit of General Signal.

2.2.1.9. Wheatland Tube Co.

2.2.2. Rigid Steel Conduit: ANSI C80.1.

2.2.3. IMC: ANSI C80.6.

2.2.4. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.

2.2.5. Plastic-Coated IMC and Fittings: NEMA RN 1.

2.2.6. EMT and Fittings: ANSI C80.3.

2.2.6.1. Fittings: Set-screw or compression type.

2.2.7. FMC: Zinc-coated steel.

2.2.8. LFMC: Flexible steel conduit with PVC jacket.

2.2.9. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

2.3.1. Available Manufacturers:

2.3.1.1. American International.

2.3.1.2. Anamet Electrical, Inc.; Anaconda Metal Hose.

2.3.1.3. Arnco Corp.

2.3.1.4. Cantex Inc.

2.3.1.5. Certainteed Corp.; Pipe & Plastics Group.

2.3.1.6. Condux International.

2.3.1.7. ElecSYS, Inc.

2.3.1.8. Electri-Flex Co.

2.3.1.9. Lamson & Sessions; Carlon Electrical Products.

2.3.1.10. Manhattan/CDT/Cole-Flex.

2.3.1.11. RACO; Division of Hubbell, Inc.

2.3.1.12. Spiralduct, Inc./AFC Cable Systems, Inc.

2.3.1.13. Thomas & Betts Corporation.

2.3.2. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

2.3.3. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.3.4. LFNC: UL 1660.

2.4 METAL WIREWAYS

2.4.1. Available Manufacturers:

2.4.1.1. Hoffman.

2.4.1.2. Square D.

2.4.2. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 1 or 3R as appropriate for location.

2.4.3. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4.4. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

2.4.5. Wireway Covers: Hinged type unless otherwise indicated.

2.4.6. Finish: Manufacturer's standard enamel finish.

2.5 NONMETALLIC WIREWAYS

2.5.1. Available Manufacturers:

2.5.1.1. Hoffman.

2.5.1.2. Lamson & Sessions; Carlon Electrical Products.

2.5.2. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.

2.5.3. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5.4. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

2.6 SURFACE RACEWAYS

2.6.1. Surface Metal Raceways: Galvanized steel with snap-on covers. Furnish with manufacturer's standard prime coating. Paint to match surrounding wall finish.

2.6.1.1. Available Manufacturers:

a. Airey-Thompson Sentinel Lighting; Wiremold Company (The).

b. Thomas & Betts Corporation.

c. Walker Systems, Inc.; Wiremold Company (The).

d. Wiremold Company (The); Electrical Sales Division.

2.6.2. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.7 BOXES, ENCLOSURES, AND CABINETS

2.7.1. Available Manufacturers:

2.7.1.1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.

2.7.1.2. Emerson/General Signal; Appleton Electric Company.

2.7.1.3. Erickson Electrical Equipment Co.

2.7.1.4. Hoffman.

2.7.1.5. Hubbell, Inc.; Killark Electric Manufacturing Co.

2.7.1.6. O-Z/Gedney; Unit of General Signal.

2.7.1.7. RACO; Division of Hubbell, Inc.

2.7.1.8. Robroy Industries, Inc.; Enclosure Division.

2.7.1.9. Scott Fetzer Co.; Adalet-PLM Division.

2.7.1.10. Spring City Electrical Manufacturing Co.

2.7.1.11. Thomas & Betts Corporation.

2.7.1.12. Walker Systems, Inc.; Wiremold Company (The).

2.7.1.13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

2.7.2. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

2.7.3. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

2.7.4. Floor Boxes: Cast metal, fully adjustable, rectangular.

2.7.5. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

2.7.6. Cast-Metal Pull and Junction Boxes: NEMA FB 1, galvanized cast iron or cast aluminum with gasketed cover.

2.7.7. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

2.7.7.1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

2.7.8. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.8 FACTORY FINISHES

2.8.1. Finish: For raceway, enclosure, or cabinet components exposed in finished spaces, provide manufacturer's standard prime-coat finish ready for field painting.

2.8.2. Finish: For raceway, enclosure, or cabinet components in other than finished spaces, provide manufacturer's standard gray paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

3.1.1. Outdoors:

3.1.1.1. Exposed: Rigid steel.

3.1.1.2. Concealed: Rigid steel or IMC.

3.1.1.3. Underground, Single Run: RNC.

3.1.1.4. Underground, Grouped: RNC.

3.1.1.5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

3.1.1.6. Boxes and Enclosures: NEMA 250, Type 3R or 4 as appropriate for the location.

3.1.2. Indoors:

3.1.2.1. Exposed: EMT; RMC where likely to be physically damaged; RNC only in refrigerated cooler boxes, above 48” AFF.

3.1.2.2. Concealed: EMT or RMC.

3.1.2.3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.

3.1.2.4. Damp or Wet Locations: Rigid steel conduit, except in refrigerated cooler boxes.

3.1.2.5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:

a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel in food prep or display areas.

3.1.3. Minimum Raceway Size: 1/2-inch trade size except as otherwise specified in other Division 16 Sections.

3.1.4. Raceway Fittings: Compatible with raceways and suitable for use and location.

3.1.4.1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.1.4.2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

3.2 INSTALLATION

3.2.1. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

3.2.2. Complete raceway installation before starting conductor installation. Plan raceways so that no more than 9 current-carrying conductors (including neutrals) will be enclosed in any single conduit more than 24 inches in length.

3.2.3. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."

3.2.4. Provide pull boxes as required to facilitate pulling in conductors.

3.2.5. Install temporary closures to prevent foreign matter from entering raceways.

3.2.6. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.

3.2.7. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

3.2.8. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

3.2.8.1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

3.2.8.2. Do not conceal in walls of refrigerated spaces.

3.2.9. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.

3.2.9.1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.

3.2.9.2. Space raceways laterally to prevent voids in concrete.

3.2.9.3. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.

3.2.9.4. Change from nonmetallic tubing to rigid steel conduit, or IMC before rising above the floor. Use RMC or IMC elbow to turn up at riser.

3.2.10. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

3.2.10.1. Run parallel or banked raceways together on common supports.

3.2.10.2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways. Take care that all conduits of a parallel circuit are of equal length from source to load.

3.2.10.3. Exposed conduit shall be 8 feet off unless total distance between end points is less than 10 feet.

3.2.11. Join raceways with fittings designed and approved for that purpose and make joints tight.

3.2.11.1. Use insulating bushings to protect conductors.

3.2.12. Tighten set screws of threadless fittings with suitable tools.

3.2.13. Terminations:

3.2.13.1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.

3.2.13.2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

3.2.14. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

3.2.15. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

3.2.16. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

3.2.16.1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

3.2.16.2. Where otherwise required by NFPA 70.

3.2.17. Stub-up Connections: Where specifically shown on drawings, extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

3.2.18. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

3.2.19. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

3.2.20. Set floor boxes level and flush with finished floor surface.

3.2.21. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.3 PAINTING

3.3.1. Exposed conduits and boxes in the Sales Area shall be painted to match the surrounding surfaces. Coordinate colors and painting with other related trades.

3.4 PROTECTION

3.4.1. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

3.4.1.1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

3.4.1.2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.5 CLEANING

3.5.1. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 16130

CONSTRUCTION ISSUE

SECTION 16138

UNDERFLOOR RACEWAYS

PART 1. GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.1.2. This section only applies to the Annapolis Navy Exchange Building.

1.2 SUMMARY

1.2.1. This Section includes underfloor raceways, junction boxes, and fittings.

1.2.2. Related Sections include the following:

1.2.2.1. Division 16 Section "Wiring Devices" for receptacles installed in service fittings.

1.3 SUBMITTALS

1.3.1. Product Data: For underfloor raceway components, fittings, and accessories indicated.

1.3.2. Shop Drawings: Include details, sections, plans, and Assembly Drawings of underfloor raceways.

1.3.3. Coordination Drawings: Include floor plans and sections drawn to scale. Identify components and accessories such as expansion-joint assemblies, straight raceway lengths, inserts, outlets, and fittings. Show underfloor raceway layout, connections between raceway elements, and relationships between components and adjacent structural elements.

1.3.4. Samples: Service fittings and flush outlet covers with required finish, for approval.

1.3.5. Record Documents: Provide with the As-Built markups drawings to show dimensioned locations of underfloor raceways, junction boxes, and preset and after-set inserts. Include locations, types, and circuiting of service-outlet fittings.

1.3.6. Maintenance Data: For underfloor raceways to include in maintenance manuals.

1.3.6.1. Include detailed manufacturer's written instructions on locating preset inserts and on installing after-set inserts.

1.4 QUALITY ASSURANCE

1.4.1. Source Limitations: Obtain underfloor raceway components through one source from a single manufacturer.

1.4.2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.3. Comply with NFPA 70.

1.5 COORDINATION

1.5.1. Coordinate layout and installation of underfloor raceway products with structural work, including slab reinforcement, and with floor finish work.

1.5.1.1. Coordinate height of preset inserts, junction boxes, access units, and raceways with depth of concrete slab and floor fill.

1.5.1.2. Coordinate thickening of slabs where required for adequate encasement of raceway components.

1.5.1.3. Coordinate exposed components with floor-covering materials to ensure that fittings and trim are suitable for floor-covering material furnished.

1.5.1.4. Revise locations from those indicated, as required to suit field conditions and ensure functioning layout and as approved by Contracting Officer.

PART 2. PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. CENTRIA/Q-Floor.

2.1.1.2. Square D.

2.1.1.3. Thomas & Betts Corporation.

2.1.1.4. Walker Systems, Inc.; Wiremold Company (The).

2.2 CELLULAR UNDERFLOOR RACEWAYS

2.2.1. Material and Fabrication: Steel, 1-1/4 inches deep; fabricate with rounded corners continuously and rigidly welded.

2.2.1.1. Standard Width: Nominal 3 inches, with a minimum cross-section area of 3 sq. in.

2.2.1.2. Extra Width: Nominal 6-1/2 inches, with a minimum cross-section area of 8-1/2 sq. in.

2.2.2. Inserts: Metal preset insert assemblies to provide for isolated access to each cell. Equip each insert with a disposable cover plate arranged for installation with top just below surface of concrete fill.

2.2.3. Junction Boxes: Designed to prevent ingress of concrete into raceways, with brackets, escutcheons, and holders to accommodate floor covering. Include leveling and height adjustment greater than 3/8 inch before and after concrete is placed.

2.2.3.1. Match raceway openings for underfloor raceways and conduits to accommodate raceway layout.

2.2.3.2. Fabricate covers with appropriate depth recess to receive specific floor finish material used.

2.2.3.3. Fabricate partitions to separate wiring of different services.

2.2.4. Supports: Adjustable for height and arranged to maintain alignment and spacing of raceways during concrete placement. Include hold-down straps.

2.2.5. Raceway Fittings: Couplings, expansion-joint sleeves, cross-under offsets, vertical and horizontal elbows, grounding screws, adapters, end caps, and other fittings suitable for use with basic components to form a complete installation.

2.3 SERVICE FITTINGS

2.3.1. After-Set Inserts: Assemblies arranged to tap embedded raceways and floor cells through uniform holes aligned with the cells and core-drilled in the slab or floor fill. Equip after-set inserts with the following features:

2.3.1.1. Surface-mounted service fitting, type as indicated.

2.3.2. Floor-Mounted Service Fittings:

2.3.2.1. As indicated on drawings.

PART 3. EXECUTION

3.1 EXAMINATION

3.1.1. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.1.2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. Install raceways aligned and leveled and, unless otherwise indicated, parallel or perpendicular to building walls.

3.2.2. Arrange supports to attain proper elevation, alignment, and spacing of raceways. Install supports securely at ends and at intervals not to exceed 60 inches, to prevent movement during concrete pour.

3.2.3. Seal raceways, cells, and inserts to prevent water, concrete, or foreign matter from entering raceways before and during pouring slab or placing fill. Provide tape or sealing compound at joints as recommended by underfloor raceway manufacturer.

3.2.4. Remove burrs, sharp edges, dents, and mechanical defects.

3.2.5. Cap or plug boxes, openings, and open raceway ends.

3.2.6. Junction Boxes: Install tops level and flush with finished floor. Install blank closure plates or plugs to close unused junction-box openings. Install boxes in place with grout to prevent movement during construction. Place top covers in inverted position to prevent damage to surface of cover.

3.2.7. Install devices and service fittings at points of use indicated.

3.2.8. Install markers at each cell to identify service. Install markers flush at screed line before pouring slab or placing fill. Extend marker with grommeted screw when floor covering is placed. Do not extend through carpet. Install markers at inserts adjacent to junction boxes, on both sides of permanent walls, and at end of each duct run. Use slotted-head screw to identify electrical power and Phillips-head screw to identify telephone and data.

3.3 CONNECTIONS

3.3.1. Ground underfloor raceways and components.

3.3.2. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 ADJUSTING

3.4.1. Level raceway components with finished slab and make adjustments for floor finishes.

END OF SECTION 16138

CONSTRUCTION ISSUE

SECTION 16139

CABLE TRAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes steel cable trays and accessories.

1.2.2. Related Sections include the following:

1.2.2.1. Division 16 Section "Basic Electrical Materials and Methods" for cable tray supports not specified in this Section.

1.2.2.2. Division 16 Section "Seismic Controls for Electrical Work" for mounting and anchoring cable trays.

1.3 SUBMITTALS

1.3.1. Product Data: Include data indicating dimensions and finishes for each type of cable tray indicated.

1.3.2. Shop Drawings: For each type of cable tray.

1.3.2.1. Show fabrication and installation details of cable tray, including plans, elevations, and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths, and fittings.

1.3.3. Product Certificates: For each type of cable tray, signed by product manufacturer.

1.3.4. Manufacturer Seismic Qualification Certification: Submit certification that cable trays, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.3.4.1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.3.4.2. Dimensioned Outline Drawings of Cable Tray Units: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.3.4.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.3.5. Field Test Reports: Written reports specified in Part 3.

1.3.6. Operation and Maintenance Data: For cable trays to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

1.4.1. Source Limitations: Obtain cable tray components through one source from a single manufacturer.

1.4.2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.3. Comply with NEMA VE 1, "Metal Cable Tray Systems," if cable tray types specified are defined in the standard.

1.4.4. Comply with NFPA 70.

1.5 COORDINATION

1.5.1. Coordinate layout and installation of cable trays and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, loudspeakers, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. B-Line Systems, Inc.

2.1.1.2. Chalfant Cable Trays.

2.1.1.3. GS Metals Corp.

2.1.1.4. Mono-Systems, Inc.

2.1.1.5. MPHusky.

2.1.1.6. P-W Industries, Inc.

2.1.1.7. Thomas & Betts Corporation.

2.2 MATERIALS AND FINISHES

2.2.1. Cable Trays, Fittings, and Accessories: Steel, solid ventilated bottom with the following finish:

2.2.1.1. Epoxy-resin paint over paint manufacturer's recommended primer and corrosion-inhibiting treatment. Where exposed in public areas, paint to match surrounding finishes.

2.2.2. Protect steel hardware against corrosion by galvanizing according to ASTM B 633

2.2.3. Fabricate cable tray products with rounded edges and smooth surfaces.

2.2.4. Sizes and Configurations: Refer to the Drawings for specific requirements for types, materials, sizes, and configurations.

2.3 CABLE TRAY ACCESSORIES

2.3.1. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

2.3.2. Covers: Solid, ventilated type of same materials and finishes as cable tray. Provide covers on all cable trays.

2.3.3. Barrier Strips: Steel.

2.3.4. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

2.4 WARNING SIGNS

2.4.1. Lettering: 1-1/2-inch high, black letters on yellow background with legend "WARNING! NOT TO BE USED AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL."

2.4.2. Materials and fastening are specified in Division 16 Section "Electrical Identification".

2.5 SOURCE QUALITY CONTROL

2.5.1. Perform design and production tests according to NEMA VE 1.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.1.2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CABLE TRAY INSTALLATION

3.2.1. Remove burrs and sharp edges from cable trays.

3.2.2. Fasten cable tray supports securely to building structure as specified in Division 16 Section "Basic Electrical Materials and Methods," unless otherwise indicated.

3.2.2.1. Locate and install supports according to NEMA VE 1.

3.2.3. Install expansion connectors where cable tray crosses building expansion joint and in cable tray runs that exceed 90 feet. Space connectors and set gaps according to NEMA VE 1.

3.2.4. Make changes in direction and elevation using standard fittings.

3.2.5. Make cable tray connections using standard fittings.

3.2.6. Locate cable tray above piping unless accessibility to cable tray is required or unless otherwise indicated.

3.2.7. Seal penetrations through fire and smoke barriers according to Division 7 Section "Through-Penetration Firestop Systems."

3.2.8. Sleeves for Future Cables: Install capped sleeves for future cables through firestop-sealed cable tray penetrations of fire and smoke barriers.

3.2.9. Workspace: Install cable trays with sufficient space to permit access for installing cables.

3.2.10. Install barriers to separate cables of different systems, such as power, communications, and data processing; or of different insulation levels, such as 600, 5000, and 15,000 V.

3.2.11. Install covers after installation of cable is completed.

3.2.12. After installation of cable trays is completed, install warning signs in visible locations on or near cable trays.

3.3 CONNECTIONS

3.3.1. Ground cable trays according to manufacturer's written instructions.

3.3.2. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

3.4.1. Testing: Perform the following field quality-control testing:

3.4.1.1. After installing cable trays and after electrical circuitry has been energized, test for compliance with requirements.

3.4.1.2. Perform the following electrical test and visual and mechanical inspections:

a. Visually inspect each cable tray joint and each ground connection for mechanical continuity.

b. Measure ground resistance of each system of cable tray from the most remote element to the point where connection is made to service disconnect enclosure grounding terminal. Record resistance in ohms.

3.4.1.3. Report results in writing.

3.5 PROTECTION

3.5.1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure cable tray is without damage or deterioration at time of Substantial Completion.

3.5.1.1. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.

3.5.1.2. Repair damage to PVC or paint finishes with matching touchup coating recommended by cable tray manufacturer.

END OF SECTION 16139

CONSTRUCTION ISSUE

SECTION 16140

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes the following:

1.2.1.1. Single and duplex receptacles, ground-fault circuit interrupters, integral surge suppression units, and isolated-ground receptacles.

1.2.1.2. Single- and double-pole snap switches and dimmer switches.

1.2.1.3. Device wall plates.

1.2.1.4. Pin and sleeve connectors and receptacles.

1.2.1.5. Floor service outlets and service poles.

1.3 DEFINITIONS

1.3.1. EMI: Electromagnetic interference.

1.3.2. GFCI: Ground-fault circuit interrupter.

1.3.3. PVC: Polyvinyl chloride.

1.3.4. RFI: Radio-frequency interference.

1.3.5. TVSS: Transient voltage surge suppressor.

1.3.6. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

1.4.1. Product Data: For each type of product indicated.

1.4.2. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.5 QUALITY ASSURANCE

1.5.1. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.

1.5.2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.3. Comply with NFPA 70.

1.6 COORDINATION

1.6.1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.6.1.1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Wiring Devices:

a. Bryant Electric, Inc./Hubbell Subsidiary.
b. Eagle Electric Manufacturing Co., Inc.
c. Hubbell Incorporated; Wiring Device-Kellems.
d. Leviton Mfg. Company Inc.
e. Pass & Seymour/Legrand; Wiring Devices Div.

2.1.1.2. Telephone/Power Poles:

a. Hubbell Incorporated; Wiring Device-Kellems.
b. Pass & Seymour/Legrand; Wiring Devices Div.
c. Square D/Groupe Schneider NA.
d. Thomas & Betts Corporation.
e. Wiremold Company (The).

2.2 RECEPTACLES

2.2.1. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.

2.2.2. Straight-Blade and Locking Receptacles: Heavy -Duty grade.

2.2.3. GFCI Receptacles: Straight blade, non-feed-through type, Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch- deep outlet box without an adapter.

2.2.4. Isolated-Ground Receptacles: Straight blade, Heavy-Duty grade, duplex receptacle, with equipment grounding contacts connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap.

2.2.4.1. Devices: Listed and labeled as isolated-ground receptacles.

2.2.4.2. Isolation Method: Integral to receptacle construction and not dependent on removable parts.

2.3 PENDANT CORD/CONNECTOR DEVICES

2.3.1. Description: Matching, locking-type plug and receptacle body connector, NEMA WD 6, Configurations to match equipment, Heavy-Duty grade.

2.3.1.1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.

2.3.1.2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.4 SWITCHES

2.4.1. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.

2.4.2. Snap Switches: Heavy-Duty grade, quiet type.

2.4.3. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.

2.4.3.1. Control: Continuously adjustable slider; with single-pole or three-way switching to suit connections.

2.4.3.2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable rotary knob, toggle switch, or slider; single pole with soft tap or other quiet switch; EMI/RFI filter to eliminate interference; and 5-inch wire connecting leads.

2.4.3.3. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.5 WALL PLATES

2.5.1. Single and combination types to match corresponding wiring devices.

2.5.1.1. Plate-Securing Screws: Metal with head color to match plate finish.

2.5.1.2. Material for Finished Spaces: 0.035-inch- thick, satin-finished stainless steel.

2.5.1.3. Material for Unfinished Spaces: Galvanized steel.

2.5.1.4. Material for Wet Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

2.6 SERVICE POLES

2.6.1. Description: Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.

2.6.1.1. Poles: Nominal 2.5-inch- square cross section, with height adequate to extend from floor to at least 6 inches above ceiling (or other height indicated on drawings), and with separate channels for power wiring and voice and data communication cabling.

2.6.1.2. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.

2.6.1.3. Finishes: Manufacturer's standard white painted finish and trim combination.

2.6.1.4. Wiring: Sized for scheduled power and ground conductors; scheduled 4-pair, Category 6 voice and data communication cables; and scheduled low voltage signaling conductors.

2.6.1.5. Power Receptacles: As scheduled on drawings.

2.6.1.6. Voice and Data Communication Outlets: As scheduled on drawings.

2.7 FINISHES

2.7.1. Color:

2.7.1.1. Wiring Devices Connected to Normal Power System: Gray, unless otherwise indicated or required by NFPA 70.

2.7.1.2. Wiring Devices Connected to Emergency Power System: Red.

2.7.1.3. TVSS Devices: Blue.

2.7.1.4. Isolated-Ground Receptacles: Orange; or as specified above, with orange triangle on face.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Install devices and assemblies level, plumb, and square with building lines.

3.1.2. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions.

3.1.3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.

3.1.4. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates. Group adjacent voice or data outlets under single, multigang wall plates.

3.1.5. Remove wall plates and protect devices and assemblies during painting.

3.1.6. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.1.7. Devices installed within gondola shelving are to be wired with Type MC metal-clad cable run in the protected spaces behind back panels and under the base shelf, supported above the floor by the holes in the base shelf supports. Coordinate the final exact locations with store operations personnel through the Contracting Officer's representative. Receptacles mounted in the toe space below the base shelf are to be aligned with the long dimension horizontal. Run wiring homeruns from gondolas up to overhead space or power poles.

3.2 IDENTIFICATION

3.2.1. Comply with Division 16 Section "Electrical Identification."

3.2.1.1. Receptacles: Identify panelboard and circuit number from which served. Use engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 CONNECTIONS

3.3.1. Ground equipment according to Division 16 Section "Grounding and Bonding."

3.3.2. Connect wiring according to Division 16 Section "Conductors and Cables."

3.3.3. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

3.4.1. Perform the following field tests and inspections and prepare test reports:

3.4.1.1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.

3.4.1.2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

3.4.2. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 16140

CONSTRUCTION ISSUE

SECTION 16145

LIGHTING CONTROL DEVICES

PART 1. GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes the following lighting control devices:

1.2.1.1. Time switches.

1.2.1.2. Outdoor and indoor photoelectric switches.

1.2.1.3. Switch-box occupancy sensors.

1.2.1.4. Indoor occupancy sensors.

1.2.1.5. Outdoor motion sensors.

1.2.1.6. Multipole contactors.

1.2.2. Related Sections include the following:

1.2.2.1. Division 16 Section "Wiring Devices" for wall-box dimmers and manual light switches.

1.2.3. LED: Light-emitting diode.

1.2.4. PIR: Passive infrared.

1.3 SUBMITTALS

1.3.1. Product Data: For each type of product indicated.

1.3.2. Shop Drawings: Show installation details for occupancy and light-level sensors.

1.3.2.1. Lighting plan showing location, orientation, and coverage area of each sensor.

1.3.2.2. Interconnection diagrams showing field-installed wiring.

1.3.3. Field quality-control test reports.

1.3.4. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

1.4.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 COORDINATION

1.5.1. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2. PRODUCTS

2.1 MANUFACTURERS

2.1.1. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.1.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

2.2.1. Line-Voltage Surge Protection: An integral part of the devices for 120- and 277-V solid-state equipment. For devices without integral line-voltage surge protection, field-mounting surge protection shall comply with IEEE C62.41 and with UL 1449.

2.3 TIME SWITCHES

2.3.1. Available Manufacturers:

2.3.1.1. Area Lighting Research, Inc.

2.3.1.2. Fisher Pierce.

2.3.1.3. Grasslin Controls Corporation.

2.3.1.4. Intermatic, Inc.

2.3.1.5. Leviton Mfg. Company Inc.

2.3.1.6. Lightolier Controls; a Genlyte Company.

2.3.1.7. Lithonia Lighting.

2.3.1.8. Paragon Electric Co.

2.3.1.9. Square D.

2.3.1.10. TORK.

2.3.1.11. Touchplate Technologies, Inc.

2.3.1.12. Watt Stopper (The).

2.3.2. Electromechanical-Dial Time Switches: Type complying with UL 917.

2.3.2.1. Contact Configuration: SPST.

2.3.2.2. Contact Rating: 20-A ballast load, 277-V ac.

2.3.2.3. Circuitry: Allow connection of a photoelectric relay as substitute for on and off function of a program.

2.3.2.4. Astronomical time dial.

2.3.2.5. Eight-Day Program: Uniquely programmable for each weekday and holidays.

2.3.2.6. Skip-a-day mode.

2.3.2.7. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 4 hours.

