



COLUMBIA STATION CARRIER ANNEX

ALTERNATE QUARTERS

January 4, 2021

FSM #Q59098

CAG #281904



Cornerstone
ARCHITECTURAL GROUP

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USPS MPF Specifications issued: 10/1/2016
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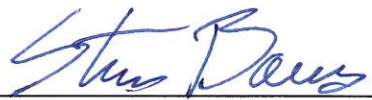
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PROJECT

Name: Columbia Carrier Annex AQ
Location: Seattle, WA
FMS Project Number: Q59098

ARCHITECT OF RECORD

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Architect of Record

1-8-21
Date

END OF DOCUMENT

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DIVISION 25 – INTEGRATED AUTOMATION (NOT USED)

DIVISION 26 – ELECTRICAL

Section	260500	Common Work Results for Electrical	1/04/2021
Section	260519	Low-Voltage Electrical Power Conductors and Cables	1/04/2021
Section	260533	Raceway and Boxes for Electrical Systems	1/04/2021
Section	260623	Lighting Control Devices	1/04/2021
Section	260800	Commissioning of Electrical Systems	1/04/2021
Section	262416	Panelboards	1/04/2021
Section	262726	Wiring Devices	1/04/2021
Section	262816	Enclosed Switches	1/04/2021
Section	264128	Surge Protective Devices (SPDs)	1/04/2021
Section	265100	Interior Lighting (LED-Solid State)	1/04/2021
Section	265600	Exterior Lighting	1/04/2021

DIVISION 27 – COMMUNICATIONS

Section	270500	Common Work Results for Communications	1/04/2021
Section	271100	Communications Equipment Room Fittings	1/04/2021
Section	271300	Communications Backbone Cabling	1/04/2021
Section	271500	Communications Horizontal Cabling	1/04/2021
Section	272133	Data Communications – Wireless Access Points	1/04/2021
Section	275116	IP Integrated Public Address Zone Paging System	1/04/2021
Section	275123	Call Bell Systems	1/04/2021

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

Section	281600	Intrusion Detection System	1/04/2021
Section	282305	Integrated Security and Investigative Platform (ISIP) CCTV System	1/04/2021
Section	283100	Fire Detection and Alarm	1/04/2021

DIVISION 31 – EARTHWORK

Section	311000	Site Clearing	10/01/15
Section	312000	Earth Moving	10/01/15
Section	312300	Excavation and Fill	10/01/15
Section	312500	Erosion and Sedimentation Controls	10/01/15

DIVISION 32 – EXTERIOR IMPROVEMENTS

Section	321216	Asphalt Paving	10/01/15
Section	321313	Concrete Paving	10/01/18
Section	321723	Pavement Markings	10/01/15
Section	323113	Chain Link Fences and Gates	10/01/18
Section	323200	Modular Concrete Retaining Walls	
Section	329113	Soil Preparation	10/01/15
Section	329200	Turf and Grasses	10/01/18
Section	329300	Plants	10/01/18

DIVISION 4 – MASONRY (NOT USED)

DIVISION 5 - METALS

Section	051200	Structural Steel	10/01/18
Section	055000	Metal Fabrications	10/01/18

DIVISION