2.4 OUTDOOR PHOTOELECTRIC SWITCHES

2.4.1. Available Manufacturers:

2.4.1.1. Area Lighting Research, Inc.

2.4.1.2. Fisher Pierce.

2.4.1.3. Grasslin Controls Corporation.

2.4.1.4. Intermatic, Inc.

2.4.1.5. Lithonia Lighting.

2.4.1.6. Novitas, Inc.

2.4.1.7. Paragon Electric Co.

2.4.1.8. Square D.

2.4.1.9. TORK.

2.4.1.10. Touchplate Technologies, Inc.

2.4.1.11. Watt Stopper (The).

2.4.2. Description: Solid state, with SPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, microprocessor input, and complying with UL 773A.

2.4.2.1. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.

2.4.2.2. Time Delay: 15-second minimum, to prevent false operation.

2.4.2.3. Surge Protection: Metal-oxide varistor type, complying with IEEE C62.41 for Category A1 locations.

2.4.2.4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the North sky exposure.

2.5 INDOOR PHOTOELECTRIC SWITCHES

2.5.1. Available Manufacturers:

2.5.1.1. Allen-Bradley/Rockwell Automation.

2.5.1.2. Area Lighting Research, Inc.

2.5.1.3. Cutler-Hammer; Eaton Corporation.

2.5.1.4. Fisher Pierce.

2.5.1.5. Grasslin Controls Corporation.

2.5.1.6. Intermatic, Inc.

2.5.1.7. Lithonia Lighting.

2.5.1.8. MicroLite Corporation.

2.5.1.9. Novitas, Inc.

2.5.1.10. Paragon Electric Co.

2.5.1.11. Square D.

2.5.1.12. TORK.

2.5.1.13. Touchplate Technologies, Inc.

2.5.1.14. Watt Stopper (The).

2.5.2. Ceiling-Mounting Photoelectric Switch: Solid-state, light-level sensor unit, with separate relay unit mounted on luminaire, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.

2.5.2.1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.

2.5.2.2. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.

2.5.2.3. Light-Level Monitoring Range: 10 to 200 fc, with an adjustment for turn-on and turn-off levels within that range.

2.5.2.4. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.

2.5.2.5. Indicator: Two LEDs to indicate the beginning of on and off cycles.

2.5.3. Skylight Photoelectric Sensors: Solid-state, light-level sensor; housed in a threaded, plastic fitting for mounting under skylight, facing up at skylight; with separate relay unit mounted on luminaire, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.

2.5.3.1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.

2.5.3.2. Relay Unit: Dry contacts rated for 20-A ballast load at 277-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.

2.5.3.3. Light-Level Monitoring Range: 1000 to 10,000 fc, with an adjustment for turn-on and turn-off levels within that range.

2.5.3.4. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.

2.5.3.5. Indicator: Two LEDs to indicate the beginning of on and off cycles.

2.6 SWITCH-BOX OCCUPANCY SENSORS

2.6.1. Available Manufacturers:

2.6.1.1. Bryant Electric; a Hubbell Company.

2.6.1.2. Hubbell Lighting Inc.

2.6.1.3. Leviton Mfg. Company Inc.

2.6.1.4. Lightolier Controls; a Genlyte Company.

2.6.1.5. Lithonia Lighting.

2.6.1.6. MYTECH Corporation.

2.6.1.7. Novitas, Inc.

2.6.1.8. RAB Electric Manufacturing, Inc.

2.6.1.9. Sensor Switch, Inc.

2.6.1.10. TORK.

2.6.1.11. Unenco Electronics; a Hubbell Company.

2.6.1.12. Watt Stopper (The).

2.6.2. Description: PIR type with integral power-switching contacts rated for 800 W at 120-V ac, suitable for incandescent light fixtures, fluorescent light fixtures with magnetic or electronic ballasts, or 1/6-hp motors; and rated for 1000 W at 277-V ac, suitable for incandescent light fixtures, fluorescent light fixtures with magnetic or electronic ballasts, or 1/3-hp motors, minimum.

2.6.2.1. Include ground wire.

2.7 INDOOR OCCUPANCY SENSORS

2.7.1. Available Manufacturers:

2.7.1.1. Hubbell Lighting Inc.

2.7.1.2. Leviton Mfg. Company Inc.

2.7.1.3. Lithonia Lighting.

2.7.1.4. MYTECH Corporation.

2.7.1.5. Novitas, Inc.

2.7.1.6. RAB Electric Manufacturing, Inc.

2.7.1.7. Sensor Switch, Inc.

2.7.1.8. TORK.

2.7.1.9. Unenco Electronics; a Hubbell Company.

2.7.1.10. Watt Stopper (The).

2.7.2. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.

2.7.2.1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

2.7.2.2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.

2.7.2.3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.

2.7.2.4. Mounting:

a. Sensor: Suitable for mounting in any position on a standard outlet box.

b. Relay: Externally mounted though a 1/2-inch knockout in a standard electrical enclosure.

c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

2.7.2.5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.

2.7.2.6. Bypass Switch: Override the on function in case of sensor failure.

2.7.3. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.

2.7.3.1. Detector Sensitivity: Detect occurrences of 6-inch minimum movement of any portion of a human body that presents a target of at least 36 sq. in.

2.7.3.2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.

2.7.3.3. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot- high ceiling.

2.7.4. Ultrasonic Type: Ceiling mounting; detect occupancy by sensing a change in pattern of reflected ultrasonic energy in area of coverage.

2.7.4.1. Detector Sensitivity: Detect a person of average size and weight moving at least 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.

2.7.4.2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. when mounted on a 96-inch-high ceiling.

2.7.4.3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on an 8-foot-high ceiling.

2.7.4.4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. when mounted on a 96-inch-high ceiling.

2.7.4.5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet when mounted on a 10-foot- high ceiling in a corridor not wider than 14 feet.

2.7.5. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on and off functions shall be selectable in the field by operating controls on unit.

2.7.5.1. Sensitivity Adjustment: Separate for each sensing technology.

2.7.5.2. Detector Sensitivity: Detect occurrences of 6-inch minimum movement of any portion of a human body that presents a target of at least 36 sq. in., and detect a person of average size and weight moving at least 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.

2.7.5.3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.

2.8 MULTIPOLE CONTACTORS

2.8.1. Available Manufacturers:

2.8.1.1. Allen-Bradley/Rockwell Automation.

2.8.1.2. ASCO Power Technologies, LP; a division of Emerson Electric Co.

2.8.1.3. Cutler-Hammer; Eaton Corporation.

2.8.1.4. Fisher Pierce.

2.8.1.5. GE Industrial Systems; Total Lighting Control.

2.8.1.6. Grasslin Controls Corporation.

2.8.1.7. Hubbell Lighting Inc.

2.8.1.8. Lithonia Lighting.

2.8.1.9. MicroLite Corporation.

2.8.1.10. TORK.

2.8.1.11. Touchplate Technologies, Inc.

2.8.1.12. Watt Stopper (The).

2.8.2. Description: Electrically operated and electrically held, complying with NEMA ICS 2 and UL 508.

2.8.2.1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).

2.8.2.2. Control-Coil Voltage: Match control power source.

2.9 CONDUCTORS AND CABLES

2.9.1. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG, complying with Division 16 Section "Conductors and Cables."

2.9.2. Class 1 Control Cable: Multiconductor cable with stranded copper conductors not smaller than No. 14 AWG, complying with Division 16 Section "Conductors and Cables."

PART 3. EXECUTION

3.1 SENSOR INSTALLATION

3.1.1. Install and aim sensors in locations to achieve at least 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 WIRING INSTALLATION

3.2.1. Wiring Method: Comply with Division 16 Section "Conductors and Cables." Minimum conduit size shall be 1/2 inch.

3.2.2. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

3.2.3. Install field-mounting transient voltage suppressors for lighting control devices in Category A locations that do not have integral line-voltage surge protection.

3.2.4. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.

3.2.5. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.2.6. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 IDENTIFICATION

3.3.1. Identify components and power and control wiring according to Division 16 Section "Electrical Identification."

3.3.2. Label time switches and contactors with a unique designation.

3.4 FIELD QUALITY CONTROL

3.4.1. Perform the following field tests and inspections and prepare test reports:

3.4.1.1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.

3.4.1.2. Operational Test: Verify actuation of each sensor and adjust time delays.

3.4.2. Remove and replace lighting control devices where test results indicate that they do not comply with specified requirements.

3.4.3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 ADJUSTING

3.5.1. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose.

END OF SECTION 16145

CONSTRUCTION ISSUE

SECTION 16231

PACKAGED ENGINE GENERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes packaged diesel-engine generator sets with the following features and accessories:

1.2.1.1. Battery charger.

1.2.1.2. Engine-generator set.

1.2.1.3. Muffler.

1.2.1.4. Exhaust piping external to set.

1.2.1.5. Outdoor enclosure.

1.2.1.6. Remote annunciator.

1.2.1.7. Remote stop switch.

1.2.1.8. Starting battery.

1.2.2. Related Sections include the following:

1.2.2.1. Division 16 Section "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.

1.3 DEFINITIONS

1.3.1. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.3.2. Steady-State Voltage Modulation: The uniform cyclical variation of voltage within the operational bandwidth, expressed in Hertz or cycles per second.

1.4 SUBMITTALS

1.4.1. Product Data: Include the following:

1.4.1.1. Data on features, components, accessories ratings, and performance.

1.4.1.2. Thermal damage curve for generator.

1.4.1.3. Time-current characteristic curves for generator protective device.

1.4.2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1.4.2.1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.

1.4.2.2. Design Calculations: Signed and sealed by a qualified professional engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

1.4.2.3. Vibration Isolation Base Details: Signed and sealed by a qualified professional engineer. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.

1.4.2.4. Wiring Diagrams: Power, signal, and control wiring.

1.4.3. Welding certificates.

1.4.4. Manufacturer Seismic Qualification Certification: Submit certification that engine-generator set, batteries, battery racks, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.4.4.1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4.4.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.4.4.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.4.5. Qualification Data: For Installer and testing agency.

1.4.6. Certified summary of prototype-unit test report.

1.4.7. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.

1.4.8. Certified Summary of Performance Tests: Demonstrate compliance with specified requirement to meet performance criteria for sensitive loads.

1.4.9. Test Reports:

1.4.9.1. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.

1.4.9.2. Report of sound generation.

1.4.9.3. Report of exhaust emissions showing compliance with applicable regulations.

1.4.9.4. Field quality-control test reports.

1.4.10. Certification of Torsional Vibration Compatibility: Comply with NFPA 110.

1.4.11. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section ‘Phase Turnover and Contract Closeout," include the following:

1.4.11.1. List of tools and replacement items recommended to be stored at the Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

1.4.12. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1.5.1.1. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

1.5.2. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 200 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

1.5.3. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

1.5.4. Product Options: Drawings indicate size, profiles, and dimensional requirements of packaged generator sets and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1.5.5. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX for welding exhaust-system piping.

1.5.6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.7. Comply with NFPA 37.

1.5.8. Comply with NFPA 70.

1.5.9. Comply with NFPA 110 requirements.

1.5.10. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

1.5.11. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.6 COORDINATION

1.6.1. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

1.7 WARRANTY

1.7.1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

1.7.1.1. Warranty Period: Five years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

1.8.1. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Maintenance agreements shall include parts and supplies as used in manufacture and installation of original equipment.

1.9 EXTRA MATERIALS

1.9.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.9.1.1. Fuses: One for every 10 of each type and rating, but not less than one of each.

1.9.1.2. Indicator Lamps: Two for every six of each type used, but not less than two of each.

1.9.1.3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Caterpillar; Engine Div.

2.1.1.2. Generac Power Systems, Inc.

2.1.1.3. Kohler Co; Generator Division.

2.1.1.4. MagneTek, Inc.

2.1.1.5. Onan Corp./Cummins Power Generation; Industrial Business Group.

2.1.1.6. Spectrum Detroit Diesel.

2.2 ENGINE-GENERATOR SET

2.2.1. Packaged engine-generator set shall be a coordinated assembly of compatible components.

2.2.2. Power Output Ratings: Nominal ratings as indicated, with capacity as required to operate as a unit as evidenced by records of prototype testing.

2.2.3. Output Connections: Three phase, four wire.

2.2.4. Safety Standard: Comply with ASME B15.1.

2.2.5. Nameplates: Each major system component shall be equipped with a nameplate to identify manufacturer's name and address, and model and serial number of component.

2.2.6. Fabricate engine-generator-set mounting frame and attachment of components to resist generator-set movement during a seismic event when generator-set mounting frame is anchored to building structure.

2.2.7. Mounting Frame: Adequate strength and rigidity to maintain alignment of mounted components without depending on concrete foundation. Mounting frame shall be free from sharp edges and corners and shall have lifting attachments arranged for lifting with slings without damaging components.

2.2.7.1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

2.3 GENERATOR-SET PERFORMANCE FOR SENSITIVE LOADS

2.3.1. Meet ISO 8528-5 G3 requirements. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.

2.3.1.1. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.

2.3.2. Steady-State Voltage Operational Bandwidth: +/- 2 percent of rated output voltage from no load to full load.

2.3.3. Steady-State Voltage Modulation Frequency: Less than 1 Hz.

2.3.4. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 0.5 second.

2.3.5. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.

2.3.6. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.

2.3.7. Transient Frequency Performance: Less than 5.0% variation for a 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within three seconds.

2.3.8. Output Waveform: Generation System shall operate at 100% nameplate capacity when connected to the system load that does not exceed 10% THVD as measured at generator output leads.

2.3.9. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, the system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.

2.3.10. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.

2.3.11. Maximum Time to Start and Be Ready to Assume Load: Comply with NFPA 110, Type 10, system requirements.

2.4 SERVICE CONDITIONS

2.4.1. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

2.4.1.1. Ambient Temperature: Minus 15 to plus 40 deg C.

2.4.1.2. Relative Humidity: 0 to 95 percent.

2.4.1.3. Altitude: Sea level to 600 feet.

2.5 ENGINE

2.5.1. Fuel: Natural Gas.

2.5.2. Rated Engine Speed: The engine RPM shall be consistent with providing best performance and longest life for the engine.

2.5.3. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm.

2.5.4. Lubrication System: The following items are mounted on engine or skid:

2.5.4.1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.

2.5.4.2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.

2.5.4.3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

2.5.5. Engine Fuel System:

2.5.5.1. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.

2.5.6. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for heater capacity.

2.5.7. Governor: Adjustable isochronous, with speed sensing.

2.6 ENGINE COOLING SYSTEM

2.6.1. Description: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.

2.6.2. Radiator: Rated for specified coolant.

2.6.2.1. Radiator Core Tubes: Nonferrous-metal construction other than aluminum.

2.6.2.2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.

2.6.2.3. Fan: Driven by multiple belts from engine shaft.

2.6.3. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.

2.6.4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

2.6.5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.

2.6.5.1. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.

2.6.5.2. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

2.7 FUEL SUPPLY SYSTEM

2.7.1. Comply with NFPA 54.

2.8 ENGINE EXHAUST SYSTEM

2.8.1. Muffler: Critical type, sized as recommended by engine manufacturer; sound level measured at a distance of 10 feet from exhaust discharge shall be 85 dBA or less.

2.8.2. Muffler: Residential type, sized as recommended by engine manufacturer; sound level measured at a distance of 10 feet from exhaust discharge shall be 95 dBA or less.

2.8.3. Muffler: Industrial type, sized as recommended by engine manufacturer; sound level in the 20- to 75-Hz frequency band measured at a distance of 25 feet from exhaust discharge shall be 87 dBA or less.

2.8.4. Condensate Drain for Muffler: Schedule 40, black steel pipe connected to muffler drain outlet through a petcock.

2.8.5. Connection from Engine to Exhaust System: Flexible section of corrugated stainless-steel pipe.

2.8.6. Connection from Exhaust Pipe to Muffler: Stainless-steel expansion joint with liner.

2.8.7. Exhaust Piping External to Engine: ASTM A 53/A 53M, Schedule 40, welded, black steel, with welded joints and fittings.

2.9 COMBUSTION-AIR INTAKE

2.9.1. Description: Engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

2.10 STARTING SYSTEM

2.10.1. Description: Electric, with negative ground and including the following items:

2.10.1.1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Environmental Conditions" Paragraph in "Service Conditions" Article.

2.10.1.2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.

2.10.1.3. Cranking Cycle: As required by NFPA 110 for system level specified.

2.10.1.4. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.

2.10.1.5. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in "Environmental Conditions" Paragraph in "Service Conditions" Article. Include accessories required to support and fasten batteries in place.

2.10.1.6. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.

2.10.1.7. Battery Charger: Battery charging system shall provide float and equalizing charging for the generation system battery rack. The battery charger shall be sized according to applicable NFPA 110 charging requirements and shall be installed on board the generator. Unit shall comply with UL 1236 and include the following features:

a. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.

b. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

2.11 CONTROL AND MONITORING

2.11.1. Functional Description: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of the generator set. When mode-selector switch is switched to the on position, the generator set starts. The off position of the same switch initiates generator-set shutdown and prohibits starting. When generator set is running, specified system or equipment failures or derangements automatically shut down the generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down the generator set.

2.11.2. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.

2.11.3. Indicating and protective devices and controls shall include those required by NFPA 110 and the following:

2.11.3.1. AC voltmeter.

2.11.3.2. AC ammeter.

2.11.3.3. AC frequency meter.

2.11.3.4. DC voltmeter (alternator battery charging).

2.11.3.5. Engine-coolant temperature gage.

2.11.3.6. Engine lubricating-oil pressure gage.

2.11.3.7. Running-time meter.

2.11.3.8. Ammeter-voltmeter, phase-selector switch(es).

2.11.3.9. Generator-voltage adjusting rheostat.

2.11.3.10. Generator overload.

2.11.4. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

2.11.5. Common Remote Audible Alarm: Comply with NFPA 110 requirements. Include necessary contacts and terminals in control and monitoring panel.

2.11.5.1. Overcrank shutdown.

2.11.5.2. Coolant low-temperature alarm.

2.11.5.3. Control switch not in auto position.

2.11.5.4. Battery-charger malfunction alarm.

2.11.5.5. Battery low-voltage alarm.

2.11.6. Remote Alarm Annunciator: Labeled LED shall identify each alarm event. Common audible signal shall sound for alarm conditions. Silencing switch in face of panel shall silence signal without altering visual indication. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

2.11.7. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.12 GENERATOR OVERCURRENT AND FAULT PROTECTION

2.12.1. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.

2.12.1.1. Trip Rating: Matched to generator rating.

2.12.1.2. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.

2.12.1.3. Mounting: Adjacent to or integrated with control and monitoring panel.

2.13 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

2.13.1. Comply with NEMA MG 1 and specified performance requirements.

2.13.2. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

2.13.3. Electrical Insulation: Class H or Class F.

2.13.4. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

2.13.5. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

2.13.6. Excitation shall use no slip or collector rings, or brushes, and shall be arranged to sustain generator output under short-circuit conditions as specified.

2.13.7. Enclosure: Dripproof.

2.13.8. Instrument Transformers: Mounted within generator enclosure.

2.13.9. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.

2.13.9.1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.

2.13.10. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

2.13.11. Windings: Two-thirds pitch stator winding and fully linked amature winding.

2.13.12. Subtransient Reactance: 12 percent, maximum.

2.14 OUTDOOR GENERATOR-SET ENCLOSURE

2.14.1. Description: Vandal-resistant, weatherproof steel housing, wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

2.15 FINISHES

2.15.1. Indoor and Outdoor Enclosures and Components: Manufacturer's standard enamel over corrosion-resistant pretreatment and compatible standard primer.

2.16 SOURCE QUALITY CONTROL

2.16.1. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

2.16.1.1. Tests: Comply with NFPA 110.

2.16.1.2. Generator Tests: Comply with IEEE 115.

2.16.1.3. Components and Accessories: Items furnished with installed unit that are not identical to those on tested prototype shall have been factory tested to demonstrate compatibility and reliability.

2.16.2. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

2.16.2.1. Full load run.

2.16.2.2. Maximum power.

2.16.2.3. Voltage regulation.

2.16.2.4. Transient and steady-state governing.

2.16.2.5. Single-step load pickup.

2.16.2.6. Safety shutdown.

2.16.3. Report factory test results within 10 days of completion of test.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

3.1.2. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.

3.1.3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CONCRETE BASES

3.2.1. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.

3.2.2. Concrete base is specified in Division 16 Section "Basic Electrical Materials and Methods," and concrete materials and installation requirements are specified in Division 3.

3.3 INSTALLATION

3.3.1. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.

3.3.2. Install packaged engine generators level on concrete base.

3.3.3. Vibration Isolation: Mount packaged engine generators on vibration isolation equipment base as specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

3.3.4. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

3.3.5. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.4 CONNECTIONS

3.4.1. Piping installation requirements are specified in Division 15 Sections. Drawings indicate general arrangement of piping and specialties. The following are specific connection requirements:

3.4.1.1. Install fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.

3.4.1.2. Connect cooling-system water supply and drain piping to diesel-engine heat exchangers. Install flexible connectors at connections to engine generator and remote radiator.

3.4.1.3. Connect fuel piping to engines with a gate valve and union.

a. Natural and LP gas piping and specialties for gas distribution outside the building are specified in Division 2 Section “Natural Gas Distribution”.

b. Natural and LP gas piping valves, and specialties for gas piping inside the building per Division 15.

3.4.2. Ground equipment according to Division 16 Section "Grounding and Bonding."

3.4.3. Connect wiring according to Division 16 Section "Conductors and Cables."

3.4.4. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 IDENTIFICATION

3.5.1. Identify system components according to Division 15 Section "Mechanical Identification" and Division 16 Section "Electrical Identification."

3.6 FIELD QUALITY CONTROL

3.6.1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

3.6.2. Perform the following field tests and inspections and prepare test reports:

3.6.2.1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Sections 7.15.2.1 and 7.22.1 (except for vibration baseline test). Certify compliance with test parameters.

3.6.2.2. Perform tests recommended by manufacturer.

3.6.2.3. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, the following:

a. Single-step full-load pickup test.

3.6.2.4. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.

b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.

c. Verify acceptance of charge for each element of the battery after discharge.

d. Verify that measurements are within manufacturer's specifications.

3.6.2.5. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

3.6.2.6. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.

3.6.2.7. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.

3.6.2.8. Exhaust Emissions Test: Comply with applicable government test criteria.

3.6.2.9. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.

3.6.2.10. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.

3.6.2.11. Noise Level Tests: Measure level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations on the property line, and compare measured levels with required values.

3.6.3. Coordinate tests with tests for transfer switches and run them concurrently.

3.6.4. Test instruments shall have been calibrated within the last 12 months, traceable to standards of the National Institute for Standards and Technology, and adequate for making positive observation of test results. Make calibration records available for examination on request.

3.6.5. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3.6.6. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

3.6.7. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.6.8. Remove and replace malfunctioning units and retest as specified above.

3.6.9. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.6.10. Report results of tests and inspections in writing. Record adjustable relay settings, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.7 STARTUP SERVICE

3.7.1. Engage a factory-authorized service representative to perform startup service.

3.7.2. Inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.

3.7.3. Complete installation and startup checks according to manufacturer's written instructions.

3.8 DEMONSTRATION

3.8.1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

3.8.1.1. Coordinate this training with that for transfer switches.

END OF SECTION 16231

CONSTRUCTION ISSUE

SECTION 16265

THREE-PHASE UNINTERRUPTIBLE POWER SUPPLY SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. This specification is based on the "Nfinity UPS System" manufactured by Liebert Global Services. Subject to compliance with project requirements, products by other manufacturers may be submitted to the Contracting Officer for approval.

1.1.2. This section only applies to the Annapolis Navy Exchange Building.

1.1.3. This Section describes a modular Uninterruptible Power Supply (UPS) system for workstation, server, network, telecom and other sensitive electronic equipment applications. It defines the electrical and mechanical characteristics and requirements for a continuous-duty single-phase, solid-state, uninterruptible power supply system for 12 to 30 KVA (208/120V or 240/120V). The uninterruptible power supply system, hereafter referred to as the UPS, shall provide high-quality AC power.

1.2 STANDARDS

1.2.1. The UPS shall be designed in accordance with the applicable sections of the current revision of the following documents. Where a conflict arises between these documents and statements made herein, the statements in this specification shall govern.

IEEE C62.41, Category A & B
ASME
CSA 22.2, No. 107.1
FCC Part 15, Sub Part B, Class A
National Electrical Code (NFPA 70)
NEMA PE-l
OSHA
UL Standard 1778

1.3 SYSTEM DESCRIPTION

1.3.1. General: The UPS system shall consist of the appropriate number of modules for capacity and/or redundancy. All modules are to be operating simultaneously and sharing the load. In a non-redundant system, all the modules making up the UPS are required to supply the full rated load. If a power or control module should malfunction, the load is to be transferred automatically to the bypass line. If a battery module should malfunction, it is to be isolated from the system resulting in reduced back up time. For redundant operation, the UPS will have one or more modules than what is required to supply the full rated load. The malfunction of one of the modules shall cause that module to be isolated from the system and the remaining module(s) shall continue to carry the load. Replacement of a module shall be capable without disturbance to the connected load.

1.3.2. Modes of Operation: The UPS shall be designed to operate as a true on-line system in the following modes:

1. Normal - The critical AC load is continuously supplied by the UPS inverter. The input converter derives power from a utility AC source and supplies DC power to the inverter. The battery charger shall maintain a float-charge on the battery.

2. Back-up - Upon failure of utility AC power the critical AC load is supplied by the inverter, which obtains power from the battery. There shall be no interruption in power to the critical load upon failure or restoration of the utility AC source.

3. Recharge - Upon restoration of utility AC power, after a utility AC power outage, the input converter shall automatically restart and resume supplying power to the inverter. Also the battery charger shall recharge the battery.

4. Automatic Restart - Upon restoration of utility AC power, after a utility AC power outage and complete battery discharge, the UPS shall automatically restart and resume supplying power to the critical load. Also the battery charger shall automatically recharge the battery. This feature shall be enabled from the factory and shall be capable of being disabled by the user. The user shall also be able to program two auto restart delay settings.

   a. Battery capacity % level.

   b. Countdown timer

5. Bypass - The bypass shall provide an alternate path for power to the critical load that shall be capable of operating in the following manner:

   a. Automatic - In the event of an internal failure or should the inverter overload capacity be exceeded, the UPS shall perform an automatic transfer of the critical AC load from the inverter to the bypass source.

   b. Manual - Should the UPS need to be taken out of service for limited maintenance or repair, manual activation of the bypass shall cause an immediate transfer of the critical AC load from the inverter to the bypass source. The input converter, inverter, and battery charging operations shall continue to operate, provided the control enable switch is in the " On " position.

1.3.3. Performance Requirements

1. System:

   a. Configuration: Select UPS systems shall be configured or upgradeable to power ratings as shown on drawings:

   b. Isolation: Input to output isolation shall be provided, via the output transformer, regardless of operating mode. (UPS or bypass).

   c. Remote Stop: The UPS shall provide provisions for remote stop capability.

2. AC Input to UPS

   a. Voltage Configuration: 208 or 240 VAC nominal, user selectable, single-phase, 2-wire-plusground. The operating voltage range shall be variable based upon output loading percentages as follows:

b. Frequency: 40 to 70 Hz.

c. Input Current Distortion: 5% THD maximum at full load.

d. Input Power Factor: 0.98 lagging at 100% rated load.

e. Inrush Current: 150% of full load input current maximum for 3 cycles.

f. Protection: Sustains input surges without damage per criteria listed in IEEE C62.41, Category B.

3. AC Output

a. A. Voltage Configuration: 208/120 VAC, single-phase, 3-wire-plus-ground. Field configurable to 240/120 VAC.

b. Voltage Regulation: +/- 3% steady state.

c. Frequency Regulation: 60 Hz, +/- 0.5%.

d. Frequency Slew Rate: Programmable, 5.0 Hertz per second maximum.

e. Bypass Frequency Synchronization Range: +/- 5.0 Hertz.

f. Voltage Distortion: 3% total harmonic distortion (THD) maximum into a 100% linear load, 7% THD maximum into a 100% non-linear load with crest factor ratio of 3:1.

g. Load Power Factor Range: 0.5 lagging to 1.

h. Maximum Output Power Rating: Rated kVA at: 0.8 lagging power factor.

i. Overload Capability: >100% - 110% indefinitely, 111% -150% for 10 seconds, 151% - 200% for 0.25 seconds, The load shall be transferred to bypass when any of the above conditions are exceeded. >201% for min. 2 cycles, then shut down of UPS. Immediate shutdown into a short circuit.

j. Voltage Transient Response: +/- 7% maximum for any load step up to and including 100% of the UPS rating.

k. Transient Recovery Time: To within 1% of steady state output voltage within 96 milliseconds.

4. Batteries

a. Internal Battery: The battery shall consist of gas recombination, valve regulated, lead acid cells. Flame retardant batteries shall be provided, which renders the UPS suitable for installation inside a computer room per requirements of UL Standard 1778.

b. Reserve Time: (with ambient temperature between 20 and 25 deg C) The UPS shall contain an internal battery system to provide a reserve time of 6 minutes at 100% load with an equal number of power and battery modules fitted. The UPS shall contain provisions to fit additional battery modules internally if space permits. The UPS shall also interface with an external battery cabinet to extend reserve time capabilities.

c. Battery Recharge: To prolong battery life, the UPS shall contain temperature-compensated battery charging. When equal number of power modules and battery modules are fitted the battery charger shall be able to recharge the internal batteries to 90% charge in six hours at nominal input voltage and nominal ambient temperature.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1. Ambient Temperature

1. Operating UPS 0 deg C to +40 deg C; battery 20 deg C to 25 deg C for optimum performance.

2. Storage: UPS -20 deg C to +60 deg C; battery -20 deg C to 25 deg C for maximum 6 months.

1.4.2. Relative Humidity

1. Operating: 5 to 95% non-condensing.

2. Storage: 5 to 95% non-condensing.

1.4.3. Altitude

1. Operating: To 10,000 feet. Derating or reduced operating temperature range required for higher altitudes.

2. Storage: To 10,000 feet.

1.4.4. Audible Noise: Noise generated by the UPS during normal operation shall not exceed 62 dBA measured at 1 meter from the surface of the UPS.

1.4.5. Electrostatic Discharge: The UPS shall be able to withstand a minimum 15 kV without damage and shall not affect the critical load.

1.5 USER DOCUMENTATION

1.5.1. The specified UPS system shall be supplied with one (1) user's manual. Manuals shall include installation drawings and instructions, a functional description of the equipment with block diagrams, safety precautions, illustrations, step by step operating procedures, and routine maintenance guidelines.

1.6 WARRANTY

1.6.1. The UPS manufacturer shall warrant the UPS against defects in materials and workmanship for two (2) years. The warranty shall cover all parts for two (2) years and onsite labor for ninety (90) days. With start-up provided by the manufacturer, the warranty shall cover all parts and onsite labor for two (2) years. Maintenance contract packages shall also be available.

1.7 QUALITY ASSURANCE

1.7.1. Manufacturer Qualifications: A minimum of thirty year's experience in the design, manufacture, and testing of solid-state UPS systems is required.

1.7.2. Factory Testing: Before shipment, the manufacturer shall fully and completely test the system to assure compliance with the specification. These tests shall include operational discharge and recharge tests on the internal battery to guarantee rated performance.

PART 2 - PRODUCTS

2.1 FABRICATION

2.1.1. All materials and components making up the UPS shall be new, of current manufacture, and shall not have been in prior service except as required during factory testing. The UPS shall be constructed of replaceable subassemblies. All active electronic devices shall be solid-state.

2.1.2. Wiring: Wiring practices, materials, and coding shall be in accordance with the requirements of the National Electrical Code (NFPA 70) and other applicable codes and standards.

2.1.3. Cabinet: The UPS unit comprised of: power module, battery module, control module, system interconnect module and user interface module housed in a single free-standing enclosure and meets the requirements of IP20. The UPS system shall be designed such that the battery modules may be installed into any module bay in the cabinet and power modules into any module bay in the top half of the cabinet. The UPS cabinet shall be cleaned, primed, and painted with the manufacturer's standard color. Casters and leveling feet shall be provided. UPS cabinet dimensions shall not exceed 20 inches wide, 29 inches deep, and 53 inches high.

2.1.4. Cooling: The UPS shall be forced air cooled by internally mounted fans.

2.2 COMPONENTS

2.2.1. Input Converter

1. General: Incoming AC power shall be converted to a regulated DC output by the input converter for supplying DC power to the inverter. The input converter shall provide input power factor and input current distortion correction.

2. AC Input Current Limit: The input converter shall be provided with AC input over current protection.

3. Input Protection: The UPS shall have built-in protection against undervoltage, overcurrent, and overvoltage conditions including low-energy surges introduced on the primary AC source and the bypass source. The UPS shall sustain input surges without damage per criteria listed in IEEE C62.41, Category A & B. The UPS cabinet shall not contain an input breaker. The customer shall supply an input breaker sized to supply full 20kVA rated load and to recharge the battery at the same time.

4. Battery Recharge: To prolong battery life, the UPS shall contain temperature-compensated battery charging. When an equal number of power modules and battery modules are fitted the battery charger shall be able to recharge the internal batteries to 90% charge in six hours at nominal input voltage and nominal ambient temperature.

5. Charger Output Filter: The battery charger shall have an output filter to minimize ripple current into the battery.

2.2.2. Inverter

1. General: The inverter shall convert DC power from the input converter output, or the battery, into precise regulated sine wave AC power for supporting the critical AC load.

2. Overload: The inverter shall be capable of supplying current and voltage for overloads exceeding 100% and up to 200% of full load current. A visual indicator and audible alarm shall indicate overload operation. For greater currents or longer time duration, the inverter shall have electronic current-limiting protection to prevent damage to components. The inverter shall be self-protecting against any magnitude of connected output overload. Inverter control logic shall sense and disconnect the inverter from the critical AC load without the requirement to clear protective fuses. The load shall be transferred to bypass when any of the above conditions are exceeded.

3. Maximum Load Alarm: The user can set the alarm point to a value less than 100% rating such that the UPS will alarm before an overload condition or loss of redundancy is reached.

4. Output Frequency: The output frequency of the inverter shall be controlled by an oscillator. The oscillator shall hold the inverter output frequency to +/- 0.5% for steady state and transient conditions. The inverter shall track the bypass continuously providing the bypass source maintains a frequency within the user selected synchronization range. If the bypass source fails to remain within the selected range, the inverter shall revert to the internal oscillator.

5. Output Protection: The UPS inverter shall employ electronic current limiting.

6. Battery over Discharge Protection: To prevent battery damage from over discharging, the UPS control logic shall control the shutdown voltage set point. This pint is dependent on the rate of discharge.

2.2.3. Display and Controls.

1. General: The front panel will consist of multiple status LEDs, switches, and a four line by twenty character LCD display for additional alarm/configuration information. All mimic display LEDs shall be green in color and indicate the following:

   AC Input
   On Battery
   Load On/Off
   On Inverter

   On Bypass

2. The UPS fault indicator is used with additional indicators and audible alarms to notify the user that a UPS fault condition has occurred. The color of the fault indicator LED shall be amber.

Replace	Battery Module
Replace	Power Module
Replace	Control Module
On Bypass	
Low Battery	
OverTemp Warning	
UPS Shutdown	

3. If there is a fault condition, the UPS shall attempt to maintain conditioned power to the load, or at minimum transfer to bypass.

4. There shall also be indication on each module should the module fail and need to be replaced

5. In addition to a visual fault signal, the UPS shall also record fault occurrences in a rolling event log. The event log on the standard unit shall record up to 255 occurrences, with the oldest events discarded first, etc. The user shall have access to the event log through the LCD display. Every alarm and/or event recorded in the event log will contain a time and date stamp

6. Audible Alarms
   a. The volume of all audible alarms shall be at least 65dBA at a distance of one meter (three feet). An audible alarm shall be used in conjunction with the LED/LCD indication to indicate a change in UPS status.

   b. The audible alarms shall enunciate for utility line loss, low battery (while on battery), and all other alarm conditions. For all alarm conditions, the user must look at the display to determine the cause of error/alarm. All alarm tones shall be a continual tone until the condition rectifies itself or the alarm is silenced. Once silenced, the audible alarm shall not sound until a new alarm condition is present.

7. Alarm Silence Button: In addition to the load on/off switch, the user interface shall include an audible 'Alarm Silence' switch. If the alarm silence switch is pressed for one second, all current audible alarms shall be disabled. If a new alarm occurs, or a cancelled alarm condition disappears and then re-appears, the audible alarm is re-enabled.

8. LCD Display: The LCD display shall be used to provide information to the user. The display shall also be used to program ALL information (voltage, frequency, etc.) into the UPS. Any display values that require time/date shall be 'year 2000' compliant.

2.2.4. Automatic Battery Test

1. The UPS shall initiate an automatic battery testing sequence periodically, at a programmed day and time of day, selectable by the end user. The user will be able to select the interval of the battery test and will be able to select 1, 2, 3, 4, or 6 week intervals, or can select to disable the automatic battery test.

2. Should a failure of the battery occur, the UPS will immediately return to normal mode and fault signals (visual, audible, and remote via serial) shall be communicated. No audible or remote (via serial/contact closures) indication of the battery test shall be communicated during the duration of the automatic battery test.

3. The automatic battery test factory default settings shall be enabled at a two week interval and to occur on Wednesdays at 0600hours (based on the twenty four hour clock).

2.2.5. Remote Emergency Power Off (REPO)

1. The remote emergency power off function (REPO) shall allow the user to disable all UPS outputs in an emergency situation. The REPO, in order to be flexible, shall be able to interface with either normally open (N.O.) or normally closed (N.C.) systems. The REPO shall be activated when a pair of 'SELV' contacts, external to the UPS, are activated. The REPO connection shall be through a simple terminal block type connector.

2. The REPO function shall not operate if no system control modules are present in the UPS or if the manual bypass switch is in the bypass position. The user must also supply a means of interfacing with the REPO circuit to allow disconnecting the UPS input feeder breaker to remove all sources of power to the UPS and the connected equipment to comply with local wiring codes/regulations.

3. Regardless of the UPS mode of operation when the REPO is activated, the UPS output shall not be re-enabled until the following occurs:

4. REPO contacts are reset (closed if N.C. contacts are used and open if N.O. contacts are used).

Input circuit breaker is closed
Control enable switch is turned on
User interface on/off switch is depressed

2.2.6. Bypass

1. General: A bypass circuit shall be provided as an integral part of the UPS. The bypass control logic shall contain an automatic transfer control circuit that senses the status of the inverter logic signals, and operating and alarm conditions. This control circuit shall provide a transfer of the load to the bypass source, without exceeding the transient limits specified herein, when an overload or malfunction occurs within the UPS.

2. Automatic Transfers:

a. The transfer control logic shall automatically activate the bypass, transferring the critical AC load to the bypass source, after the transfer logic senses one of the following conditions:

Inverter overload capacity exceeded
Inverter over temperature
UPS fault condition

b. For inverter overload conditions, the transfer control logic shall inhibit an automatic transfer of the critical load to the bypass source if one of the following conditions exists:

Inverter/Bypass voltage difference exceeding preset limits (±15 % of nominal)
Bypass frequency out of preset limits (± 5 % of nominal frequency)

3. Automatic Retransfer

a. Retransfer of the critical AC load from the bypass source to the inverter output shall be automatically initiated unless inhibited by manual control. The transfer control logic shall inhibit an automatic retransfer of the critical load to the inverter if one of the following conditions exists:

Bypass out-of-synchronization range with inverter output
Overload condition exists in excess of inverter full load rating
UPS fault condition present

4. Manual Transfer

a. In addition to the internal bypass function, the UPS shall have a manual bypass function. The manual bypass function shall be provided via a switch mounted on the bottom-front of

the UPS, removal of the lower front bezel shall be required. The actual AC break time between inverter and bypass shall be less than four milliseconds.

b. The manual bypass shall also be a partial 'wrap-around' bypass, and shall be configured to wrap around the rectifier, battery charger, inverter, and battery in the same manner as the automatic bypass. The manual bypass shall not wrap around the EMI filtering, overcurrent protection or isolation transformer.

c. The UPS shall initiate an audible alarm upon transfer to manual bypass. The audible alarm shall be capable of being silenced by the user. The alarm shall continue to sound (unless silenced) while in bypass mode. This shall provide a reminder to the user that the load continues to be powered from utility supply alone.

2.2.7. Internal Battery

1. Flame retardant, valve regulated, gas recombination, lead acid batteries shall be used as a stored-energy source for the specified UPS system. The battery shall be housed in separate replaceable modules that slide into any open bay of the UPS cabinet, and sized to support the inverter at rated load and power factor, in an ambient temperature between 20° and 25° C, for a 6 minutes reserve time. The expected life of the battery shall be 3 to 5 years or a minimum 250 complete discharge cycles. For extended battery reserve time, additional battery modules may be added, if the frame size allows, external battery cabinets shall be also be available as an option.

2.3 COMMUNICATIONS

2.3.1. The UPS shall allow for flexibility in communications and shall be able to communicate through two communications ports simultaneously; the media of either communications port may change without affecting the operation of the UPS. The use of relay contacts shall not affect the operation of the two communications ports.

2.3.2. Relay Contacts.

1. The relay contacts shall be available through at least one DB-9F communication connector, and shall be compatible with the SiteNet MultiLink system. The UPS shall communicate via relay contact closure the following information:

   Low Battery
   On Battery

2. One connector to provide relay contacts shall be fitted on all UPS models as standard (designated comm port 1). Relay contacts shall be rated 48 VDC, 1 A. Additional signals (such as on bypass and summary alarm) shall be provided by a Relay Contacts Intellislot card option (or equal).

3. The following pins for comm port 1 shall be used:

Pin 1	Low Battery	(normally open)
Pin 4	Shutdown in battery mode (5 – 12 VDC for 1.5 sec)	
Pin 5	Common	
Pin 7	Low Battery common	
Pin 8	On Battery	(normally open)
Pin 9	On Battery common	

4. As an option, an Intellislot option card may be used for additional contact outputs, as well as to accept contact inputs, such as water/smoke detection.

2.3.3. Serial Communications.

1. The Nfinity UPS shall be able to communicate via Liebert proprietary protocol through the following communication ports (or equal):

   Comm port 2 (standard on UPS)
   Intellislot option card slot 1 only

2. At a minimum, the UPS shall be supported by SiteNet MultiLink software (or equal).

3. The pin-out configuration for comm port 2 shall be as follows:

Pin 2	Transmit Data
Pin 3	Receive Data
Pin 5	Common

2.3.4. Network Communications.

1. The user shall have the option of installing an optional Intellislot card to provide SNMP communication over a local area network. 10/100Mbit Ethernet support shall be included. At a minimum, the UPS shall be supported by SiteNet MultiLink software.

2.3.5. Intellislot Specification.

1. All models of the Nfinity UPS product line shall have four Intellislot ports standard. Existing Intellislot cards, such as the MultiPort 4 card, and Relay Contacts card, shall be compatible.

2.3.6. UPS Status Information

1. The software shall be able to retrieve all status information present in the UPS (and available on the display). Retrieval of data shall be through either serial communications or through a network connection.

2.4 ACCESSORIES (OPTIONAL COMPONENTS)

2.4.1. External Battery Cabinets

1. The UPS shall have the capability to add external battery cabinets to the base product. These external battery cabinets with chargers and front access battery terminals, shall be installed in parallel to provide backup times as required. The connections between the UPS and the extended battery cabinets shall contain DC power only. All of these shall be able to be connected or disconnected safely by the user without interrupting power to the load.

2. Modular Extended Battery Cabinets

3. The Modular Battery Cabinet shall be pre-configured with 1 to 12 Nfinity Battery Modules installed. Battery Cabinets with less than 12 Battery Modules shall be field upgradable using the standard Nfinity Battery Module Expansion Kit. Each Extended Battery Cabinet shall include (2) Intellislot

Battery Cards (IBC) and (2) 10-foot communications cables. Each Extended Battery Cabinet shall require one unused Intellislot on the Nfinity UPS and a maximum of four Extended Battery Cabinets shall be used with one Nfinity UPS.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

3.1.1. The following inspections and test procedures shall be performed by factory trained field service personnel during the UPS start-up.

3.1.2. Visual Inspection

1. Inspect equipment for signs of shipping or installation damage.
2. Verify installation per drawings.
3. Inspect cabinets for foreign objects.
4. Verify neutral and ground conductors are properly sized and configured.

3.1.3. Mechanical Inspection.

1. Check all power modules are correctly fitted.
2. Check all battery modules are correctly fitted.
3. Check all terminal screws, nuts, and/or spade lugs for tightness.

3.1.4. Electrical Inspection.

1. Confirm input voltage and phase rotation is correct.
2. Verify bypass voltage jumper is correct for voltages being used.

3.2 UNIT START-UP AND SITE TESTING

3.2.1. The manufacturer’s field service personnel shall provide site testing if requested. Site testing shall consist of a complete test of the UPS system and the associated accessories supplied by the manufacturer. A partial battery discharge test shall be provided as part of the standard start-up procedure. The test results shall be documented, signed, and dated for future reference.

3.3 MANUFACTURER'S FIELD SERVICE

3.3.1. Service Personnel.

1. The UPS manufacturer shall directly employ a nationwide service organization, consisting of factory trained Customer Engineers dedicated to the start-up, maintenance, and repair of UPS and power

equipment. The organization shall consist of factory-trained Customer Engineers working out of District Offices in most major cities. An automated procedure shall be in place to insure that the manufacturer is dedicating the appropriate technical support resources to match escalating customer needs.

2. The manufacturer shall provide a fully automated national dispatch center to coordinate field service personnel schedules. One toll-free number shall reach a qualified support person 24 hours/day, 7 days/week, and 365 days/year. If emergency service is required, call back response time from a local Customer Engineer shall be 20 minutes or less.

3.3.2. Replacement Parts Stocking.

1. Parts shall be available through an extensive network to ensure around- the-clock parts availability throughout the country.

2. Local Customer Engineers shall stock replacement spare parts with back up available from District Service offices and the manufacturing location.

3. Customer Support Parts Coordinators shall be on-call 24 hours a day, 7 days a week, 365 days a year for immediate parts availability.

3.3.3. UPS Maintenance Training

1. Maintenance training courses for customer employees shall be available by the UPS manufacturer. This training is in addition to the basic operator training conducted as a part of the system start-up.

2. The training course shall cover UPS theory, location of subassemblies, safety, battery considerations and UPS operational procedures. The course shall include AC to DC conversion and DC to AC inversion techniques as well as control and metering, Troubleshooting and fault isolation using alarm information and internal self-diagnostics shall be stressed.

3.3.4. Maintenance Contracts

1. A complete offering of preventive and full service maintenance contracts for both the UPS system and battery system shall be available. An extended warranty and preventive maintenance package shall be available. Warranty and preventive maintenance service shall be performed by factory trained Customer Engineers.

END OF SECTION 13720

CONSTRUCTION ISSUE

SECTION 16271

MEDIUM-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes the following types of transformers with medium-voltage primaries:

1.2.1.1. Pad-mounted, liquid-filled transformers.

1.3 SUBMITTALS

1.3.1. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, location of each field connection, and performance for each type and size of transformer indicated.

1.3.2. Shop Drawings: Wiring and connection diagrams including power, signal and control wiring where applicable.

1.3.3. Manufacturer Seismic Qualification Certification: Submit certification that transformer assembly and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.3.3.1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.3.3.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.3.3.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.3.4. Source quality-control test reports.

1.3.5. Field quality-control test reports.

1.3.6. Follow-up service reports.

1.3.7. Operation and Maintenance Data: For transformer and accessories to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

1.4.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.2. Comply with IEEE C2.

1.4.3. Comply with ANSI C57.12.28, IEEE C57.12.10, IEEE C57.12.70, and IEEE C57.12.80.

1.4.4. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

1.5.1. Service Conditions: IEEE C37.121, usual service conditions except for the following:

1.5.1.1. Exposure to significant solar radiation.

1.5.1.2. Exposure to hot and humid climate or to excessive moisture, including steam, salt spray, and dripping water.

1.5.1.3. Exposure to excessively high or low temperatures.

1.5.1.4. Unusual transportation or storage conditions.

1.5.1.5. Unusual grounding-resistance conditions.

1.5.1.6. Unusual space limitations.

1.6 COORDINATION

1.6.1. Coordinate installation of area drainage, downspouts, maintenance access, louvers, doors, spill retention areas, and sumps. Coordinate installation so no piping or conduits are installed in space allocated for medium-voltage transformers except those directly associated with transformers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Acme Electric Corporation; Power Distribution Products Division.

2.1.1.2. Cooper Industries; Cooper Power Systems Division.

2.1.1.3. Cutler-Hammer.

2.1.1.4. GE Electrical Distribution & Control.

2.1.1.5. Hammond Manufacturing; Transformer Group.

2.1.1.6. Kuhlman Electric Corporation.

2.1.1.7. Pauwels Transformers.

2.1.1.8. Pioneer Transformers Ltd.

2.1.1.9. Siemens Energy & Automation, Inc.

2.1.1.10. Square D/Groupe Schneider NA.

2.1.1.11. Uptegraff, R. E. Mfg. Co.

2.1.1.12. Virginia Transformer Corp.

2.2 PAD-MOUNTED, LIQUID-FILLED TRANSFORMERS

2.2.1. Description: ANSI C57.12.13, IEEE C57.12.00, IEEE C57.12.26, pad-mounted, 2-winding transformers.

2.2.2. Insulating Liquid: Mineral oil, complying with ASTM D 3487, Type II, and tested according to ASTM D 117.

2.2.3. Basic Impulse Level: 95 kV.

2.2.4. Full-Capacity Voltage Taps: Four 2.5 percent taps, 2 above and 2 below rated high voltage; with externally operable tap changer for de-energized use and with position indicator and padlock hasp.

2.2.5. High-Voltage Terminations and Equipment: Dead front with universal-type bushing wells for dead-front bushing-well inserts, complying with IEEE 386 and including the following:

2.2.5.1. Bushing-Well Inserts: One for each high-voltage bushing well.

2.2.5.2. Surge Arresters: Dead-front, elbow-type, metal-oxide-varistor units.

2.2.5.3. Parking Stands: One for each high-voltage bushing well.

2.2.5.4. Portable Insulated Bushings: Arranged for parking insulated, high-voltage, load-break cable terminators; one for each primary feeder conductor terminating at transformer.

2.2.6. Accessories:

2.2.6.1. Drain Valve: 1 inch, with sampling device.

2.2.6.2. Dial-type thermometer.

2.2.6.3. Liquid-level gage.

2.2.6.4. Pressure-vacuum gage.

2.2.6.5. Pressure Relief Device: Self-sealing with an indicator.

2.3 IDENTIFICATION DEVICES

2.3.1. Nameplates: Engraved, laminated-plastic or metal nameplate for each transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 16 Section "Electrical Identification."

2.4 SEISMIC RESTRAINTS

2.4.1. Design and fabricate transformers, and anchorage devices for them, to withstand static and seismic forces in any direction.

2.5 SOURCE QUALITY CONTROL

2.5.1. Factory Tests: Perform design and routine tests according to standards specified for components. Conduct transformer tests according to IEEE C57.12.90.

2.5.2. Factory Tests: Perform the following factory-certified tests on each transformer:

2.5.2.1. Resistance measurements of all windings on rated-voltage connection and on tap extreme connections.

2.5.2.2. Ratios on rated-voltage connection and on tap extreme connections.

2.5.2.3. Polarity and phase relation on rated-voltage connection.

2.5.2.4. No-load loss at rated voltage on rated-voltage connection.

2.5.2.5. Excitation current at rated voltage on rated-voltage connection.

2.5.2.6. Impedance and load loss at rated current on rated-voltage connection and on tap extreme connections.

2.5.2.7. Applied potential.

2.5.2.8. Induced potential.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine areas and conditions for compliance with requirements for medium-voltage transformers.

3.1.2. Examine roughing-in of conduits and grounding systems to verify the following:

3.1.2.1. Wiring entries comply with layout requirements.

3.1.2.2. Entries are within conduit-entry tolerances specified by manufacturer and no feeders will have to cross section barriers to reach load or line lugs.

3.1.3. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

3.1.4. Verify that ground connections are in place and that requirements in Division 16 Section "Grounding and Bonding" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.

3.1.5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. Install transformers on concrete bases.

3.2.1.1. Anchor transformers to concrete bases according to manufacturer's written instructions, seismic codes at Project, and requirements in Division 16 Section "Seismic Controls for Electrical Work."

3.2.1.2. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit and 4 inches above finished grade.

3.2.1.3. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.2.1.4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.2.2. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

3.3 IDENTIFICATION

3.3.1. Identify field-installed wiring and components and provide warning signs as specified in Division 16 Section "Electrical Identification."

3.4 CONNECTIONS

3.4.1. Ground equipment according to Division 16 Section "Grounding and Bonding."

3.4.2. Connect wiring according to Division 16 Section "Conductors and Cables."

3.4.3. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

3.5.1. Perform the following field tests and inspections and prepare test reports:

3.5.1.1. After installing transformers but before primary is energized, verify that grounding system at substation is tested at specified value or less.

3.5.1.2. After installing transformers and after electrical circuitry has been energized, test for compliance with requirements.

3.5.1.3. Perform electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.2. Certify compliance with test parameters.

3.5.1.4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5.2. Remove malfunctioning units, replace with new units, and retest as specified above.

3.5.3. Test Reports: Prepare written reports to record the following:

3.5.3.1. Test procedures used.

3.5.3.2. Test results that comply with requirements.

3.5.3.3. Test results that do not comply with requirements and corrective actions taken to achieve compliance with requirements.

3.6 FOLLOW-UP SERVICE

3.6.1. Voltage Monitoring and Adjusting: If requested by Owner, perform the following voltage monitoring after Substantial Completion but not more than six months after Final Acceptance:

3.6.1.1. During a period of normal load cycles as evaluated by Owner, perform seven days of three-phase voltage recording at secondary terminals of each transformer. Use voltmeters with calibration traceable to National Institute of Science and Technology standards and with a chart speed of not less than 1 inch per hour. Voltage unbalance greater than 1 percent between phases, or deviation of any phase voltage from nominal value by more than plus or minus 5 percent during test period, is unacceptable.

3.6.1.2. Corrective Actions: If test results are unacceptable, perform the following corrective actions, as appropriate:

a. Adjust transformer taps.

b. Prepare written request for voltage adjustment by electric utility.

3.6.1.3. Retests: After corrective actions have been performed, repeat monitoring until satisfactory results are obtained.

3.6.1.4. Report: Prepare written report covering monitoring and corrective actions performed.

3.6.2. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared scan of each transformer. Open primary and secondary front rear panels so joints and connections are accessible to portable scanner.

3.6.2.1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each transformer 11 months after date of Substantial Completion.

3.6.2.2. Instrument: Use an infrared-scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

3.6.2.3. Record of Infrared Scanning: Prepare a certified report that identifies transformer checked and that describes infrared-scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

CONSTRUCTION ISSUE

END OF SECTION 16271

CONSTRUCTION ISSUE

SECTION 16289

TRANSIENT VOLTAGE SUPPRESSION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes transient voltage surge suppressors for low-voltage power, control, and communication equipment.

1.2.2. Related Sections include the following:

1.2.2.1. Division 16 Section "Wiring Devices" for devices with integral transient voltage surge suppressors.

1.2.2.2. Division 16 Section "Panelboards" for factory-installed transient voltage surge suppressors.

1.2.2.3. Division 16 Section "Switchboards" for factory-installed transient voltage surge suppressors.

1.3 SUBMITTALS

1.3.1. Product Data: For each type of product indicated. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

1.3.2. Product Certificates: Signed by manufacturers of transient voltage suppression devices, certifying that products furnished comply with the following testing and labeling requirements:

1.3.2.1. UL 1283 certification.

1.3.2.2. UL 1449 listing and classification.

1.3.3. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:

1.3.3.1. Test procedures used.

1.3.3.2. Test results that comply with requirements.

1.3.3.3. Failed test results and corrective action taken to achieve requirements.

1.3.4. Maintenance Data: For transient voltage suppression devices to include in maintenance manuals specified in Division 1.

1.3.5. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

1.4.1. Source Limitations: Obtain suppression devices and accessories through one source from a single manufacturer providing field representation in the project area.

1.4.2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.3. IEEE Compliance: Comply with IEEE C62.41, "IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits," and test devices according to IEEE C62.45, "IEEE Guide for Surge Suppressor Testing."

1.4.4. NEMA Compliance: Comply with NEMA LS 1, "Low Voltage Surge Protective Devices."

1.4.5. UL Compliance: Comply with UL 1283, "Electromagnetic Interference Filters," and UL 1449, "Transient Voltage Surge Suppressors."

1.5 PROJECT CONDITIONS

1.5.1. Placing into Service: Do not energize or connect data terminals to their sources until the surge protective devices are installed and connected.

1.5.2. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1.5.2.1. Notify Contracting Officer not less than ten days in advance of proposed utility interruptions.

1.5.2.2. Do not proceed with utility interruptions without Contracting Officer's written permission.

1.5.3. Service Conditions: Rate surge protective devices for continuous operation under the following conditions, unless otherwise indicated:

1.5.3.1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.

1.5.3.2. Operating Temperature: 30 to 120 deg F.

1.5.3.3. Humidity: 0 to 85 percent, noncondensing.

1.5.3.4. Altitude: Less than 10,000 feet above sea level.

1.6 COORDINATION

1.6.1. Coordinate location of field-mounted surge suppressors to allow adequate clearances for maintenance.

1.7 WARRANTY

1.7.1. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.7.2. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of surge suppressors that fail in materials or workmanship within five years from date of Substantial Completion.

1.7.3. Special Warranty for Plug-in Cord-Connected Surge Suppressors: Written warranty, executed by manufacturer agreeing to repair or replace electronic equipment connected to circuits protected by surge suppressors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Manufacturers of a Broad Line of Suppressors:

a. Advanced Protection Technologies, Inc.
b. Atlantic Scientific Corp.
c. Current Technology, Inc.
d. Cutler-Hammer, Inc.
e. Entrelec, Inc.
f. Innovative Technology, Inc.
g. Intermatic, Inc.
h. LEA International.
i. Leviton Manufacturing Co. Inc.
j. Liebert Corp.
k. Northern Technologies.
l. Siemens Energy & Automation.
m. Square D Co.
n. Sutton Designs, Inc.
o. Transtector Systems, Inc.
p. Tycor International, Inc.
q. United Power, Inc.

r. Zero Surge Inc.

2.1.1.2. Manufacturers of Category A and Telephone/Data Line Suppressors:

a. MCG Electronics, Inc.

b. NTE Electronics, Inc.

c. Telebyte Technology, Inc.

2.2 SERVICE ENTRANCE SUPPRESSORS

2.2.1. Surge Protective Device Description: Modular design with field-replaceable modules and the following features and accessories:

2.2.1.1. Fuses, rated at 200-kA interrupting capacity.

2.2.1.2. Fabrication using bolted compression lugs for internal wiring.

2.2.1.3. Integral disconnect switch.

2.2.1.4. Redundant suppression circuits.

2.2.1.5. Redundant replaceable modules.

2.2.1.6. For units internal to switchboard. Arrangement with copper busbars and for bolted connections to phase buses, neutral bus, and ground bus.

2.2.1.7. For units mounted externally. Arrangement with wire connections to phase buses, neutral bus, and ground bus.

2.2.1.8. Red and green LED indicator lights for power and protection status.

2.2.1.9. Audible alarm, with silencing switch, to indicate when protection has failed.

2.2.1.10. Surge-event operations counter.

2.2.2. Peak Single-Impulse Surge Current Rating: 320 kA per phase.

2.2.3. Connection Means: Permanently wired.

2.2.4. Protection modes and UL 1449 clamping voltage for grounded wye circuits with voltages of 480Y/277 and 208Y/120; 3-phase, 4-wire circuits, shall be as follows:

2.2.4.1. Line to Neutral: 800 V for 480Y/277; 400 V for 208Y/120.

2.2.4.2. Line to Ground: 800 V for 480Y/277; 400 V for 208Y/120.

2.2.4.3. Neutral to Ground: 800 V for 480Y/277; 400 V for 208Y/120.

2.3 PANELBOARD SUPPRESSORS

2.3.1. Surge Protective Device Description: Modular design with field-replaceable modules and the following features and accessories:

2.3.1.1. Fuses, rated at 200-kA interrupting capacity.

2.3.1.2. Fabrication using bolted compression lugs for internal wiring.

2.3.1.3. Integral disconnect switch.

2.3.1.4. Redundant suppression circuits.

2.3.1.5. Redundant replaceable modules.

2.3.1.6. Arrangement with wire connections to phase buses, neutral bus, and ground bus.

2.3.1.7. Red and green LED indicator lights for power and protection status.

2.3.1.8. Audible alarm, with silencing switch, to indicate when protection has failed.

2.3.1.9. Surge-event operations counter.

2.3.2. Peak Single-Impulse Surge Current Rating: 160 kA per phase.

2.3.3. Protection modes and UL 1449 clamping voltage for grounded wye circuits with voltages of 480Y/277 and 208Y/120; 3-phase, 4-wire circuits, shall be as follows:

2.3.3.1. Line to Neutral: 800 V for 480Y/277; 400 V for 208Y/120.

2.3.3.2. Line to Ground: 800 V for 480Y/277; 400 V for 208Y/120.

2.3.3.3. Neutral to Ground: 800 V for 480Y/277; 400 V for 208Y/120.

2.4 CONTROL AND DATA TERMINALS

2.4.1. Protectors for copper data, antenna, and telephone conductors entering the building from the outside shall be as recommended by the manufacturer for the type of line being protected.

2.5 ENCLOSURES

2.5.1. NEMA 250, with type matching the enclosure of panel or device being protected.

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTIVE DEVICES

3.1.1. Install devices at service entrance on load side, with ground lead bonded to service entrance ground.

3.1.2. Install devices for panelboards with conductors between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.

3.1.2.1. Provide multipole, 15-A circuit breaker as a dedicated disconnect for the suppressor, unless otherwise indicated.

3.2 CONNECTIONS

3.2.1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.3 FIELD QUALITY CONTROL

3.3.1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation. Report results in writing.

3.3.1.1. Verify that electrical wiring installation complies with manufacturer's installation requirements.

END OF SECTION 16289

CONSTRUCTION ISSUE

SECTION 16375

UNDERGROUND ELECTRICAL DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.1.2. Medium voltage cables are covered in Section 16124; 600 V cables are covered in Section 16120.

1.1.3. Grounding and Bonding are covered in Section 16060.

1.2 SUMMARY

1.2.1. This section includes underground duct and manhole systems for electrical distribution and communications distribution.

1.3 SUBMITTALS

1.3.1. Submit manufacturer's cut sheets on each item in this Article according to Division 1 Specification Sections.

1.3.2. Cut Sheet Submittals required for:

1.3.2.1. Electrical and Communication duct components.

1.3.2.2. Manhole components (covers and rings, duct end bells, cable racks and insulators, pulling irons, steps, sump grates, grounding rods, exothermic brazing materials).

1.3.3. Shop Drawings: If manholes are not detailed on the Drawings, provide Shop Drawings showing plan and section views of the manholes to scale, detailing wall thicknesses, reinforcement, and layout of ducts, appurtenances and accessories.

1.4 QUALITY ASSURANCE

1.4.1. Codes and Standards:

1.4.1.1. UL Listed components

1.4.1.2. NFPA-70 National Electrical Code (Latest adopted edition)

1.4.1.3. IEEE C2 (2002) National Electrical Safety Code (NESC)

1.4.1.4. NEMA TC2-1990 Incl. Rev. 1 thru 4 – Electrical Plastic Tubing (EPT) and Conduit (EPC40 and EPC80)

1.4.1.5. UL 651 – Schedule 40 and 80 Rigid PVC Conduit (May 8,m 1981, 4th Ed.)

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

2.1.1. Carlon

2.2 UNDERGROUND DUCT SYSTEM DESCRIPTION

2.2.1. Concrete encased schedule 40 PVC ducts, minimum concrete cover 3 inches. Steel reinforced where passing under pavements or building foundations, and for 3 feet either side.

2.2.2. Concrete for duct encasement shall be not less than 2500 psi. Comply with Section 03300, Cast-in-Place Concrete.

2.2.3. Minimum depth of horizontal runs:

2.2.3.1. Medium voltage electrical lines – 36 inches

2.2.3.2. Low voltage electrical lines (600V or less) – 24 inches

2.2.3.3. Communication lines (Voice or Data) – 24 inches

.2.2.4 Use long sweep bends for changes in direction of 10 degrees or more either vertical or horizontal. Ells (90 degree; use only at risers) shall be of galvanized rigid steel conduit.

2.2.5. Use end bells on all conduits terminating in manholes.

2.2.6. Provide traceable marking tape over all underground duct lines, 18 inches below the surface grade. Marking tape is covered in section 16075, Electrical Identification.

2.3 CONDUITS

2.3.1. PVC, schedule 40, Type EB, sizes as indicated on the Drawings.

2.3.2. Fittings shall be designed for the specific conduit used and shall provide a waterproof joint. Fitting material shall exactly match the conduit material.

PART 3 - EXECUTION

3.1 UNDERGROUND DUCTS

3.1.1. Ducts shall be stored in a manner to prevent warping or deterioration. Lay ducts on a flat surface protected from direct rays of the sun. Keep ends plugged.

3.1.2. Conduits shall be thoroughly cleaned for laying.

3.1.3. Ducts shall be laid to a minimum grade of 4 inches per 100 LF. Slope may be from a riser to a manhole, from one manhole to the next, or both ways from a high point between manholes.

3.1.4. Conduit joints may be placed side by side horizontally but shall be staggered at least 6 inches vertically in duct banks.

3.1.5. Solvent weld all joints to provide a watertight duct.

3.1.6. During and after construction, all open duct ends shall be plugged to prevent mud or water entry into the conduits. Particular care must be taken to keep conduits clean of concrete and dirt during the course of construction.

3.1.7. Concrete encased duct lines shall be doweled into the manhole wall with reinforcing bars. The earth below the duct bank shall be well compacted to mitigate settlement.

3.1.8. After the duct line is complete, and before any cables are pulled in, a standard flexible mandrel not less than 12 inches long, having a diameter approximately 1/4 inch less than the conduit internal diameter, shall be pulled through each conduit, after which a brush with stiff bristles followed by a rag shall be pulled through each conduit to make certain that no particles of earth, sand, concrete or gravel have been left in the duct. Repeat the process until the cleaning assembly produces minimal additional foreign matter from the duct line.

3.1.9. Install nylon pull rope in each new duct not used for cables on this project.

END OF SECTION 16375

CONSTRUCTION ISSUE

SECTION 16415

TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes transfer switches rated 600 V and less, including the following:

1.2.1.1. Automatic transfer switches. Referred to “ATS”.

1.2.1.2. Non-automatic transfer switches. Referred to “MTS”.

1.3 SUBMITTALS

1.3.1. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.

1.3.2. Shop Drawings: Dimensioned plans, sections, and elevations showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.

1.3.3. Manufacturer Seismic Qualification Certification: Submit certification that transfer switches, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.3.3.1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.3.3.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.3.3.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.3.4. Qualification Data: For manufacturer.

1.3.5. Field quality-control test reports.

1.3.6. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Phase Turnover and Contract Closeout" include the following:

1.3.6.1. Features and operating sequences, both automatic and manual.

1.3.6.2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE

1.4.1. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.

1.4.2. Source Limitations: Obtain automatic transfer switches and nonautomatic transfer switches through one source from a single manufacturer.

1.4.3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for emergency service under UL 1008, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.4. Comply with NEMA ICS 1.

1.4.5. Comply with NFPA 70.

1.4.6. Comply with NFPA 110.

1.4.7. Comply with UL 1008 unless requirements of these Specifications are stricter.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Contactor Transfer Switches:

a. Caterpillar; Engine Div.

b. Emerson; ASCO Power Technologies, LP.

c. Generac Power Systems, Inc.

d. GE Zenith Controls.

e. Kohler Co.; Generator Division.

f. Onan Corp./Cummins Power Generation; Industrial Business Group.

g. Russelectric, Inc.

h. Spectrum Detroit Diesel.

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

2.2.1. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

2.2.2. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

2.2.3. Solid-State Controls: Repetitive accuracy of all settings is plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

2.2.4. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

2.2.5. Neutral Terminal: Solid and fully rated, unless otherwise indicated, non-switched.

2.2.6. Enclosures: General-purpose NEMA 250, Type 1, 3R, or 12, as appropriate to the location, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.2.7. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color code or by numbered or lettered wire and cable tape markers at terminations.

2.2.7.1. Designated Terminals: Pressure type suitable for types and sizes of field wiring indicated.

2.2.7.2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.

2.2.7.3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

2.2.8. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.

2.2.9. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

2.2.9.1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.

2.2.9.2. Switch Action: Open transition (“break-before-make”), Double throw; mechanically held in both directions.

2.2.9.3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.

2.3 AUTOMATIC TRANSFER SWITCHES

2.3.1. Comply with Level 1 equipment according to NFPA 110.

2.3.2. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

2.3.3. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

2.4 AUTOMATIC TRANSFER-SWITCH FEATURES

2.4.1. Under-voltage Sensing for Each Phase of Normal Source: Senses low phase-to-ground voltage on each phase. Pickup voltage is adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.

2.4.2. Time delay for override of normal-source voltage sensing delays transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.

2.4.3. Voltage/Frequency Lockout Relay: Prevents premature transfer to generator. Pickup voltage is adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency is adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.

2.4.4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes. Provides automatic defeat of delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.

2.4.5. Test Switch: Simulates normal-source failure.

2.4.6. Switch-Position Pilot Lights: Indicate source to which load is connected.

2.4.7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

2.4.7.1. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

2.4.7.2. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

2.4.8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

2.4.9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.

2.4.10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

2.4.11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.

2.4.12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

2.4.12.1. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.

2.4.12.2. Push-button programming control with digital display of settings.

2.4.12.3. Integral battery operation of time switch when normal control power is not available.

2.5 NONAUTOMATIC TRANSFER SWITCHES

2.5.1. Operation: Electrically actuated by push buttons designated "Normal Source" and "Alternate Source." In addition, removable manual handle provides quick-make, quick-break manual-switching action. Switch is capable of electrically or manually transferring load in either direction with either or both sources energized. Control circuit disconnects from electrical operator during manual operation.

2.5.2. Double-Throw Switching Arrangement: Incapable of pauses or intermediate position stops during switching sequence.

2.6 NONAUTOMATIC TRANSFER-SWITCH ACCESSORIES

2.6.1. Pilot Lights: Indicate source to which load is connected.

2.6.2. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and alternate-source sensing circuits.

2.6.2.1. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

2.6.2.2. Emergency Power Supervision: Red light with nameplate engraved "Alternate Source Available."

2.6.3. Unassigned Auxiliary Contacts: One set of normally closed contacts for each switch position, rated 10 A at 240-V ac.

2.7 FINISHES

2.7.1. Enclosures: Manufacturer's standard enamel over corrosion-resistant pretreatment and primer.

2.8 SOURCE QUALITY CONTROL

2.8.1. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."

3.1.2. Floor-Mounted Switch: Anchor to floor by bolting.

3.1.2.1. Concrete Bases: 4 inches high, reinforced, with chamfered edges. Extend base no more than 2 inches in all directions beyond the maximum dimensions of switch, unless otherwise indicated. Cast anchor-bolt inserts into bases. Comply with Division 3 Section "Cast-in-Place Concrete."

3.1.3. Identify components according to Division 16 Section "Electrical Identification."

3.2 CONNECTIONS

3.2.1. Ground equipment according to Division 16 Section "Grounding and Bonding."

3.2.2. Connect wiring according to Division 16 Section "Conductors and Cables."

3.2.3. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

3.3.1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

3.3.2. Perform the following field tests and inspections and prepare test reports:

3.3.2.1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.

3.3.2.2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.22.3. Certify compliance with test parameters.

3.3.2.3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

a. Check for electrical continuity of circuits and for short circuits.

b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.

c. Verify that manual transfer warnings are properly placed.

d. Perform manual transfer operation.

3.3.2.4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.

b. Simulate loss of phase-to-ground voltage for each phase of normal source.

c. Verify time-delay settings.

d. Verify pickup and dropout voltages by data readout or inspection of control settings.

e. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

3.3.3. Coordinate tests with tests of generator and run them concurrently.

3.3.4. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.3.5. Remove and replace malfunctioning units and retest as specified above.

3.4 DEMONSTRATION

3.4.1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 1 Section "Phase Turnover and Contract Closeout."

3.4.1.1. Coordinate this training with that for generator equipment.

END OF SECTION 16415

CONSTRUCTION ISSUE

SECTION 16430

MOTOR CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes AC, enclosed controllers rated 600 V and less, of the following types:

1.2.1.1. Across-the-line, manual and magnetic controllers.

1.2.1.2. Reduced-voltage controllers.

1.2.1.3. Multispeed controllers.

1.2.1.4. Variable frequency controllers for small motor applications.

1.2.2. Related Sections include the following:

1.2.2.1. Division 16 Section "Transient Voltage Suppression" for low-voltage power, control, and communication surge suppressors.

1.3 SUBMITTALS

1.3.1. Product Data: For each type of enclosed controller. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.

1.3.2. Shop Drawings: For each enclosed controller.

1.3.2.1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Each installed unit's type and details.

b. Nameplate legends.

c. Short-circuit current rating of integrated unit.

d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices in combination controllers.

1.3.2.2. Wiring Diagrams: Power, signal, and control wiring.

1.3.3. Manufacturer Seismic Qualification Certification: Submit certification that enclosed controllers, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.3.3.1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.3.3.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.3.3.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.3.4. Qualification Data: For manufacturer.

1.3.5. Field quality-control test reports.

1.3.6. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Phase Turnover and Contract Closeout," include the following:

1.3.6.1. Routine maintenance requirements for enclosed controllers and all installed components.

1.3.6.2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.3.7. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

1.4 QUALITY ASSURANCE

1.4.1. Source Limitations: Obtain enclosed controllers of a single type through one source from a single manufacturer.

1.4.2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.3. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.6 PROJECT CONDITIONS

1.6.1. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1.6.1.1. Notify Contracting Officer no fewer than ten days in advance of proposed interruption of electrical service.

1.6.1.2. Indicate method of providing temporary utilities.

1.6.1.3. Do not proceed with interruption of electrical service without Contracting Officer's written permission.

1.7 COORDINATION

1.7.1. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.7.2. Coordinate features of enclosed controllers and accessory devices with pilot devices and control circuits to which they connect.

1.7.3. Coordinate features, accessories, and functions of each enclosed controller with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

1.8 EXTRA MATERIALS

1.8.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.8.1.1. Spare Fuses: Furnish one spare for every ten installed, but no fewer than one set of three of each type and rating.

1.8.1.2. Indicating Lights: Two of each type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary.

2.1.1.2. Danfoss Inc.; Danfoss Electronic Drives Div.

2.1.1.3. Eaton Corporation; Cutler-Hammer Products.

2.1.1.4. General Electrical Company; GE Industrial Systems.

2.1.1.5. Rockwell Automation; Allen-Bradley Co.; Industrial Control Group.

2.1.1.6. Siemens/Furnas Controls.

2.1.1.7. Square D.

2.2 ACROSS-THE-LINE ENCLOSED CONTROLLERS

2.2.1. Manual Controller: NEMA ICS 2, general purpose, Class A, with toggle action and overload element.

2.2.2. Magnetic Controller: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, single speed or two speed.

2.2.2.1. Control Circuit: 120 V; obtained from integral control power transformer of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

2.2.2.2. Overload Relay: Ambient-compensated type with inverse-time-current characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.

2.2.3. Combination Magnetic Controller: Factory-assembled combination controller and disconnecting means.

2.2.3.1. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by an NRTL.

2.2.3.2. Nonfusible Disconnecting Means: NEMA KS 1, heavy-duty, nonfusible switch.

2.2.3.3. Circuit-Breaker Disconnecting Means: NEMA AB 1, motor-circuit protector with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.

2.3 ENCLOSURES

2.3.1. Description: Flush- or surface-mounting cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to comply with environmental conditions at installed location.

2.3.1.1. Outdoor Locations: NEMA 250, Type 3R.

2.3.1.2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.

2.3.1.3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.4 ACCESSORIES

2.4.1. Devices shall be factory installed in controller enclosure, unless otherwise indicated.

2.4.2. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

2.4.3. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.

2.4.4. Control Relays: Auxiliary and adjustable time-delay relays.

2.4.5. Elapsed Time Meters: Heavy duty with digital readout in hours.

2.4.6. Phase-Failure and Undervoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection. Provide adjustable undervoltage setting.

2.5 FACTORY FINISHES

2.5.1. Finish: Manufacturer's standard gray paint applied to factory-assembled and -tested enclosed controllers before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine areas and surfaces to receive enclosed controllers for compliance with requirements, installation tolerances, and other conditions affecting performance.

3.1.1.1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. See Division 16 Section "Basic Electrical Materials and Methods" for general installation requirements.

3.2.2. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Division 16 Section "Basic Electrical Materials and Methods."

3.2.3. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."

3.2.4. Enclosed Controller Fuses: Install fuses in each fusible switch. Comply with requirements in Division 16 Section "Fuses."

3.3 IDENTIFICATION

3.3.1. Identify enclosed controller, components, and control wiring according to Division 16 Section "Electrical Identification."

3.4 CONTROL WIRING INSTALLATION

3.4.1. Install wiring between enclosed controllers according to Division 16 Section "Conductors and Cables."

3.4.2. Bundle, train, and support wiring in enclosures.

3.4.3. Connect hand-off-automatic switch and other automatic-control devices where applicable.

3.4.3.1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.

3.4.3.2. Connect selector switches with enclosed controller circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 CONNECTIONS

3.5.1. Conduit installation requirements are specified in other Division 16 Sections. Drawings indicate general arrangement of conduit, fittings, and specialties.

3.5.2. Ground equipment according to Division 16 Section "Grounding and Bonding."

3.6 FIELD QUALITY CONTROL

3.6.1. Prepare for acceptance tests as follows:

3.6.1.1. Test insulation resistance for each enclosed controller element, bus, component, connecting supply, feeder, and control circuit.

3.6.1.2. Test continuity of each circuit.

3.6.2. Manufacturer's Field Service: Engage a factory-authorized service representative to perform the following:

3.6.2.1. Inspect controllers, wiring, components, connections, and equipment installation.

3.6.2.2. Assist in field testing of equipment including pretesting and adjusting of solid-state controllers.

3.6.2.3. Report results in writing.

3.6.3. Perform the following field tests and inspections and prepare test reports:

3.6.3.1. Perform each electrical test and visual and mechanical inspection, except optional tests, stated in NETA ATS, "Motor Control - Motor Starters." Certify compliance with test parameters.

3.6.3.2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.7 ADJUSTING

3.7.1. Set field-adjustable switches and circuit-breaker trip ranges.

END OF SECTION 16430

CONSTRUCTION ISSUE

SECTION 16441

SWITCHBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes service and distribution switchboards rated 600 V and less.

1.3 DEFINITIONS

1.3.1. EMI: Electromagnetic interference.

1.3.2. GFCI: Ground-fault circuit interrupter.

1.3.3. RFI: Radio-frequency interference.

1.3.4. RMS: Root mean square.

1.3.5. SPDT: Single pole, double throw.

1.4 SUBMITTALS

1.4.1. Product Data: For each type of switchboard, overcurrent protective device, transient voltage suppression device, ground-fault protector, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1.4.2. Shop Drawings: For each switchboard and related equipment.

1.4.2.1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.

b. Bus configuration, current, and voltage ratings.

c. Short-circuit current rating of switchboards and overcurrent protective devices.

d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components, sufficient for selective coordination study.

1.4.2.2. Wiring Diagrams: Power, signal, and control wiring.

1.4.3. Manufacturer Seismic Qualification Certification: Submit certification that switchboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.4.3.1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.4.3.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.4.3.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.4.4. Field quality-control test reports including the following:

1.4.4.1. Test procedures used.

1.4.4.2. Test results that comply with requirements.

1.4.4.3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4.5. Operation and Maintenance Data: For switchboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section “Phase Turnover and Project Closeout," include the following:

1.4.5.1. Routine maintenance requirements for switchboards and all installed components.

1.4.5.2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.4.5.3. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

1.5.1. Source Limitations: Obtain switchboards through one source from a single manufacturer.

1.5.2. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.5.3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.4. Comply with NEMA PB 2, "Deadfront Distribution Switchboards."

1.5.5. Comply with NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1. Deliver in sections or lengths that can be moved past obstructions in delivery path.

1.6.2. Store indoors in clean dry space with uniform temperature to prevent condensation. Protect from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.7 PROJECT CONDITIONS

1.7.1. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1.7.1.1. Ambient Temperature: Not exceeding 110 deg F.

1.7.1.2. Altitude: Not exceeding 6600 feet.

1.7.2. Service Conditions: NEMA PB 2, usual service conditions, as follows:

1.7.2.1. Ambient temperatures within limits specified.

1.7.2.2. Altitude not exceeding 6600 feet.

1.8 COORDINATION

1.8.1. Coordinate layout and installation of switchboards and components with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.8.2. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

1.9 EXTRA MATERIALS

1.9.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.9.1.1. Potential Transformer Fuses: Equal to 10 percent of amount installed for each size and type, but no fewer than 2 of each size and type.

1.9.1.2. Control-Power Fuses: Equal to 10 percent of amount installed for each size and type, but no fewer than 2 of each size and type.

1.9.1.3. Fuses for Fused Switches: Equal to 10 percent of amount installed for each size and type, but no fewer than 3 of each size and type.

1.9.1.4. Indicating Lights: Equal to 10 percent of amount installed for each size and type, but no fewer than 1 of each size and type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.1.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 MANUFACTURED UNITS

2.2.1. Available Manufacturers:

2.2.1.1. Eaton Corporation; Cutler-Hammer Products.

2.2.1.2. General Electric Co.; Electrical Distribution & Protection Div.

2.2.1.3. Siemens Energy & Automation, Inc.

2.2.1.4. Square D.

2.2.2. Front-Connected, Front-Accessible Switchboard: Fixed, individually mounted main device, panel-mounted branches, and sections rear aligned.

2.2.3. Nominal System Voltage: 480Y/277 V.

2.2.4. Main-Bus Continuous: Non-tapering with rating as indicated on drawings.

2.2.5. Fabricate and test switchboards according to IEEE 344 to withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work."

2.2.6. Enclosure: Steel, NEMA 250, Type 1.

2.2.7. Enclosure Finish for Outdoor Units: Factory-applied finish in manufacturer's standard color, undersurfaces treated with corrosion-resistant undercoating.

2.2.8. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.

2.2.9. Barriers: Between adjacent switchboard sections.

2.2.10. Insulation and isolation for main bus of main section and main and vertical buses of feeder sections.

2.2.11. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

2.2.12. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

2.2.13. Pull Box on Top of Switchboard:

2.2.13.1. Adequate ventilation to maintain temperature in pull box within same limits as switchboard.

2.2.13.2. Removable covers shall form top, front, and sides. Top covers at rear shall be easily removable for drilling and cutting.

2.2.13.3. Bottom shall be insulating, fire-resistive material with separate holes for cable drops into switchboard.

2.2.13.4. Cable supports shall be arranged to facilitate cabling and adequate to support cables indicated, including those for future installation.

2.2.14. Buses and Connections: Three phase, four wire, unless otherwise indicated.

2.2.14.1. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent conductivity with copper feeder circuit-breaker line connections.

2.2.14.2. Load Terminals: Insulated, rigidly braced, silver-plated, copper runback bus extensions equipped with pressure connectors for outgoing circuit conductors. Provide load terminals for future circuit-breaker positions at full ampere rating of circuit-breaker position.

2.2.14.3. Ground Bus: 1/4-by-2-inch- minimum-size, hard-drawn copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors. For busway feeders, extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.

2.2.14.4. Contact Surfaces of Buses: Silver plated.

2.2.14.5. Main Phase Buses, Neutral Buses, and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.

2.2.14.6. Neutral Buses: 100 percent of the ampacity of phase buses, unless otherwise indicated, equipped with pressure connectors for outgoing circuit neutral cables. Bus extensions for busway feeder neutral bus are braced.

2.2.15. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

2.3 TRANSIENT VOLTAGE SUPPRESSION DEVICES

2.3.1. IEEE C62.41, integrally mounted, plug-in-style, solid-state, parallel-connected, sine-wave tracking suppression and filtering modules.

2.3.2. Minimum single-impulse current rating shall be as follows:

2.3.2.1. Line to Neutral: 100,000 A.

2.3.2.2. Line to Ground: 100,000 A.

2.3.2.3. Neutral to Ground: 50,000 A.

2.3.3. Protection modes shall be as follows:

2.3.3.1. Line to neutral.

2.3.3.2. Line to ground.

2.3.3.3. Neutral to ground.

2.3.4. EMI/RFI Noise Attenuation Using 50-ohm Insertion Loss Test: 55 dB at 100 kHz.

2.3.5. Maximum Category C combination wave clamping voltage shall not exceed 600 V, line to neutral and line to ground on 120/208 V;, and 1000 V, line to neutral and line to ground on 277/480 V systems.

2.3.6. Maximum UL 1449 clamping levels shall not exceed 400 V, line to neutral and line to ground on 120/208 V; and 800 V, line to neutral and line to ground on 277/480 V systems.

2.3.7. Withstand Capabilities: 3000 Category C surges with less than 5 percent change in clamping voltage.

2.3.8. Accessories:

2.3.8.1. Form-C contacts, one normally open and one normally closed, for remote monitoring of system operation. Contacts to reverse position on failure of any surge diversion module.

2.3.8.2. Audible alarm activated on failure of any surge diversion module.

2.3.8.3. Six-digit transient-counter set to total transient surges that deviate from the sine-wave envelope by more than 125 V.

2.4 OVERCURRENT PROTECTIVE DEVICES

2.4.1. Molded-Case Circuit Breaker: NEMA AB 3, with interrupting capacity to meet available fault currents.

2.4.1.1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2.4.1.2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

2.4.1.3. Electronic trip-unit circuit breakers shall have RMS sensing, field-replaceable rating plug, and the following field-adjustable settings:

a. Instantaneous trip.

b. Long- and short-time pickup levels.

c. Long- and short-time time adjustments.

d. Ground-fault pickup level, time delay, and I^2t response.

2.4.1.4. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.

2.4.2. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

2.4.2.1. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.

2.4.2.2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

2.4.2.3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

2.4.2.4. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

2.4.2.5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.

2.4.2.6. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.4.2.7. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.

2.4.2.8. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.

2.4.3. Enclosed, Insulated-Case Circuit Breaker: Fully rated, encased-power circuit breaker with interrupting capacity rating to meet available fault current.

2.4.3.1. Fixed circuit-breaker mounting.

2.4.3.2. Two-step, stored-energy closing.

2.4.3.3. Microprocessor-based trip units with interchangeable rating plug, LED trip indicators, and the following field-adjustable settings:

a. Instantaneous trip.

b. Long- and short-time pickup levels.

c. Long- and short-time time adjustments with I^2t response.

d. Ground-fault pickup level, time delay, and I^2t response.

2.4.3.4. Remote trip indication and control.

2.4.3.5. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.

2.4.3.6. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.

2.4.3.7. Control Voltage: 125-V, ac.

2.5 INSTRUMENTATION

2.5.1. Instrument Transformers: NEMA EI 21.1, IEEE C57.13, and the following:

2.5.1.1. Potential Transformers: Secondary voltage rating of 120 V and NEMA accuracy class of 0.3 with burdens of W, X, and Y.

2.5.1.2. Current Transformers: Ratios shall be as indicated with accuracy class and burden suitable for connected relays, meters, and instruments.

2.5.1.3. Control-Power Transformers: Dry type, mounted in separate compartments for units larger than 3 kV.

2.5.2. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:

2.5.2.1. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:

a. Phase Currents, Each Phase: Plus or minus 1 percent.

b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.

c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.

d. Megawatts: Plus or minus 2 percent.

e. Megavars: Plus or minus 2 percent.

f. Power Factor: Plus or minus 2 percent.

g. Frequency: Plus or minus 0.5 percent.

h. Megawatt Demand: Plus or minus 2 percent; demand interval programmable from 5 to 60 minutes.

i. Accumulated Energy, Megawatt Hours: Plus or minus 2 percent. Accumulated values unaffected by power outages up to 72 hours.

2.5.2.2. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.

2.6 CONTROL POWER

2.6.1. Control Circuits: 120 V, supplied through secondary disconnecting devices from control-power transformer.

2.6.2. Control-Power Fuses: Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.

2.6.3. Control Wiring: Factory installed, with bundling, lacing, and protection included. Provide flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.

2.7 ACCESSORY COMPONENTS AND FEATURES

2.7.1. Spare-Fuse Cabinet: Suitably identified, wall-mounted, lockable, compartmented steel box or cabinet. Arrange for wall mounting.

2.8 IDENTIFICATION

2.8.1. Provide identification in accordance with Division 16 Section “Electrical Identification”

PART 3 - EXECUTION

3.1 PROTECTION

3.1.1. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

3.2 EXAMINATION

3.2.1. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance.

3.2.2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

3.3.1. Install switchboards and accessories according to NEMA PB 2.1 and NECA 40.

3.3.2. Install and anchor switchboards level on concrete bases, 3.5-inch nominal thickness. Concrete base is specified in Division 16 Section "Basic Electrical Materials and Methods," and concrete materials and installation requirements are specified in Division 3.

3.3.2.1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.

3.3.2.2. For switchboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.

3.3.2.3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3.2.4. Install anchor bolts to elevations required for proper attachment to switchboards.

3.3.3. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."

3.3.4. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.

3.3.5. Operating Instructions: Frame and mount the printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.

3.3.6. Install overcurrent protective devices, transient voltage suppression devices, and instrumentation.

3.3.6.1. Set field-adjustable switches and circuit-breaker trip ranges.

3.3.7. Install spare-fuse cabinet.

3.4 IDENTIFICATION

3.4.1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."

3.4.2. Switchboard Nameplates: Label each switchboard compartment with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.5 FIELD QUALITY CONTROL

3.5.1. Prepare for acceptance tests as follows:

3.5.1.1. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.

3.5.1.2. Test continuity of each circuit.

3.5.2. Perform the following field tests and inspections and prepare test reports:

3.5.2.1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Sections 7.1, 7.5, 7.6, 7.9, 7.10, 7.11, and 7.14 as appropriate. Certify compliance with test parameters.

3.5.2.2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.5.2.3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switchboard. Remove front panels so joints and connections are accessible to portable scanner.

b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switchboard 11 months after date of Substantial Completion.

c. Instruments, Equipment, and Reports:

(1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

(2) Prepare a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 CLEANING

3.6.1. On completion of installation, inspect interior and exterior of switchboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

3.7 DEMONSTRATION

3.7.1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain switchboards, overcurrent protective devices, instrumentation, and accessories. Refer to Division 1 Section "Phase Turnover and Project Closeout."

END OF SECTION 16441

CONSTRUCTION ISSUE

SECTION 16442

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes the following:

1.2.1.1. Distribution panelboards.

1.2.1.2. Lighting and appliance branch-circuit panelboards.

1.2.1.3. Transient voltage suppression panelboards.

1.3 DEFINITIONS

1.3.1. EMI: Electromagnetic interference.

1.3.2. GFCI: Ground-fault circuit interrupter.

1.3.3. RFI: Radio-frequency interference.

1.3.4. RMS: Root mean square.

1.3.5. SPDT: Single pole, double throw.

1.4 SUBMITTALS

1.4.1. Product Data: For each type of panelboard, overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1.4.2. Shop Drawings: For each panelboard and related equipment.

1.4.2.1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.

b. Bus configuration, current, and voltage ratings.

c. Short-circuit current rating of panelboards and overcurrent protective devices.

d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components, sufficient for selective coordination study.

1.4.2.2. Wiring Diagrams: Power, signal, and control wiring.

1.4.3. Manufacturer Seismic Qualification Certification: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.4.3.1. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.4.3.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.4.3.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.4.4. Qualification Data: For testing agency.

1.4.5. Field quality-control test reports including the following:

1.4.5.1. Test procedures used.

1.4.5.2. Test results that comply with requirements.

1.4.5.3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4.6. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.4.7. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Phase Turnover and Project Closeout," include the following:

1.4.7.1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.4.7.2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

1.5.1. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.

1.5.2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.3. Comply with NEMA PB 1.

1.5.4. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

1.6.1. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1.6.1.1. Ambient Temperature: Not exceeding 104 deg F.

1.6.1.2. Altitude: Not exceeding 6600 feet.

1.6.2. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1.6.2.1. Notify Contracting Officer no fewer than ten days in advance of proposed interruption of electrical service.

1.6.2.2. Do not proceed with interruption of electrical service without Contracting Officer's written permission.

1.7 COORDINATION

1.7.1. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

1.7.2. Coordinate size and location of concrete bases, if free-standing panels are required. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

1.8 EXTRA MATERIALS

1.8.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.8.1.1. Keys: Six spares for each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:

a. Eaton Corporation; Cutler-Hammer Products.

b. General Electric Co.; Electrical Distribution & Protection Div.

c. Siemens Energy & Automation, Inc.

d. Square D.

2.1.1.2. Transient Voltage Suppression Panelboards:

a. Current Technology.

b. Liebert Corporation.

2.2 MANUFACTURED UNITS

2.2.1. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work."

2.2.2. Enclosures: Flush or Surface-mounted cabinets as scheduled. NEMA PB 1, Type 1.

2.2.2.1. Rated for environmental conditions at installed location.

a. Outdoor Locations: NEMA 250, Type 3R.

b. Kitchen Areas: NEMA 250, Type 4X, stainless steel.

c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

d. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

2.2.2.2. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

2.2.2.3. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.

2.2.3. Phase and Ground Buses:

2.2.3.1. Material: Hard-drawn copper, 98 percent conductivity.

2.2.3.2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box. All panelboards.

2.2.3.3. Isolated Equipment Ground Bus: Adequate for branch-circuit equipment ground conductors; insulated from box. Where scheduled.

2.2.3.4. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads. Where scheduled.

2.2.3.5. Split Bus: Vertical buses divided into individual vertical sections. Where scheduled.

2.2.4. Conductor Connectors: Suitable for use with conductor material.

2.2.4.1. Main and Neutral Lugs: Compression type.

2.2.4.2. Ground Lugs and Bus Configured Terminators: Compression type.

2.2.4.3. Feed-Through Lugs: Where scheduled or required, Compression type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

2.2.4.4. Extra-Capacity Neutral Lugs: Where scheduled or required, Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

2.2.5. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.

2.2.6. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices. Provide where spaces are scheduled.

2.3 PANELBOARD SHORT-CIRCUIT RATING

2.3.1. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.4 DISTRIBUTION PANELBOARDS

2.4.1. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

2.4.2. Main Overcurrent Protective Devices: Circuit breaker.

2.4.3. Branch Overcurrent Protective Devices: Bolt-on circuit breakers.

2.5 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

2.5.1. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

2.5.2. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.6 LOAD CENTERS

2.6.1. Do not use.

2.7 TRANSIENT VOLTAGE SUPPRESSION PANELBOARDS

2.7.1. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

2.7.2. Main Overcurrent Devices: Thermal-magnetic circuit breaker.

2.7.3. Branch Overcurrent Protective Devices: Bolt-on circuit breakers.

2.7.4. Bus: Copper phase and neutral buses; 200 percent capacity neutral bus and lugs.

2.7.5. Transient Voltage Suppression Device: IEEE C62.41, integrally mounted, plug-in-style, solid-state, parallel-connected, sine-wave tracking suppression and filtering modules.

2.7.5.1. Minimum Single-Impulse Current Ratings:

a. Line to Neutral: 100,000 A.

b. Line to Ground: 100,000 A.

c. Neutral to Ground: 50,000 A.

2.7.5.2. Protection modes shall be as follows:

a. Line to neutral.

b. Line to ground.

c. Neutral to ground.

2.7.5.3. EMI/RFI Noise Attenuation Using 50-ohm Insertion Loss Test: 55 dB at 100 kHz.

2.7.5.4. Maximum Category C Combination Wave Clamping Voltage: 600 V, line to neutral and line to ground on 120/208 V systems; 1000 V, line to neutral and line to ground on 277/480 V systems.

2.7.5.5. Maximum UL 1449 Clamping Levels: 400 V, line to neutral and line to ground on 120/208 V systems; 800 V, line to neutral and line to ground on 277/480 V systems.

2.7.5.6. Withstand Capabilities: 3000 Category C surges with less than 5 percent change in clamping voltage.

2.7.5.7. Accessories:

a. Form-C contacts, one normally open and one normally closed, for remote monitoring of system operation. Contacts to reverse position on failure of any surge diversion module.

b. Audible alarm activated on failure of any surge diversion module.

c. Six-digit transient-counter set to total transient surges that deviate from the sine-wave envelope by more than 125 V.

2.8 OVERCURRENT PROTECTIVE DEVICES

2.8.1. Molded-Case Circuit Breaker: UL 489, with interrupting capacity to meet available fault currents. Multipole units enclosed in a single housing, all poles common trip, with a single handle to operate as a single unit.

2.8.1.1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2.8.1.2. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.

2.8.2. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

2.8.2.1. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.

2.8.2.2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

2.8.2.3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

2.8.2.4. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

2.9 CONTROLLERS

2.9.1. Motor Controllers: NEMA ICS 2, Class A, combination controller equipped for panelboard mounting and including the following accessories:

2.10 ACCESSORY COMPONENTS AND FEATURES

2.10.1. Fungus Proofing: Permanent fungicidal treatment for panelboard interior, including overcurrent protective devices and other components.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Install panelboards and accessories according to NEMA PB 1.1.

3.1.2. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."

3.1.3. Mount top of trim 74 inches above finished floor, unless otherwise indicated.

3.1.4. Mount plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

3.1.5. Install overcurrent protective devices and controllers.

3.1.5.1. Set field-adjustable switches and circuit-breaker trip ranges.

3.1.6. Install filler plates in unused spaces.

3.1.7. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade, with caps.

3.1.8. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

3.2.1. Identify panelboards, field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."

3.2.2. Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

3.3 CONNECTIONS

3.3.1. Ground equipment according to Division 16 Section "Grounding and Bonding."

3.3.2. Connect wiring according to Division 16 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

3.4.1. Prepare for acceptance tests as follows:

3.4.1.1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.

3.4.1.2. Test continuity of each circuit.

3.4.2. Perform the following field tests and inspections and prepare test reports:

3.4.2.1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.

3.4.2.2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.4.3. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

3.4.3.1. Measure as directed during period of normal system loading.

3.4.3.2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment. Use colored tape banding to revise the color code of conductors changed to a different phase, at the panel and at the load.

3.4.3.3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.

3.4.3.4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.4.4. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scanning of each panelboard. Remove panel fronts so joints and connections are accessible to portable scanner. Perform remedial action for any deficiencies detected.

3.4.4.1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

3.4.4.2. Record of Infrared Scanning: Prepare a certified report that identifies panelboards checked and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 CLEANING

3.5.1. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16442

CONSTRUCTION ISSUE

SECTION 16460

DRY-TYPE TRANSFORMERS (600 V AND LESS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:

1.2.1.1. Distribution transformers.

1.2.1.2. Buck-boost transformers.

1.2.1.3. Control and signal transformers.

1.3 SUBMITTALS

1.3.1. Product Data Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.

1.3.2. Shop Drawings: Wiring and connection diagrams.

1.3.3. Manufacturer Seismic Qualification Certification: Submit certification that transformer assembly and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.3.3.1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.3.3.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.3.3.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.3.4. Source quality-control test reports.

1.3.5. Output Settings Reports: Record of tap adjustments specified in Part 3.

1.4 QUALITY ASSURANCE

1.4.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.2. Comply with IEEE C 57.12.91.

1.4.3. Energy-Efficient Transformers Rated 15 kVA and Larger: Certified as meeting NEMA TP 1, Class 1 efficiency levels when tested according to NEMA TP 2.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.6 COORDINATION

1.6.1. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

1.6.2. Coordinate installation of wall-mounting and structure-hanging supports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Acme Electric Corporation; Power Distribution Products Division.

2.1.1.2. Challenger Electrical Equipment Corp.; a division of Eaton Corp.

2.1.1.3. Computer Power Inc.

2.1.1.4. Controlled Power Co.

2.1.1.5. Cutler-Hammer.

2.1.1.6. GE Electrical Distribution & Control.

2.1.1.7. Jefferson Electric, Inc.

2.1.1.8. Micron Industries Corp.

2.1.1.9. Siemens Energy & Automation, Inc.

2.1.1.10. Sola/Hevi-Duty Electric.

2.1.1.11. Square D/Groupe Schneider NA.

2.2 MATERIALS

2.2.1. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

2.2.2. Cores: Grain-oriented, non-aging silicon steel.

2.2.3. Coils: Continuous copper windings without splices, except for taps.

2.2.3.1. Internal Coil Connections: Brazed or pressure type.

2.3 DISTRIBUTION TRANSFORMERS

2.3.1. Comply with NEMA ST 20, and list and label as complying with UL 1561.

2.3.2. Provide transformers that are internally braced to withstand seismic forces specified in Division 16 Section "Seismic Controls for Electrical Work."

2.3.3. Cores: One leg per phase.

2.3.4. Enclosure: Ventilated, dripproof, NEMA 250, Type 2. Indoor, where scheduled.

2.3.5. Enclosure: Ventilated, raintight, NEMA 250, Type 3R. Outdoor, where scheduled.

2.3.5.1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.

2.3.6. Transformer Enclosure Finish: Manufacturer's standard finish, unless otherwise shown or scheduled.

2.3.7. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 80 deg C rise above 40 deg C ambient temperature.

2.3.8. Taps for Transformers Smaller than 3 kVA: One 5 percent tap above normal full capacity.

2.3.9. Taps for Transformers 7.5 to 24 kVA: One 5 percent tap above and one 5 percent tap below normal full capacity.

2.3.10. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity.

2.3.11. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.

2.3.11.1. Arrange coil leads and terminal strips to minimize capacitive coupling between input and output terminals.

2.3.11.2. Include special terminal for grounding the shield.

2.3.11.3. Shield Effectiveness:

a. Capacitance between Primary and Secondary Windings: Not to exceed 33 picofarads over a frequency range of 20 Hz to 1 MHz.

b. Common-Mode Noise Attenuation: Minus 120 dBA minimum at 0.5 to 1.5 kHz; minus 65 dBA minimum at 1.5 to 100 kHz.

c. Normal-Mode Noise Attenuation: Minus 52 dBA minimum at 1.5 to 10 kHz.

2.3.12. Wall Brackets: Manufacturer's standard brackets.

2.3.13. Fungus Proofing: Permanent fungicidal treatment for coil and core.

2.4 BUCK-BOOST TRANSFORMERS

2.4.1. Description: Self-cooled, two-winding dry type, rated for continuous duty and with wiring terminals suitable for connection as autotransformer. Transformers shall comply with NEMA ST 1 and shall be listed and labeled as complying with UL 506 or UL 1561.

2.4.2. Enclosure: Ventilated, NEMA 250, Type 2.

2.4.2.1. Finish Color: Manufacturer’s standard finish.

2.5 CONTROL AND SIGNAL TRANSFORMERS

2.5.1. Description: Self-cooled, two-winding dry type, rated for continuous duty, complying with NEMA ST 1, and listed and labeled as complying with UL 506.

2.5.2. Ratings: Continuous duty. If rating is not indicated, provide at least 50 percent spare capacity above connected peak load.

2.6 SOURCE QUALITY CONTROL

2.6.1. Test and inspect transformers according to IEEE C57.12.91.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

3.1.2. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.

3.1.3. Examine walls and floors for suitable mounting conditions where transformers will be installed.

3.1.4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.

3.2.1.1. Brace wall-mounting transformers as specified in Division 16 Section "Seismic Controls for Electrical Work."

3.2.2. Install floor-mounting transformers level on concrete bases 3.5” high**.**

3.2.2.1. Anchor transformers to concrete bases according to manufacturer's written instructions, seismic codes at Project, and requirements in Division 16 Section "Seismic Controls for Electrical Work."

3.2.3. Install suspended transformers on trapeze brackets suspended from the building structure as shown on the drawings.

3.2.3.1. Brace suspended transformers as specified in Division 16 Section "Seismic Controls for Electrical Work."

3.3 CONNECTIONS

3.3.1. Ground equipment according to Division 16 Section "Grounding and Bonding."

3.3.2. Connect wiring according to Division 16 Section "Conductors and Cables."

3.3.3. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 ADJUSTING

3.4.1. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 5 percent. Submit recording and tap settings as test results.

3.4.2. Adjust buck-boost transformers to provide nameplate voltage of equipment being served, plus or minus 5 percent, at secondary terminals.

3.4.3. Output Settings Report: Prepare a written report recording output voltages and tap settings.

END OF SECTION 16460

CONSTRUCTION ISSUE

SECTION 16491

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes the following:

1.2.1.1. Cartridge fuses rated 600 V and less for use in switches, switchboards, controllers, and motor-control centers.

1.2.1.2. Spare-fuse cabinets.

1.3 SUBMITTALS

1.3.1. Product Data: Include the following for each fuse type indicated:

1.3.1.1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.

1.3.1.2. Let-through current curves for fuses with current-limiting characteristics.

1.3.1.3. Time-current curves, coordination charts and tables, and related data.

1.3.1.4. Fuse size for elevator feeders and elevator disconnect switches.

1.3.2. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

1.3.2.1. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.

1.3.2.2. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

1.3.3. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals.

1.3.3.1. In addition to items specified in Division 1 Section ”Phase Turnover and Contract Closeout," include the following:

a. Let-through current curves for fuses with current-limiting characteristics.

b. Time-current curves, coordination charts and tables, and related data.

c. Ambient temperature adjustment information.

1.4 QUALITY ASSURANCE

1.4.1. Source Limitations: Obtain fuses from a single manufacturer.

1.4.2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.3. Comply with NEMA FU 1.

1.4.4. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

1.5.1. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

1.6.1. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size.

1.7 EXTRA MATERIALS

1.7.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7.1.1. Fuses: Quantity equal to ten percent of each fuse type and size, but no fewer than 3 of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Cooper Bussman, Inc.

2.1.1.2. Eagle Electric Mfg. Co., Inc.; Cooper Industries, Inc.

2.1.1.3. Ferraz Shawmut, Inc.

2.1.1.4. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

2.2.1. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

2.3 SPARE-FUSE CABINET

2.3.1. Cabinet: Wall-mounted, 0.05-inch- thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.

2.3.1.1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.

2.3.1.2. Finish: Gray, baked enamel.

2.3.1.3. Identification: "SPARE FUSES" in 1-1/2-inch- high letters on exterior of door.

2.3.1.4. Fuse Pullers: For each size of fuse.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

3.1.2. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

3.1.3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

3.2.1. Service Entrance: Class L, time delay.

3.2.2. Feeders: Class J, time delay.

3.2.3. Motor Branch Circuits: Class RK5, time delay.

3.2.4. Other Branch Circuits: Class RK5, time delay.

3.3 INSTALLATION

3.3.1. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.3.2. Install spare-fuse cabinet(s).

3.4 IDENTIFICATION

3.4.1. Install labels indicating fuse replacement information on inside door of each fused switch or other fusible device.

END OF SECTION 16491

CONSTRUCTION ISSUE

SECTION 16500-A

INTERIOR LIGHTING

PART 1. GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes the following:

1.2.1.1. Interior lighting fixtures with lamps and ballasts.

1.2.1.2. Lighting fixtures mounted on exterior building surfaces.

1.2.1.3. Exit signs.

1.2.2. Related Sections include the following:

1.2.2.1. Division 01 Section “Sustainable Design Requirements”.

1.2.2.2. Division 16 Section "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

1.2.2.3. Division 16 Section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.2.2.4. Division 16 Section "Dimming Controls" for architectural dimming systems.

1.3 DEFINITIONS

1.3.1. BF: Ballast factor. Ratio of light output of a given lamp(s) operated by the subject ballast to the light output of the same lamp(s) when operated on an ANSI reference circuit.

1.3.2. CRI: Color rendering index.

1.3.3. CU: Coefficient of utilization.

1.3.4. LER: Luminaire efficiency rating, which is calculated according to NEMA LE 5. This value can be estimated from photometric data using the following formula:

1.3.4.1. LER is equal to the product of total rated lamp lumens times BF times luminaire efficiency, divided by input watts.

1.3.5. RCR: Room cavity ratio.

1.4 SUBMITTALS

1.4.1. Product Data: For each type of lighting fixture scheduled, arranged in order of fixture designation. Include data on features, accessories, finishes, photometric performance data, and the following:

1.4.1.1. Physical description of fixture, including dimensions and verification of indicated parameters.

1.4.1.2. Coefficient of Utilization Chart

1.4.1.3. Emergency lighting unit battery and charger.

1.4.1.4. Fluorescent and high-intensity-discharge ballasts.

a. Fluorescent: for each specific lamp / ballast system used, provide system lumens, input watts, ballast factor, efficacy and minimum starting temperature. For dimming ballasts, provide the data at minimum and maximum of the dimming range.

1.4.1.5. Lamps (Full data – Include ANSI Code, initial and mean lumens, rated life, CRI).

1.4.2. Wiring Diagrams: Power, signal, and control wiring.

1.4.3. Product Certificates: For each type of ballast for dimmer-controlled fixtures, signed by product manufacturer.

1.4.4. Field quality-control test reports.

1.4.5. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Phase Turnover and Contract Closeout," include the following:

1.4.5.1. Catalog data for each fixture. Include the diffuser, ballast, and lamps installed in that fixture.

1.4.5.2. List of lamp requirements for each room (for relamping purposes), including: fixture drawing designation(s) in which lamp is used; the full lamp description; full ordering code or manufacturer's product number; total quantity of lamps installed.

1.4.6. Sustainable Design Submittals:

a. Materials shall comply with requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating the amount of mercury in all mercury containing lamps.

1.4.7.

1.4.8. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

1.5.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.2. Comply with NFPA 70.

1.5.3. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.6 WARRANTY

1.6.1. Warranty Period: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.

1.6.2. Special Warranty for Fluorescent Ballasts: Manufacturer's standard form in which ballast manufacturer agrees to repair or replace ballasts that fail in materials or workmanship within specified warranty period.

1.6.2.1. Warranty Period for Electronic Ballasts: Five years from date of Substantial Completion.

1.6.3. Manufacturer's Special Warranty for T5 and T8 Fluorescent Lamps: Manufacturer's standard form, made out to Owner and signed by lamp manufacturer agreeing to replace lamps that fail in materials or workmanship, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1.6.3.1. Warranty Period: Two years from date of Substantial Completion.

1.7 EXTRA MATERIALS

1.7.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7.1.1. Lamps**:** 10 for every 100 of each type and rating installed. Furnish at least one of each type, excluding inductively-coupled electrodeless “I.C.E.” lamps.

PART 2. PRODUCTS

2.1 SUSTAINABILITY REQUIREMENTS

2.1.1. Comply with Division 01 Section “Sustainable Design Requirements.”

2.1.2. Mercury Containing Lamps

2.1.2.1. On a weighted average, lamps must have a mercury content of 90 picograms per lumen-hour or less.

2.2 MANUFACTURERS

2.2.1. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.2.1.1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.3 FIXTURES AND COMPONENTS, GENERAL

2.3.1. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

2.3.2. Fluorescent Fixtures: Comply with UL1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

2.3.3. HID Fixtures: Comply with UL1598. Where LER is specified, test according to NEMA LE 5B. Metal halide lamp fixtures shall use "O-rated" lamps suitable for open fixtures, or shall be fitted with an enclosing diffuser; if the enclosing diffuser is thermoplastic, such as acrylic, and the lamp is not "O-rated," a tempered glass shield shall be provided between the lamp and the plastic diffuser.

2.3.4. Metal Parts: Free of burrs and sharp corners and edges.

2.3.5. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

2.3.6. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

2.3.7. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

2.3.7.1. White Surfaces: 85 percent.

2.3.7.2. Specular Surfaces: 83 percent.

2.3.7.3. Diffusing Specular Surfaces: 75 percent.

2.3.7.4. Laminated Silver Metallized Film: 90 percent.

2.3.8. Plastic Diffusers, Covers, and Globes:

2.3.8.1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

a. Lens Thickness: At least 0.125 inch minimum unless different thickness is scheduled.

b. UV stabilized.

2.3.8.2. Glass: Annealed crystal glass, unless otherwise indicated.

2.4 LIGHTING FIXTURES

2.4.1. Fixture.

2.4.1.1. Refer to Drawings for fixture designations, types, voltage, mounting and model numbers.

2.5 FLUORESCENT LAMP BALLASTS

2.5.1. Description: Include the following features, unless otherwise indicated:

2.5.1.1. Designed for type and quantity of lamps indicated at full light output except for emergency lamps powered by in-fixture battery-packs.

2.5.2. Electronic ballasts for linear lamps shall include the following features, unless otherwise indicated:

2.5.2.1. Comply with NEMA C82.11.

2.5.2.2. Ballast Type: Instant start, unless otherwise indicated.

2.5.2.3. Programmed Start: Ballasts with two-step lamp starting to extend life of frequently started lamps.

2.5.2.4. Operating Temperature: Ballasts for standard T8 and T5 lamps shall be suitable for ambient temperatures from 0°F to 120°F, starting and operating lamps reliably as low as 0°F.

2.5.2.5. System Ballast Factor: Not less than 0.90 with scheduled lamps, unless scheduled otherwise.

2.5.2.6. Sound Rating: A.

2.5.2.7. Total harmonic distortion rating of less than 10 percent according to NEMA C82.11.

2.5.2.8. Transient Voltage Protection: IEEE C62.41, Category A.

2.5.2.9. Operating Frequency: 20 kHz or higher.

2.5.2.10. Power Factor: 95 per cent minimum.

2.5.2.11. Lamp Current Crest Factor: Less than 1.7.

2.5.2.12. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.

2.5.3. Ballasts for compact lamps in recessed fixtures shall have the following features, unless otherwise indicated:

2.5.3.1. Type: Electronic.

2.5.3.2. Power Factor: 90 percent, minimum.

2.5.3.3. Flicker: Less than 5 percent.

2.5.3.4. Lamp Current Crest Factor: Less than 1.7.

2.5.3.5. Electronic Ballast Operating Frequency: 20 kHz or higher.

2.5.3.6. Lamp end-of-life detection and shutdown circuit.

2.5.3.7. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.

2.5.3.8. Interference: Comply with 47 CFR, Chapter 1, Part 18, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.

2.5.4. Ballasts for Low-Temperature Environments (Less than 65 degrees F.):

2.5.4.1. Temperatures 0 deg F and Higher: Electronic type rated for 0 deg F starting temperature.

2.5.5. Ballasts for Low Electromagnetic-Interference Environments: Comply with 47 CFR, Chapter 1, Part 18, Subpart C, for limitations on electromagnetic and radio-frequency interference for consumer equipment.

2.6 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

2.6.1. General: Comply with NEMA C82.4 and UL 1029. Shall include the following features, unless otherwise indicated.

2.6.1.1. Type: Constant-wattage autotransformer or regulating high-power-factor type.

2.6.1.2. Minimum Starting Temperature: Minus 22 deg F for single-lamp ballasts.

2.6.1.3. Normal Ambient Operating Temperature: 104 deg F.

2.6.1.4. Open-circuit operation that will not reduce average life.

2.6.2. Low-Noise Ballasts: Manufacturers' standard epoxy-encapsulated models designed to minimize audible fixture noise.

2.7 EXIT SIGNS

2.7.1. General: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.

2.7.2. Internally Lighted Signs:

2.7.2.1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum of rated lamp life.

2.7.3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

2.7.3.1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.

2.7.3.2. Charger: Fully automatic, solid-state type with sealed transfer relay.

2.7.3.3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

2.8 FLUORESCENT LAMPS

2.8.1. Sustainability Requirements

2.8.1.1. Comply with Division 01 Section “Sustainable Design Requirements.”

2.8.1.2. Mercury Containing Lamps

a. On a weighted average, lamps must have a mercury content of 90 picograms per lumen-hour or less.

2.8.2. T8 rapid-start low-mercury lamps, rated 32 W maximum, nominal length 48 inches, 2800 initial lumens (minimum), CRI of 82 (minimum), color temperature of 3500K, and average rated life of 20,000 hours, unless otherwise indicated.

2.8.3. T8 rapid-start low-mercury lamps, rated 17 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), CRI of 82 (minimum), color temperature of 3500K, and average rated life of 20,000 hours, unless otherwise indicated.

2.8.4. T8 Fluorescent lamps of other lengths shall be selected from the manufacturer's same product series as the above, having the same efficacy and characteristics.

2.8.5. T5HO rapid-start low-mercury lamps, rated 54 W maximum, nominal length 48 inches, 5000 initial lumens (minimum), CRI of 82 (minimum), color temperature of 3500K, and average rated life of 20,000 hours, unless otherwise indicated.

2.8.6. T5 rapid start low-mercury lamps, rated 28W maximum, nominal length 48 inches, 2730 initial lumens (minimum), CRI of 82 (minimum), color temperature of 3500K, and average rated life of 20,000 hours, unless otherwise indicated.

2.8.7. T5 rapid start low-mercury lamps, rated 14 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), color temperature of 3500K, and average rated life of 20,000 hours, unless otherwise indicated.

2.8.8. T5 Fluorescent lamps of other lengths shall be selected from the manufacturer's same product series as the above, having the same efficacy and characteristics.

2.8.9. Compact Fluorescent Lamps: CRI 80 (minimum), color temperature 3500K, average rated life of 10,000 hours at 3 hours operation per start, unless otherwise indicated.

2.8.9.1. T4, Double-Twin Tube: Rated 26 W, 1700 initial lumens (minimum).

2.8.9.2. T4, Double-Twin Tube: Rated 32 W, 2300 initial lumens (minimum).

2.8.9.3. T4, Double-Twin Tube: Rated 42 W, 3100 initial lumens (minimum).

2.8.10. Any of the above lamps may be specified in 3000 deg K color temperature where specifically scheduled or noted on the drawings for special product displays.

2.8.11. Inductively Coupled Electrodeless Lamps: 100 watt Sylvania "Icetron" induction lamps, or equal; 100,000 hour rated life, -40 deg F minimum starting temperature, 8000 lumens (initial), 3500 K color temperature, 80 CRI. (For use in frozen food storage rooms).

2.9 HIGH-INTENSITY-DISCHARGE LAMPS

2.9.1. Metal Halide Lamps: PAR 38, ceramic arc tube, pulse start, Philips MasterColor or equal; UV filtered, 12,500-Hour rated life, low mercury lamp. 3000 K color temperature CRI 82, or 4000 K color temperature CRI 92; 70 W or 100 W; as scheduled. (Used in accent lighting track fixtures.)

2.10 LED LIGHTING MODULES

2.10.1. Light Emitting Diode lighting modules shall be as scheduled, with the following technical characteristics, unless scheduled otherwise:

2.10.2. Rated life: 55,000 hours

2.10.3. Efficacy: 60 lumens/watt minimum

2.10.4. Color temperature: 5000K to 6500K (in utility or back-room areas); 3500K in public areas.

2.10.5. CRI: 70 (minimum in utility or back-room areas); 85 in public areas.

2.10.6. Dimmable to 20% of maximum

2.11 FIXTURE SUPPORT COMPONENTS

2.11.1. Comply with Division 16 Section "Basic Electrical Materials and Methods" for channel- and angle-iron supports and nonmetallic channel and angle supports.

2.11.2. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

2.11.3. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

2.11.4. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated, 12 gage.

2.11.5. Wires For Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.

2.11.6. Rod Hangers: 3/16-inch-minimum diameter, cadmium-plated, threaded steel rod.

2.11.7. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

2.11.8. Aircraft Cable Support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer.

2.12 FINISHES

2.12.1. Fixtures: Manufacturers' standard, unless otherwise indicated.

2.12.1.1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.

2.12.1.2. Metallic Finish: Corrosion resistant.

PART 3. EXECUTION

3.1 INSTALLATION

3.1.1. Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

3.1.2. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.

3.1.2.1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.

3.1.2.2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.

3.1.2.3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.

3.1.3. Suspended Fixture Support: As follows:

3.1.3.1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.

3.1.3.2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3.1.3.3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

3.1.4. Adjust aimable fixtures to provide required light intensities.

3.2 CONNECTIONS

3.2.1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

3.3.1. Inspect each installed fixture for damage. Replace damaged fixtures and components.

3.3.2. Verify normal operation of each fixture after installation.

3.3.3. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify normal transfer to battery power source and retransfer to normal.

3.3.4. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.3.5. Corroded Fixtures: During warranty period, replace fixtures that show any signs of corrosion.

END OF SECTION 16500-A

CONSTRUCTION ISSUE

SECTION 16500-B

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes the following:

1.2.1.1. Exterior luminaires with lamps and ballasts.

1.2.1.2. Luminaire poles and bases.

1.2.2. Related Sections include the following:

1.2.2.1. Division 01 Section “Sustainable Design Requirements”.

1.2.2.2. Division 16 Section "Interior Lighting" for exterior luminaires normally mounted on exterior surfaces of buildings.

1.3 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

1.3.1. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4.

1.3.2. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4.

1.3.3. Wind Load: Pressure of wind on pole and luminaire, calculated and applied as stated in AASHTO LTS-4.

1.3.3.1. Wind speed for calculating wind load for poles 50 feet or less in height is 125 mph.

1.4 SUBMITTALS

1.4.1. Product Data: For each luminaire, arranged in the order of lighting unit designation. Include data on features, accessories, finishes, and the following:

1.4.1.1. Physical description of fixture, including dimensions and verification of indicated parameters.

1.4.1.2. Luminaire dimensions, effective projected area, details of attaching luminaires, accessories, and installation and construction details.

1.4.1.3. Luminaire materials.

1.4.1.4. Photoelectric relays.

1.4.1.5. Fluorescent and high-intensity-discharge ballasts.

1.4.1.6. Fluorescent and high-intensity-discharge lamps.

1.4.1.7. Electrical and energy-efficiency data for ballasts.

1.4.2. Product Data: For each pole type. Provide Manufacturer's descriptive data, materials, finishes, dimensions, and loading data

1.4.2.1. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1.4.3. Sustainable Design Submittals:

a. Materials shall comply with requirements of Division 1 Section "Sustainable Design Requirements."
b. Submit product data indicating the amount of mercury in all mercury containing lamps.

1.4.4. Wiring Diagrams: Power, signal, and control wiring.

1.4.5. Field quality-control test reports.

1.4.6. Operation and Maintenance Data: For luminaires to include in maintenance manuals.

1.4.7. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

1.5.1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.2. Comply with IEEE C2, "National Electrical Safety Code."

1.5.3. Comply with NFPA 70.

1.6 WARRANTY

1.6.1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace luminaires or components of luminaires and lamps that fail in materials or workmanship; corrode; or fade, stain, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

1.6.1.1. Warranty Period for Luminaires: Five years from date of Substantial Completion.

a. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.

b. Warranty Period for Color Retention: Five years from date of Substantial Completion.

1.6.1.2. Warranty Period for Lamps: Replace lamps and fuses that fail within 12 months from date of Substantial Completion; furnish replacement lamps and fuses that fail within the second 12 months from date of Substantial Completion.

1.7 EXTRA MATERIALS

1.7.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7.1.1. Spare Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY REQUIREMENTS

2.1.1. Comply with Division 01 Section "Sustainable Design Requirements."

2.1.2. Mercury Containing Lamps

2.1.2.1. On a weighted average, lamps must have a mercury content of 90 picograms per lumen-hour or less.

MANUFACTURERS

2.1.3. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.1.3.1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.2 LUMINAIRES, GENERAL

2.2.1. Complying with UL 1598 and listed for installation in wet locations.

2.2.2. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

2.2.3. Metal Parts: Free of burrs and sharp corners and edges.

2.2.4. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.

2.2.5. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

2.2.6. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames,

lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

2.2.7. Exposed Hardware Material: Stainless steel.

2.2.8. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

2.2.9. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

2.2.9.1. White Surfaces: 85 percent.

2.2.9.2. Specular Surfaces: 83 percent.

2.2.9.3. Diffusing Specular Surfaces: 75 percent.

2.2.10. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

2.3 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

2.3.1. General: Comply with NEMA C82.4 and UL 1029. Shall include the following features, unless otherwise indicated:

2.3.1.1. Type: Constant-wattage autotransformer or regulating high-power-factor type.

2.3.1.2. Minimum Starting Temperature: Minus 22 deg F for single-lamp ballasts.

2.3.1.3. Normal Ambient Operating Temperature: 104 deg F.

2.3.1.4. Open-circuit operation will not reduce average life.

2.3.1.5. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.

2.4 HIGH-INTENSITY-DISCHARGE LAMPS

2.4.1. Pulse-Start, Metal Halide Lamps: Minimum CRI 65, and color temperature 4000 K.

2.5 FACTORY FINISHES

2.5.1. Factory-Applied Finish for Aluminum Luminaires and Poles: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.5.1.1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

2.5.1.2. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally

colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

a. Color: Dark bronze.

2.6 POLES AND SUPPORT COMPONENTS, GENERAL REQUIREMENTS

2.6.1. Structural Characteristics: Comply with AASHTO LTS-4.

2.6.1.1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in Part 1 "Structural Analysis Criteria for Pole Selection" Article, with a gust factor of 1.3.

2.6.1.2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

2.6.2. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts, unless otherwise indicated.

2.6.3. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

2.6.3.1. Materials: Shall not cause galvanic action at contact points.

2.6.3.2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication, unless stainless-steel items are indicated.

2.6.3.3. Anchor-Bolt Template: Plywood or steel.

2.6.4. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Division 3 Section "Cast-in-Place Concrete."

2.7 ALUMINUM POLES

2.7.1. Poles: ASTM B 209, 5052-H34 marine sheet alloy with access handhole in pole wall.

2.7.1.1. Shape: Round, straight.

2.7.1.2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.

2.7.2. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

2.7.3. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Division 16 Section "Grounding and Bonding," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.

2.7.4. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.

2.7.4.1. Tapered oval cross section, with straight tubular end section to accommodate luminaire.

2.7.4.2. Finish: Same as luminaire.

2.7.5. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.

2.7.6. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.7.6.1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

2.7.6.2. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

a. Color: Dark bronze.

2.8 POLE ACCESSORIES

2.8.1. Base Covers: Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish same as pole.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

3.1.1. Install lamps in each fixture.

3.1.2. Luminaire Attachment: Fasten to indicated structural supports.

3.1.3. Adjust luminaires that require field adjustment or aiming.

3.2 CONNECTIONS

3.2.1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 POLE INSTALLATION

3.3.1. Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

3.3.2. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features, unless otherwise indicated on Drawings:

3.3.2.1. Fire Hydrants and Storm Drainage Piping: 60 inches.

3.3.2.2. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet or per utility company requirements.

3.3.2.3. Trees: 15 feet.

3.3.3. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Division 3 Section "Cast-in-Place Concrete."

3.3.4. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.

3.3.4.1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.

3.3.4.2. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.

3.3.4.3. Install base covers, unless otherwise indicated.

3.3.4.4. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

3.4 FIELD QUALITY CONTROL

3.4.1. Inspect each installed fixture for damage, and test for normal operation. Replace damaged fixtures and components.

3.4.2. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 16500-B

CONSTRUCTION ISSUE

SECTION 16640

CATHODIC PROTECTION

PART 1. GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes Cathodic Protection for underground or submerged structures of ferrous metal.

1.2.1.1. Buried ferrous metal pipelines for **natural gas and water** service, including valves and fittings.

1.2.1.2. Valves or fittings of ferrous metal on buried nonmetallic pipelines for **natural gas and water** service.

1.2.2. The structures to be cathodically protected are shown on the contract drawings.

1.3 CATHODIC PROTECTION INSTALLATION AND PERFORMANCE REQUIREMENTS

1.3.1. Qualified Individual: Design, construction supervision, and testing of the cathodic protection and associated bonding, isolation, and coating of the structures shall be accomplished by an individual qualified under one of the following:

1.3.1.1. A Professional Engineer Registered or Licensed in one of the United States or Puerto Rico in the field of Corrosion Engineering, specializing in cathodic protection;

1.3.1.2. An individual Accredited by the National Association of Corrosion Engineers (NACE) as a Corrosion Specialist or as a Corrosion Technologist specializing in cathodic protection.

1.3.2. Design appropriate and economical cathodic protection for each structure in accordance with the NACE Recommended Practice for Control of Pipeline Corrosion. Include all bonding and isolation, and appropriate test stations. Design for not less than 20 years anode life expectancy.

1.3.2.1. Investigate existing conditions on site that affect cathodic protection, and research utility records of the Host Military Installation to determine the existence of other utilities and cathodic protection systems in the area that may influence, or be influenced by, the new protected structure(s).

1.3.2.2. Conduct any tests that may be required in the design of the cathodic protection, furnishing all equipment, supplies, and labor for the tests. (Examples of tests that might be required are soil resistivity, current requirements tests, structure continuity tests, stray current tests.)

1.3.3. Furnish and install the cathodic protection equipment and materials as designed by the Qualified Individual, under his supervision.

1.3.4. Test the completed cathodic protection to demonstrate acceptable protective structure-to-soil potentials of not less than -0.85 volt, nor exceeding -2.0 volts, (Cu/CuSO4 electrode); with anode current flows not exceeding the current as designed for anode life expectancy.

1.3.5. Test the protected structure for "hot spots", unprotected areas of structure, or interference from stray currents.

1.3.6. Check for cathodic interference on other structures in the vicinity, if deemed necessary by the Qualified Individual.

1.3.7. Make any adjustments or corrections that may be required to bring the protected structure to acceptable protection, or to eliminate interferences, and retest.

1.3.8. Furnish full reports of all tests, prepared and signed by the Qualified Individual.

1.3.9. SUBMITTALS

1.3.9.1. Qualifications and Credentials of the Qualified Individual. Submit verifiable evidence of the required engineering registration/license or NACE accreditation, for approval.

1.3.9.2. Design calculations supporting the cathodic protection design, and sketches indicating the proposed cathodic protection installations, for approval and record.

1.3.9.3. List of materials and equipment proposed for the cathodic protection installation, for approval and record.

1.3.9.4. Results of all tests performed before and after installation, in clear, typewritten tabular form, certified by the Qualified Individual, for permanent facility records.

1.3.9.5. Operation and Maintenance information. Include detailed recommendations for adjustments, maintenance testing and full descriptions of all parts for replacement purposes.

1.3.9.6. As-Built drawings: Record the locations of all wiring, connections, equipment and components of the cathodic protection system on the As-Built record drawings required under Division 1 Section, "Phase Turnover and Contract Closeout".

1.3.10. SUBMITTALS

1.3.10.1. Submit catalog data on all equipment and materials to be provided for the cathodic protection installation, showing conformance to these specification requirements. For Approval.

1.3.10.2. Submit test reports of all tests conducted on the cathodic protection systems. For Approval and permanent facility records.

1.3.10.3. Operation and Maintenance information, including spare parts information.

1.3.10.4. Submit Record Drawings: Record locations and sizes of anodes, test stations, insulators and the like on the record drawings as required in Division 1 Section "Phase Turnover and Contract Closeout".

PART 2. PRODUCTS

2.1 MANUFACTURERS

2.1.1. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.1.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 Sacrificial Anodes

2.2.1. Available Manufacturers

2.2.1.1. HARCO

2.2.1.2. Mesa Products

2.2.1.3. Brance-Krachy

2.2.2. Packaged Magnesium Anodes, H-1 Alloy:

2.2.2.1. Cast magnesium anodes of H-1 alloy, Grade A, in accordance with ASTM Standard B843, Alloy AZ63. Open Circuit Potential not less than 1.53 volts, and Current Efficiency not less than 45%, when tested in accordance with ASTM-G97 procedures.

a. H-1 magnesium alloy, Grade A: Aluminum 5.3-6.7%; Zinc 2.5-3.5%; Manganese 0.15-0.7%; Silicon 0.10% max.; Copper 0.02% max.; Nickel 0.002% max.; Iron 0.003% max.; Other Impurities 0.30% max.; Magnesium – remainder to 100%.

2.2.2.2. Lead wire of #12 AWG copper wire, insulated with type TW insulation or HMWPE insulation, 10 feet long, silver-soldered (45% silver) to the galvanized steel core of the magnesium anode, and sealed against moisture.

2.2.2.3. Anode centered in a cloth bag containing a backfill mixture of 75% hydrated gypsum, 20% bentonite, and 5% sodium sulfate.

2.2.2.4. Packaged for shipping and storage in a multiwall paper sack; palletized, and film-wrapped.

2.3 Test Stations

2.3.1. Available Manufacturers

2.3.1.1. Cott Manufacturing Company

2.3.1.2. C.P. Test Services

2.3.1.3. Handley Industries

2.3.2. Test stations shall be flush-to-grade design with sturdy plastic outer tube and well-sealing top cover, similar to “Fink” test stations by Cott Manufacturing . Terminals and connecting links shall be of nickel plated brass. Provide each test station with a minimum of 3 terminals and one link. Station shall include a locator magnet.

2.3.3. Provide three each of any special tools required for operation and maintenance of the test stations.

PART 3. EXECUTION

3.1 INSTALLATION OF PACKAGED MAGNESIUM ANODES

3.1.1. Handling: Keep packaged magnesium anodes dry and protect from physical damage until ready to install. Remove protective packaging carefully just before installation to avoid damage to the cloth backfill sack or lead wire. Never handle the anode by its lead wire. When lowering the anode into the earth, support its weight with a “sling” of rope or fabric until it is resting on the bottom of the hole.

3.1.2. Location: Space anodes evenly over the extent of the protected structure; if one anode is required, it should be near the midpoint of the structure.

3.1.3. Bell Hole: Provide a bell hole for the anode that is to one side of the structure to be protected, deep enough that the entire anode will be lower than the lowest part of the structure. Minimum separation of the anode from the structure shall be 12 inches. Over excavate sufficiently so that all large rocks and other foreign matter can be removed from the vicinity of the anode. Segregate the backfill so that the backfill close to the anode or its lead wire contains no debris or stones larger than 1/2 inch, to avoid damaging the anode or wire.

3.1.4. Wiring: Anode lead wires and wires for contact to the structure shall be installed with sufficient slack that tamping the backfill will not place strain upon the wires or the wire connections. Place wires in the trench in such a way that they are not likely to be damaged if the structure has to be dug up in the future.

3.1.4.1. Connecting to the Structure: All connections to the structure shall be exothermically welded (Cadweld, Thermoweld) to the structure. The weld and all exposed metal of the structure and the wire shall be thoroughly insulated and protected, using a plastic weld cap filled with mastic. Follow instructions of the weld manufacturer explicitly. The structure wire connections for the anode current and for testing must be separate welds separated by at least 12 inches.

3.1.4.2. Connecting to Test Stations: Connect to test station terminals with at least 10 inches of slack inside the test station, so that the entire terminal board can be removed for servicing or testing. Coil the slack wire compactly below the terminal board. Ensure that all terminal connections are clean and bright, and made up tightly. Expose no more of the copper wire than necessary to make the connections.

3.1.5. Backfilling: When backfilling the anode, after about 12 inches of backfill cover has been placed, activate the anode by pouring 5 gallons of clean water slowly over the anode site to moisten the anode, the prepared backfill inside the cloth bag, and the earth around the anode.

3.2 INSTALLATION OF TEST STATIONS

3.2.1. Avoid placing test stations directly above anodes or directly above the protected structure. Place test stations 18 to 24 inches off the centerline of the protected structure, and at least 5 feet horizontally from the anode. Place the top of the station flush with pavements, or 1/2 inch above grade if unpaved. The earth directly underneath a test station should be native backfill, so it can be used for earth contact for testing purposes in case the surrounding area is paved or covered.

3.3 TESTING

3.3.1. Structure-to-Soil Potential Measurements

3.3.1.1. Be sure your test lead connection to the structure makes good contact to metal. Use abrasive paper or a file to clean tarnish or soil from any connection point. Do not use the anode wire as a structure contact; use an independent structure contact wire at the test station.

3.3.1.2. To insure good soil contact at the tip of the copper/copper sulfate reference electrode, moisten the soil slightly (about 1/2 cup of clean water) at the point of contact. Place the reference electrode on the soil as close to the vertical centerline of the structure as possible.

3.3.1.3. Record the negative potential of the pipe to the soil, to 3 significant figures.

3.3.2. Anode Current Measurements

3.3.2.1. Positive current flow in the anode lead is from the structure to the anode.

3.3.2.2. Record current to 3 significant figures. Record a sample structure-to-soil potential reading taken simultaneously with the current reading, to ensure that the insertion of the ammeter has not altered the protective current level.

3.3.3. Testing Insulating Couplings and Unions

3.3.3.1. Presence of a potential difference across the union or coupling is usually satisfactory evidence that the insulator is intact; but lack of a potential difference is inconclusive.

3.3.3.2. If the potential difference is zero or very small, test the insulator with a Test Instrument designed for the purpose, or with a battery and magnetic compass. Apply the battery voltage across the insulator with test leads (ensure good contact on both sides of the insulator), while noting any deflection of the magnetic compass near the insulator. Keep the battery leads close together and as far away from the compass as possible, since some current may flow in the leads through a parallel path around the insulator; i.e., through earth. If the leads are near the compass, their magnetic field may affect the compass. A current through a defective insulator will produce a magnetic field and deflect the compass pointer.

3.3.4. Test Reports:

3.3.4.1. Record all tests and corrective actions. Provide a test report, clearly typed, showing all tests and numerical results, identifying the protected structures tested, persons involved in the tests, equipment used, and the date the tests and corrective actions were accomplished..

END OF SECTION 16640

CONSTRUCTION ISSUE

SECTION 16726

PUBLIC ADDRESS AND MUSIC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.1.2. Section 13853, Mass Notification System

1.1.3. Section 13851, Fire Alarm System

1.2 SUMMARY

1.2.1. This Section includes equipment for amplifying, distributing, and reproducing sound signals.

1.3 DEFINITIONS

1.3.1. Channels: Separate parallel signal paths, from sources to loudspeakers or loudspeaker zones, with separate amplification and switching that permit selection between paths for speaker alternative program signals.

1.3.2. Zone: Separate group of loudspeakers and associated supply wiring that may be arranged for selective switching between different channels.

1.3.3. VU: Volume unit.

1.4 SUBMITTALS

1.4.1. Product Data: For the following:

1.4.1.1. Tape Cassette Deck

1.4.1.2. CD Player Deck

1.4.1.3. AM/FM Tuner

1.4.1.4. Programmed Prerecorded Announcement Unit

1.4.1.5. Preamplifiers.

1.4.1.6. Power amplifiers.

1.4.1.7. Microphone.

1.4.1.8. Volume limiter/compressor.

1.4.1.9. Mass Notification paging adapter.

1.4.1.10. Telephone paging adapter.

1.4.1.11. Tone generator.

1.4.1.12. Equipment cabinet and rack.

1.4.1.13. Monitor panel.

1.4.1.14. Loudspeakers.

1.4.1.15. Noise-operated gain controller for Sales Area Zone.

1.4.2. Shop Drawings: Signed and sealed by a qualified professional engineer.

1.4.2.1. Design Calculations: Calculate requirements for selecting seismic restraints for central control cabinets.

1.4.2.2. Equipment Details: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection.

1.4.2.3. Control panels.

1.4.2.4. Rack arrangements.

1.4.2.5. Wiring Diagrams: Power, signal, and control wiring. Include the following:

a. Identify terminals to facilitate installation, operation, and maintenance.

b. Single-line diagram showing interconnection of components.

c. Cabling diagram showing cable routing.

1.4.3. Manufacturer Seismic Qualification Certification: Submit certification that public address and music equipment, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.4.3.1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.4.3.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.4.3.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.4.4. Qualification Data: For Installer and testing agency.

1.4.5. Field quality-control test reports.

1.4.6. Operation and Maintenance Data: For public address and music equipment to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1.5.1.1. Maintenance Proximity: Not more than 4 hours' normal travel time from Installer's place of business to Project site.

1.5.2. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1.5.2.1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

1.5.3. Source Limitations: Obtain public address and music equipment through a single source authorized by manufacturer to distribute each product.

1.5.4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.5. Comply with NFPA 70.

1.5.6. Comply with NFPA 72 requirements for speech intelligibility.

1.5.7. Comply with UL 50.

1.6 COORDINATION

1.6.1. Coordinate layout and installation of system components and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1. Alpha Communications.

2.1.1.2. Altec Lansing Technologies, Inc.

2.1.1.3. Atlas Soundolier; Atlas Sound.

2.1.1.4. Bogen Communications International, Inc.

2.1.1.5. Dukane Corporation; Communications Systems Div.

2.1.1.6. Electro-Voice, Inc.

2.1.1.7. Executone Information Systems, Inc.

2.1.1.8. Federal Signal Corporation; Electrical Products Division.

2.1.1.9. Peavey Electronics Corporation.

2.1.1.10. Rauland-Borg Corporation.

2.1.1.11. Whelen Engineering Company, Inc.

2.2 FUNCTIONAL DESCRIPTION OF SYSTEM

2.2.1. System Functions: Include the following:

2.2.1.1. Providing three separate zones unless otherwise noted or shown on drawings.

2.2.1.2. Selectively connecting separate zones to different signal channels.

2.2.1.3. Selectively amplifying sound among various microphone outlets and other inputs.

2.2.1.4. Recording and playing in-store promotional announcements at programmed times.

2.2.1.5. Communicating simultaneously to all zones regardless of zone or channel switch settings.

2.2.1.6. Paging to all zones, by dialing an extension from any local telephone instrument and speaking into the telephone.

2.2.1.7. Priority transmission of Mass Notification signals to all zones.

2.2.1.8. Producing a program-signal tone that is amplified and sounded over all speakers, overriding signals currently being distributed.

2.2.1.9. Reproducing high-quality sound that is free of noise and distortion at all loudspeakers at all times during equipment operation including standby mode with inputs off; and output free of nonuniform coverage of amplified sound.

2.3 EQUIPMENT AND MATERIALS

2.3.1. Coordinate features to form an integrated system. Match components and interconnections for optimum performance of specified functions.

2.3.2. Equipment: Modular type using solid-state components, fully rated for continuous duty, unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.

2.3.3. Waterproof Equipment: Loudspeakers listed and labeled for duty outdoors or in damp locations.

2.4 PREAMPLIFIERS

2.4.1. Comply with TIA/EIA SE-101-A; either separately mounted or as an integral part of power amplifier.

2.4.2. Output Power: Plus 4 dB above 1 mW at matched power-amplifier load.

2.4.3. Total Harmonic Distortion: Less than 1 percent.

2.4.4. Frequency Response: Within plus or minus 2 dB from 20 to 20,000 Hz.

2.4.5. Input Jacks: Minimum of two. One matched for low-impedance microphone; the other matchable to cassette deck, CD player, or radio tuner signals without external adapters.

2.4.6. Minimum Noise Level: Minus 55 dB below rated output.

2.4.7. Controls: On/off, input levels, and master gain.

2.5 POWER AMPLIFIERS

2.5.1. Comply with TIA/EIA SE-101-A.

2.5.2. Mounting: Rack mounted.

2.5.3. Output: 70-V balanced line.

2.5.4. Frequency Response: Within plus or minus 2 dB from 50 to 12,000 Hz.

2.5.5. Minimum Signal-to-Noise Ratio: 60 dB, at rated output.

2.5.6. Total Harmonic Distortion: Less than 3 percent at rated power output from 50 to 12,000 Hz.

2.5.7. Output Regulation: Less than 2 dB from full to no load.

2.5.8. Controls: On/off, input levels, and low-cut filter.

2.5.9. Input Sensitivity: Matched to preamplifier and providing full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on speaker microphone or handset transmitter.

2.6 COMPONENTS

2.6.1. Microphone: Comply with TIA/EIA SE-105.

2.6.1.1. Type: Dynamic, with cardioid polar or omnidirectional characteristic.

2.6.1.2. Impedance: 150 ohms.

2.6.1.3. Frequency Response: Uniform, 50 to 14,000 Hz.

2.6.1.4. Output Level: Minus 58 dB minimum.

2.6.1.5. Finish: Satin chrome.

2.6.1.6. Cable: C25J.

2.6.1.7. Mounting: Desk stand with integral-locking, press-to-talk switch.

2.6.1.8. Quantity of Microphones: One.

2.6.1.9. Quantity of Desk Stands: One.

2.6.2. AM/FM Tuner: Rack-mounted, with manual and signal-seeking tuning for the standard AM and FM broadcast bands. Sensitivity and audio quality commensurate with that of the remainder of the sound system.

2.6.3. Cassette Deck: Rack mounted, auto-reverse cassette tape deck, capable of recording and playing standard audio cassettes at 1-7/8 i.p.s. tape speed. Audio quality commensurate with the remainder of the sound system.

2.6.4. CD Player Deck: Rack mounted, five-cd changer for playing audio compact discs. Audio quality commensurate with the remainder of the sound system.

2.6.5. Programmed Prerecorded Promotional Announcement Unit: Rack mounted digital recorder for recording promotional announcements from microphone or downloading from cassette tape input; capable of programmed playback of selected announcements from non-volatile memory at predetermined times over the Music/PA system, fading the background music during the announcements. Audio quality commensurate with the remainder of the sound system.

2.6.6. Volume Limiter/Compressor: Equip each zone with a volume limiter/compressor. Install in central equipment cabinet. Arrange to provide a constant input to power amplifiers.

2.6.6.1. Frequency Response: 45 to 15,000 Hz, plus or minus 1 dB minimum.

2.6.6.2. Signal Reduction Ratio: At least a 10:1 and 5:1 selectable capability.

2.6.6.3. Distortion: 1 percent, maximum.

2.6.6.4. Rated Output: Minimum of plus 14 dB.

2.6.6.5. Inputs: Minimum of two inputs with variable front-panel gain controls and VU or dB meter for input adjustment.

2.6.7. Control Console: Contained within equipment rack, providing switching and control of all input sources, and gain and program controls for all zones. Provide a monitor speaker and circuit-closing headphone jack with switching and volume control, to monitor program or volume adjustments.

2.6.8. Mass Notification Paging Adapter: Arranged to accept alert tones and voice messages from the mass notification system panel, muting all other inputs, and distributing to all zones simultaneously. Adapter shall adjust gain and frequency response for maximum speech intelligibility to comply with NFPA 72 requirements for emergency voice transmissions.

2.6.9. Telephone Paging Adapter: Arranged to accept voice signals from telephone extension dialing access and to automatically provide amplifier input and program override for preselected zones.

2.6.9.1. Minimum Frequency Response: Flat, 200 to 2500 Hz.

2.6.9.2. Impedance Matching: Adapter matches telephone line to public address equipment input.

2.6.10. Tone Generator: For clock and program interface.

2.6.10.1. Signals Produced: Minimum of seven distinct, audible signal types including wail, warble, high/low, alarm, repeating chimes, single-stroke chime, and tone.

2.6.10.2. Pitch Control: Chimes and tone.

2.6.10.3. Volume Control: All outputs.

2.6.10.4. Activation-Switch Network: Establishes priority and hierarchy of output signals produced by different activation setups.

2.6.11. Equipment Rack: Comply with TIA/EIA-310-D. House amplifiers and auxiliary equipment in standard TIA/EIA 19-inch racks.

2.6.11.1. Group items of same function together, either vertically or side by side, and arrange controls symmetrically.

2.6.11.2. Power-Supply Connections: Approved plugs and receptacles.

2.6.11.3. Arrange all inputs, outputs, interconnections, and test points so they are accessible at rear of rack for maintenance and testing, with each item removable from rack without disturbing other items or connections.

2.6.11.4. Blank Panels: Cover empty space in equipment racks so entire front of rack is occupied by panels.

2.6.11.5. Enclosure Panels: Ventilated rear and sides and solid top. Use louvers in panels to ensure adequate ventilation.

2.6.11.6. Finish: Uniform, baked-enamel factory finish over rust-inhibiting primer.

2.6.11.7. Power-Control Panel: On front of equipment housing, with master power on/off switch and pilot light; and with socket for 5-A cartridge fuse for rack equipment power.

2.6.11.8. Service Light: At top rear of rack with an adjacent control switch.

2.6.11.9. Vertical Plug Strip: Grounded receptacles, 12 inches o.c. the full height of rack, to supply rack-mounted equipment.

2.6.11.10. Maintenance Receptacles: Duplex convenience outlets supplied independent of vertical plug strip and located in front and bottom rear of rack.

2.6.11.11. Spare Capacity: 20 percent spare space capacity in rack for future equipment.

2.6.12. Monitor Panel: Mounted above amplifiers.

2.6.12.1. Equip with VU or dB meter, speaker with volume control, and multiple-position rotary selector switch.

2.6.12.2. Connect selector switch and volume control to permit selective monitoring of output of each separate power amplifier via VU or dB meter and speaker.

2.6.13. Cone-Type Loudspeakers: Comply with TIA/EIA SE-103.

2.6.13.1. Minimum Axial Sensitivity: TIA/EIA pressure rating of 45 dB.

2.6.13.2. Frequency Response: Within plus or minus 3 dB from 50 to 15,000 Hz.

2.6.13.3. Size: 8 inches with 1-inch voice coil and minimum 5-oz. ceramic magnet.

2.6.13.4. Minimum Dispersion Angle: 100 degrees.

2.6.13.5. Rated Output Level: 10 W.

2.6.13.6. Matching Transformer: Comply with TIA/EIA-160. Full-power rated with four TIA/EIA standard taps. Maximum insertion loss of 0.5 dB.

2.6.13.7. Surface-Mounting Units: Ceiling, wall, or pendant mounting, as indicated, in steel back boxes, acoustically dampened. Front face of at least 0.0478-inch steel and whole assembly rust proofed and shop primed for field painting.

2.6.13.8. Flush-Ceiling-Mounting Units: In steel back boxes, acoustically dampened. Metal ceiling grille with white baked enamel.

2.6.14. Horn-Type Loudspeakers: Comply with TIA/EIA SE-103.

2.6.14.1. Type: Single-horn units, double-reentrant design, with minimum full-range power rating of 15 W.

2.6.14.2. Waterproof design approved for wet locations, when used in refrigerated processing or storage rooms subject to washdown, or in other locations subject to wet conditions.

2.6.14.3. Matching Transformer: Comply with TIA/EIA-160. Full-power rated with four TIA/EIA standard taps. Maximum insertion loss of 0.5 dB.

2.6.14.4. Frequency Response: Within plus or minus 3 dB from 250 to 12,000 Hz.

2.6.14.5. Dispersion Angle: 130 by 110 degrees.

2.6.14.6. Mounting: Integral bracket.

2.6.15. Volume Attenuator Station: Wall-plate-mounted autotransformer type with paging priority feature.

2.6.15.1. Wattage Rating: 10 W, unless otherwise indicated.

2.6.15.2. Attenuation per Step: 3 dB, with positive off position.

2.6.15.3. Insertion Loss: 0.4 dB maximum.

2.6.15.4. Attenuation Bypass Relay: Single pole, double throw. Connected to operate and bypass attenuation when all-call, paging, program signal, or prerecorded message features are used. Relay returns to normal position at end of priority transmission.

2.6.15.5. Label: "PA Volume."

2.6.16. Microphone Outlet: Three-pole, polarized, locking-type, microphone receptacles in single-gang boxes. Equip wall outlets with brushed stainless-steel device plates.

2.6.17. Conductors and Cables: Jacketed, twisted pair and twisted multipair, untinned solid copper.

2.6.17.1. Insulation for Wire in Conduit: Thermoplastic, not less than 1/32 inch thick.

2.6.17.2. Microphone Cables: Neoprene jacketed, not less than 2/64 inch thick, over shield with filled interstices. Shield No. 34 AWG tinned, soft-copper strands formed into a braid or approved equivalent foil. Shielding coverage on conductors is not less than 60 percent.

2.6.17.3. Plenum Cable: Listed and labeled for plenum installation.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Wiring Method: Install wiring in raceways except within consoles, desks, and counters. Conceal cables and raceways except in unfinished spaces.

3.1.2. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Use lacing bars in cabinets.

3.1.3. Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.

3.1.4. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

3.1.5. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.1.6. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

3.1.7. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.

3.1.8. Wall-Mounting Outlets: Flush mounted.

3.1.9. Conductor Sizing: Unless otherwise indicated, size speaker circuit conductors from racks to loudspeaker outlets not smaller than No. 18 AWG and conductors from microphone receptacles to amplifiers not smaller than No. 22 AWG.

3.1.10. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.

3.1.11. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.

3.1.12. Connect wiring according to Division 16 Section "Conductors and Cables."

3.2 GROUNDING

3.2.1. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

3.2.2. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.

3.3 FIELD QUALITY CONTROL

3.3.1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.

3.3.2. Perform the following field tests and inspections and prepare test reports:

3.3.2.1. Schedule tests with at least seven days' advance notice of test performance.

3.3.2.2. After installing public address and music equipment and after electrical circuitry has been energized, test for compliance with requirements.

3.3.2.3. Operational Test: Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, Mass Notification inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.

3.3.2.4. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:

a. Disconnect microphone at connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure signal-to-noise ratio.

b. Repeat test for each separately controlled zone of loudspeakers.

c. Minimum acceptance ratio is 50 dB.

3.3.2.5. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.

3.3.2.6. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in the same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.

3.3.2.7. Power Output Test: Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.

3.3.2.8. Signal Ground Test: Measure and report ground resistance at pubic address equipment signal ground. Comply with testing requirements specified in Division 16 Section "Grounding and Bonding."

3.3.3. Retesting: Correct deficiencies, revising tap settings of speaker-line matching transformers where necessary to optimize volume and uniformity of sound levels, and retest. Prepare a written record of tests.

3.3.4. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

3.4 STARTUP SERVICE

3.4.1. Engage a factory-authorized service representative to perform startup service.

3.4.2. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.

3.4.3. Complete installation and startup checks according to manufacturer's written instructions.

3.5 ADJUSTING

3.5.1. On-Site Assistance: Engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.

3.5.2. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose, without additional cost.

3.6 DEMONSTRATION

3.6.1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain public address and music equipment. Refer to Division 1 Section "Phase Turnover and Contract Closeout."

END OF SECTION 16726

CONSTRUCTION ISSUE

SECTION 16750

VOICE AND DATA COMMUNICATION CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1. This Section includes wire, cable, connecting devices, installation, and testing for wiring systems to be used as signal pathways for voice and high-speed data transmission.

1.3 DEFINITIONS

1.3.1. EMI: Electromagnetic interference.

1.3.2. IDC: Insulation displacement connector.

1.3.3. LAN: Local area network.

1.3.4. PVC: Polyvinyl chloride.

1.3.5. STP: Shielded twisted pair.

1.3.6. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

1.4.1. Product Data: Include data on features, ratings, and performance for each component specified.

1.4.2. Shop Drawings: Include dimensioned plan and elevation views of each individual component. Show equipment assemblies, method of field assembly, workspace requirements, and access for cable connections.

1.4.2.1. System labeling schedules, including electronic copy of labeling schedules, as specified in Part 3, in software and format selected by Owner.

1.4.2.2. Wiring diagrams. Show typical wiring schematics including the following:

a. Workstation outlets, jacks, and jack assemblies.

b. Patch cords.

c. Patch panels.

d. Fiber-optic boxes.

1.4.3. Cable Administration Drawings: As specified in Part 3.

1.4.4. Product Certificates: For each type of cable, connector, and terminal equipment, signed by product manufacturer.

1.4.5. Manufacturer Seismic Qualification Certification: Submit certification that distribution racks and their components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1.4.5.1. Basis for Certification: Base certification on the maximum number of components capable of being mounted in each rack type. Identify components on which certification is based. Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.4.5.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity of each rack-mounted component and of each assembled rack type, and locate and describe mounting and anchorage provisions.

1.4.5.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.4.6. Qualification Data: For Installer and testing agency.

1.4.7. Field quality-control test reports.

1.4.8. Operation and Maintenance Data: For voice and data communication cabling to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

1.5.1. Installer Qualifications: System installer must have on staff a registered communication distribution designer certified by Building Industry Consulting Service International (BICSI).

1.5.2. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1.5.2.1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

1.5.3. Source Limitations: Obtain all products except twisted-pair and fiber-optic cables through one source from a single manufacturer. Twisted pair and fiber-optic cable shall each be products of a single manufacturer (not necessarily the same manufacturer for both).

1.5.4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5.5. Comply with NFPA 70.

1.6 COORDINATION

1.6.1. Coordinate layout and installation of voice and data communication cabling with Owner's telecommunications and LAN equipment suppliers. Coordinate service entrance arrangement with local exchange carrier.

1.6.1.1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.

1.6.1.2. Record agreements reached in meetings and distribute to other participants.

1.6.1.3. Adjust arrangements and locations of distribution frames and cross-connect and patch panels in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

1.7 EXTRA MATERIALS

1.7.1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7.1.1. Cable: 250 feet of each size and type used for Project. Furnish on reels.

1.7.1.2. Patch-Panel Units: One of each type for every six installed, but no fewer than one.

1.7.1.3. Connecting Blocks: One of each type for every 25 installed, but no fewer than one.

1.7.1.4. Outlet Assemblies: One of each type for every 25 installed, but no fewer than one.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1. Basis of Design Products: To establish the significant qualities related to type, function, dimension, in service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product may be named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.1.2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.2.1. Cable:

a. Belden Inc.; Electronics Division.

b. Berk-Tek; an Alcatel Company.

c. Brand-Rex Co.; Unit of BICC Cables Corp.

d. Champlain Cable Corporation.

e. Chromatic Technologies, Incorporated.

f. General Cable Corporation.

g. HeLix/HiTemp Cables, Inc.

h. ICC.

i. Lucent Technologies; Global Service Provider.

j. Mohawk/CDT; a division of Cable Design Technologies.

k. Montrose/CDT; a division of Cable Design Technologies.

l. Optical Cable Corporation.

m. Panduit Corp.

n. Prestolite Wire Corp.

o. Remee Products Corp.

p. Siecor.

q. Superior Essex; Superior Telecommunications Inc.

r. Cisco

2.1.2.2. Terminal and Connector Components and Distribution Racks:

a. AMP Incorporated; a Tyco International Ltd. Company.

b. Hubbell Premise Wiring.

c. Leviton Telecom.

d. Lucent Technologies; Global Service Provider.

e. Panduit Corp.

f. Thomas & Betts Corporation.

2.2 SYSTEM REQUIREMENTS

2.2.1. General: Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.

2.2.2. Expansion Capability: Unless otherwise indicated, provide spare conductor pairs in cables, positions in cross-connect and patch panels and LIUs, and terminal strips to accommodate 20 percent future increase in active workstations.

2.3 MOUNTING ELEMENTS

2.3.1. Cable Trays: Comply with Division 16 Section "Cable Trays."

2.3.2. Raceways and Boxes: Comply with Division 16 Section "Raceways and Boxes."

2.3.3. Backboards: 3/4-inch, interior-grade, fire-retardant-treated plywood.

2.3.4. Distribution Racks: Freestanding and wall-mounting, modular-steel units designed for telecommunications terminal support and data service, coordinated with dimensions of units to be supported.

2.3.4.1. Approximate Module Dimensions (free-standing): 84 inches high by 24 inches wide by 30 inches deep; front and back doors.

2.3.4.2. Where double-width freestanding modules are required or shown on the drawings, the units shall consist of two modules as described above, unitized by bolting together. The finished metal sidewalls between the two unitized modules may be omitted.

2.3.4.3. Approximate module Dimensions (wall-mounted): 48 inches high by 22.75 inches wide by 20.29 inches deep; front door only.

2.3.4.4. Finish: Baked-polyester powder coat.

2.3.4.5. Doors: Acrylic front door, lockable; lockable rear door.

2.3.4.6. Ventilation: Low-dB forced air, top loaded, 400 cfm for free-standing modules.

2.3.4.7. Power strip

2.3.4.8. Shelves: Webbed or vented for air flow, 3/4 depth; 3 ea. (free-standing), 1 ea. (wall-mtd.)

2.3.4.9. Rails: For 19” standard mounting, adjustable

2.3.4.10. Bolts: Provide 80 each equipment mounting bolts with each free-standing module; 30 each for wall-mount cabinets, for mounting user-furnished equipment.

2.4 TWISTED-PAIR CABLES, CONNECTORS, AND TERMINAL EQUIPMENT

2.4.1. Cables: Listed as complying with Category 3 and 6 of TIA/EIA-568-A, as scheduled for applications in this project.

2.4.2. Conductors: Solid copper.

2.4.3. UTP Cable: Comply with TIA/EIA-568-A. Four, thermoplastic-insulated, individually twisted pairs of conductors; No. 23 AWG, color-coded; enclosed in PVC jacket. Jacket material color coded for various services as scheduled.

2.4.4. UTP Plenum Cable: Listed for use in air-handling spaces. Features are as specified for cables, conductors, and UTP cable except materials are modified as required for listing.

2.4.5. UTP Cable Connecting Hardware: Comply with TIA/EIA-568-A. IDC type, using modules designed for punch-down caps or tools.

2.4.5.1. IDC Terminal Block Modules: Integral with connector bodies, including plugs and jacks where indicated.

2.4.5.2. IDC Connecting Hardware: Consistent throughout Project.

2.4.5.3. Number of Terminals per Field: One for each conductor in assigned cables.

2.4.5.4. Mounting: Backboard for voice, Rack for data.

2.4.6. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

2.4.6.1. Number of Jacks per Field: One for each four-pair UTP cable indicated plus 25% spares.

2.4.7. Jacks and Jack Assemblies for UTP Cable: Modular, color-coded, RJ-45 receptacle units with integral IDC-type terminals. Use keyed jacks for data service.

2.4.8. UTP Patch Cords: Factory-made four-pair cables in 48-inch lengths, terminated with RJ-45 plug at each end. Use keyed plugs for data service.

2.4.9. Workstation Outlets: Dual jack-connector assemblies mounted in single or multigang faceplate; or four jack-connector assemblies mounted in multigang faceplate for combined voice/data service.

2.4.9.1. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, modular, RJ-45. Comply with TIA/EIA-568-B.1.

2.4.9.2. Faceplate: Stainless steel.

2.4.9.3. Mounting: Flush, unless otherwise indicated.

2.4.9.4. Legend: Factory labeled, top and bottom jack of each pair "Voice" or "Data," as applicable, by silk-screening or engraving.

2.5 FIBER-OPTIC CABLES, CONNECTORS, AND TERMINAL EQUIPMENT

2.5.1. Available Cable, Terminal and Connector Product Manufacturers:

2.5.1.1. Avaya Inc.

2.5.1.2. Berk-Tek; an Alcatel Company.

2.5.1.3. Chromatic Technologies; a Draka USA Company.

2.5.1.4. CommScope Properties, LLC.

2.5.1.5. Corning Cable Systems.

2.5.1.6. General Cable Technologies Corporation.

2.5.1.7. Mohawk/CDT; a division of Cable Design Technologies.

2.5.1.8. Molex Premise Networks; a division of Molex, Incorporated.

2.5.1.9. Nordex/CDT; a Subsidiary of Cable Design Technologies.

2.5.1.10. Optical Cable Corporation.

2.5.1.11. Panduit Corp.

2.5.1.12. Prestolite Wire Corp.

2.5.1.13. Superior Essex; Superior Telecommunications Inc.

2.5.2. Cables:

2.5.2.1. Multimode: Factory fabricated, jacketed, low loss, glass type, fiber optic, multimode, graded index, operating at 850 and 1300 nm.

a. Backbone, Strands per Cable: 12, unless otherwise indicated.

b. Comply with TIA/EIA-492AAAA, tight buffer.

c. NFPA 70, Type OFN complying with UL 1666.

d. Dimensions: 62.5-micrometer core diameter; 125-micrometer cladding diameter.

e. Maximum Attenuation: Minus 3.75 dB/km at 850 nm; minus 1.5 dB/km at 1300 nm.

f. Minimum Modal Bandwidth: 160 MHz/km at 850 nm; 500 MHz/km at 1300 nm.

g. Operating Temperature Range: Minus 20 to plus 70 deg C.

2.5.2.2. Multimode/Single mode: Basis-of-Design Product – 12 strand Indoor, Accumax Hybrid Plenum By AVAYA/Lucent, Vendor number LGCC 12/12 D-S_LPX or Equal. Terminate with SC connectors.

2.5.3. Jacket Color: Orange.

2.5.4. Plenum Cable: Listed for use in plenums.

2.5.5. Cable Connectors: Quick-connect, simplex- and duplex-type SC couplers with self-centering, axial alignment mechanisms. Insertion loss not more than 0.7 dB.

2.5.6. Patch Panel: Modular panels housing multiple-numbered, duplex cable connectors.

2.5.6.1. Permanent Connection: Permanently connect one end of each connector module to installed cable fiber.

2.5.6.2. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to satisfy specified expansion criteria.

2.5.7. Patch Cords: Factory made, dual fiber cables in 36-inch lengths.

2.5.7.1. Terminations: Two duplex connectors arranged to mate with patch-panel connectors, one at each end of each fiber in cord.

2.6 COAXIAL CABLES

2.6.1. Basis-of-Design Product for Wireless LAN Remote Antenna: Hyperlink 400-Style, 50-Ohm Coax Cable, with RP-TNC connectors or equal brand.

2.6.2. For Video Surveillance Applications: Coordinate with Video Surveillance equipment manufacturer. Refer to Division 13 Section “Video Surveillance”.

2.6.2.1. RG59/U, Plenum-Rated Indoor Distribution Cable: No. 20 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation. Double shielded with 100 percent aluminum-foil shield, 65 percent aluminum braid. Copolymer jacket. NFPA 70, Type CATV and UL 910.

2.7 IDENTIFICATION PRODUCTS

2.7.1. Comply with Division 16 Section "Electrical Identification" and the following:

2.7.1.1. Cable Labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION OF MEDIA

3.2.1. Backbone Cable for Data Service: Use fiber-optic cable for runs between equipment rooms and wiring closets and for runs between wiring closets.

3.2.2. Backbone Cable for Voice Service: Use UTP Category 3 cable for runs between equipment rooms and wiring closets and for runs between wiring closets.

3.2.3. Horizontal Cable for Data Service: Use UTP Category 6 cable for runs between wiring closets and workstation outlets. Jacket colors shall be blue for POS, green for PC LAN, yellow for wireless LAN and air defense, and white for meat scale data service.

3.2.4. Horizontal Cable for Voice Service: Use UTP Category 6 cable for runs between wiring closets and workstation outlets. Jacket color shall be gray.

3.3 INSTALLATION

3.3.1. Wiring Method: Install wiring and optical fiber in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.

3.3.2. Install cables using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6 performance of completed and linked signal paths, end to end.

3.3.3. Install cables without damaging conductors, shield, or jacket.

3.3.4. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer.

3.3.5. Pull cables without exceeding cable manufacturer's recommended pulling tensions.

3.3.5.1. Pull cables simultaneously if more than one is being installed in same raceway.

3.3.5.2. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.

3.3.5.3. Use pulling means, including fish tape, cable, rope, and basket-weave wire or cable grips, that will not damage media or raceway.

3.3.6. Install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible.

3.3.7. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

3.3.8. Wiring within Wiring Closets and Enclosures: Provide conductors of adequate length. Train conductors to terminal points with no excess. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

3.3.9. Separation of Wires: Comply with TIA/EIA-569-A rules for separating unshielded copper voice and data communication cabling from potential EMI sources, including electrical power lines and equipment.

3.3.10. Wiring at Drops for Checkout Stands: Provide 10 feet slack by making a 5-foot loop-back in the cable tray for each cable at drops to checkout stands. Outside the cable tray, provide a coiled-up length of each cable equal to 10 feet plus the distance from the cable tray to the floor, for installation by others using a service pole provided with the checkout stand. Label each cable to identify service and cable number. Attach the coiled cables to structure or suspension members supporting the cable tray or ceiling using ty-wraps or equivalent. Perform final testing of the cables after installation and termination is complete.

3.3.11. Make splices, taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.

3.3.12. Use splice and tap connectors compatible with media types.

3.4 GROUNDING

3.4.1. Comply with Division 16 Section "Grounding and Bonding."

3.4.2. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

3.4.3. Bond shields and drain conductors to ground at only one point in each circuit.

3.4.4. Signal Ground Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.

3.4.5. Signal Ground Bus: Mount on wall of main equipment room with standoff insulators.

3.4.6. Signal Ground Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

3.5 INSTALLATION IN EQUIPMENT ROOMS AND WIRING CLOSETS

3.5.1. Install plywood backboards on walls of equipment rooms and wiring closets from floor to ceiling.

3.5.2. Mount patch panels, terminal strips, and other connecting hardware for Voice service on backboards, unless otherwise indicated. Mount patch panels and related hardware for Data service in equipment racks, unless otherwise indicated.

3.5.3. Group connecting hardware for cables into separate logical fields.

3.5.4. Use patch panels to terminate cables entering the space, unless otherwise indicated.

3.6 INSTALLATION STANDARDS

3.6.1. Comply with requirements in TIA/EIA-568-A and TIA/EIA-569-A.

3.7 IDENTIFICATION

3.7.1. In addition to requirements in this Article, comply with applicable requirements in Division 16 Section "Electrical Identification" and TIA/EIA-606.

3.7.2. System: Use a unique, three-syllable, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with same designation. Use logical and systematic designations for facility's architectural arrangement.

3.7.2.1. First syllable identifies and locates equipment room or wiring closet where cables originate.

3.7.2.2. Second syllable identifies and locates cross-connect- or patch-panel field in which cables terminate.

3.7.2.3. Third syllable designates type of media (copper or fiber) and position occupied by cable pairs or fibers in field.

3.7.3. Workstation: Label cables within outlet boxes.

3.7.4. Distribution Racks and Frames: Label each unit and field within that unit.

3.7.5. Within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

3.7.6. Cables, General: Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

3.7.7. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.

3.7.8. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project, in software and format selected by Owner.

3.7.9. Cable Administration Drawings: Show building floor plans with cable administration point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606. Furnish electronic record of all drawings, in software and format selected by Owner.

3.8 FIELD QUALITY CONTROL

3.8.1. Perform the following field tests and inspections and prepare test reports:

3.8.1.1. Category 5e UTP Cabling Tests:

a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in Annex I, complying with measurement accuracy specified in Annex H. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

b. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

c. Wire-map test that reports open circuits, short circuits, crossed pairs, reversed pairs, split pairs, and improper terminations.

d. Channel and permanent link tests for cable length, insertion loss, near-end crosstalk loss, power sum near-end crosstalk loss, equal-level far-end crosstalk loss, power sum equal-level far-end crosstalk, return loss, propagation delay, and delay skew. Performance shall comply with minimum criteria in TIA/EIA-568-B.2.

3.8.1.2. Category 6 UTP Cabling Tests:

a. Tests shall include all tests of Category 5e, conducted from 1 to 250 MHz.

b. Channel and permanent link tests shall be performed with a tester that complies with performance requirements in TIA/EIA-568-B.2, Level III. Include tests for longitudinal or transverse conversion loss.

c. Performance shall comply with minimum criteria in TIA/EIA-568-B.2.

3.8.1.3. Fiber-Optic Cable Tests:

a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

b. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

c. Link End-to-End Attenuation Tests:

(1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.

d. Attenuation test results for horizontal links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

3.8.1.4. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

3.8.1.5. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

3.8.1.6. Retest and inspect cabling to determine compliance of replaced or additional work with specified requirements.

3.9 DEMONSTRATION

3.9.1. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets. Refer to Division 1 Section "Demonstration and Training."

END OF SECTION 16750

CONSTRUCTION ISSUE

SECTION 16760

PROCESSING AREA SIGNALING (DOORBELL) SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.1.2. Section 16130, Raceways and Boxes

1.1.3. Section 16120, Conductors and Cables

1.1.4. Section 16060, Grounding and Bonding

1.2 SUMMARY

1.2.1. This Section includes general requirements for a doorbell signaling system, including conduit, wire, controls, audible signaling devices, pushbuttons, and outlet boxes for a complete, fully operational system.

1.2.2. The extent of the work is shown on the Drawings and described herein.

1.2.3. This Contractor shall furnish and install all equipment, conduit, wiring, pull boxes, back boxes, cover plates and testing necessary for the complete system.

1.3 QUALITY ASSURANCE

1.3.1. Codes and Standards

1.3.1.1. UL Listed

1.3.1.2. NFPA-70 NEC

1.3.1.3. NEMA

1.3.1.4. IEEE

1.4 SUBMITTALS

1.4.1. General: Submit each item in this Article according to Division 1 Specification Sections.

1.4.2. Submit Manufacturer's data demonstrating compliance with this specification and the Drawings. Information shall include, but not be limited to:

1.4.2.1. Data for all devices, pushbuttons, cover plates, rough-in boxes, bells and buzzers; including full dimensions.

1.4.2.2. Indicate all accessories included, and where or what device they are for.

1.4.2.3. Indicate operating voltages, capacities, decibel ratings of bells and buzzers, overcurrent protection requirements, power requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

2.1.1. Edwards

2.1.2. Wheelock

2.2 MATERIALS

2.2.1. All conduit, boxes and wire shall be as specified in other sections of these specifications.

2.2.2. Door Bell System:

2.2.2.1. Bell shall be single stroke heavy duty 24V AC. Mon flush 4 inch octagon box, Edwards Cat. No. 338-G5.

2.2.2.2. Pushbutton rated for 24V AC, satin brass housing; weatherproof, Edwards Cat. No. 600.

2.2.2.3. Transformer shall have 120V AC primary, 24V AC secondary, minimum 15 VA. Mount in a NEMA 1 enclosure. Edwards Cat. No. 592 with No. 593 mounting plate.

2.2.2.4. Provide in-line fusing as required by manufacturer and/or local codes.

2.2.3. Door Buzzer System:

2.2.3.1. General Locations: Buzzer shall be fully enclosed, adjustable volume, 24V AC. Mount on flush 4 inch octagon box. Edwards Cat. No. 340A-G5.

2.2.3.2. Wet Locations, processing rooms, warehouse, and refrigeration rooms: Adaptatone multiple tone signaling horn with weatherproof design, with 13-tone central generator. Minimum 95 DBAC at 10 ft.

2.2.3.3. Transformer shall have 120V AC primary, 24V AC secondary, minimum 15 VA. Mount in a NEMA 1 enclosure. Edwards Cat. No. 592 with No. 593 mounting plate.

2.2.3.4. Provide in-line fusing as required by manufacturer and/or local codes.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. Furnish and install in accordance with the manufacturer's instructions, all equipment, pull tapes, conduit, boxes, wiring, testing, coordination, and adjusting required for the installation and operation of complete signaling systems as described herein and shown on the drawings.

3.1.1.1. All conduit shall be of the same approved type as used for electric light and power wiring, and shall meet all the applicable requirements of the National Electrical Code. The size of the different wires shall be as specified elsewhere in these specifications. All wiring shall be tagged at all junction points, and shall test free from grounds or crosses between conductors. Wire shall be furnished and installed by this contractor.

END OF SECTION 16760

CONSTRUCTION ISSUE

SECTION 16997

COMMISSIONING ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
1. Division 16 responsibilities in the commissioning process.
2. Commissioning Electrical Distribution Systems
3. Commissioning Electrical Generation Systems
4. Commissioning Communications Systems
5. Commissioning Sound and PA Systems
6. Commissioning Lighting Control Systems
7. Commissioning of Cathodic Protection

B. Related Sections
1. Section 01810 - Commissioning Requirements.

1.2 DEFINITIONS

A. CA: Commissioning Agent.

B. CO: Contracting Officer.

C. GC: Contractor; General Contractor, not a Subcontractor.

D. O&M: Operations and Maintenance.

E. QC: Contractor's Quality Control Manager.

F. TI: Technical Inspector

1.3 DESCRIPTION

A. This Section describes commissioning requirements applicable to commissioned items and systems specified in Division 16 to ensure that all systems are operating in a manner consistent with the Contract Documents.

B. Conform to commissioning requirements and the commissioning plan.

1.4 RESPONSIBILITIES

A. Construction and Acceptance Phases
1. Include the cost of commissioning in the contract price.
2. In each purchase order or subcontract written, include requirements for submittal data, O&M data and training.
3. Conduct a commissioning scoping meeting and other meetings necessary to facilitate the Commissioning process.
4. Provide requested documentation to the TI, developed for functional testing procedures.

5. Assist in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
6. Provide functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
7. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the prefunctional checklists for all commissioned equipment. Submit to QC for review prior to startup. TI will verify plan for compliance. Refer to Section 01810 for further details related to start-up.
8. During the startup and initial checkout process, execute and document the electrical-related portions of the prefunctional checklists provided by the CA for all commissioned equipment.
9. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the QC and TI.
10. Address current A/E punch list items before functional testing. Fire and life safety systems shall be completed with discrepancies and problems remedied before functional testing of the respective systems.
11. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
12. Provide all test equipment necessary to fulfill specified testing requirements.
13. Perform functional performance testing under the direction of the CA for specified equipment. Assist the CA and TI in interpreting the monitoring data, as necessary.
14. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, TI and A/E and retest the equipment.
15. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
16. During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing). Prepare red-line as-built drawings for all drawings and final as-builts for contractor-generated coordination drawings.
17. Provide training of the Government's operating personnel as specified.
18. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

B. Operation Manuals shall include:
1. A table of all setpoints and implications when changing them.
2. Schedules.
3. Instructions for operation of each piece of equipment for emergencies.
4. Startup and shutdown.
5. Recommendations for recommissioning frequency by equipment type.

C. Warranty Period
1. Execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
2. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

1.5 SUBMITTALS

A. Provide submittal documentation relative to commissioning as required in this Section, Section 01810 and other specified requirements.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 STARTUP

A. The electrical contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section and in 01810. Division 16 has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the Commissioning Agent, Technical Inspector, or Government.

B. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems, or sub-systems at the discretion of the PM and GC. Beginning system testing before full completion, does not relieve the Contractor from fully completing the system, including all prefunctional checklists as soon as possible.

3.2 OPERATIONS AND MAINTENANCE (O&M) MANUALS

A. The following O&M manual requirements do not replace O&M manual documentation requirements elsewhere in these specifications.

B. Division 16 shall compile and prepare documentation for all commissioned systems covered in Division 16 and deliver this documentation to the GC for inclusion in the O&M manuals prior to the training of Government personnel.

3.3 TRAINING OF GOVERNMENT PERSONNEL

A. The GC shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.

B. The QC shall be responsible for reviewing the content and adequacy of the training of Government personnel for commissioned equipment or systems. TI will verify compliance.

C. Electrical Contractor. The electrical contractor shall have the following training responsibilities:
1. Provide the TI with a training plan four weeks before the planned training.
2. Provide designated Government personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each major piece of commissioned electrical equipment or system.
3. Training shall start with classroom sessions, if necessary, followed by hands on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer’s representative. Practical building operating expertise

as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.

6. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
7. Training shall include:
   a. Use the printed installation, operation and maintenance instruction material included in the O&M manuals.
   b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
   c. Discussion of relevant health and safety issues and concerns.
   d. Discussion of warranties and guarantees.
   e. Common troubleshooting problems and solutions.
   f. Explanation of information included in the O&M manuals.
   g. Discussion of any peculiarities of equipment installation or operation.
   h. Classroom sessions shall include the use of overhead projections, slides, video and audio taped material as might be appropriate.
8. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and maintenance of all pieces of equipment.
9. Fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
10. Training shall occur after functional testing is complete, unless approved otherwise by the Project Manager.
11. Minimum Duration of Training: The electrical contractor shall provide training on each piece of equipment according to the periods indicated in the individual Division 16 Sections.

END OF SECTION 16997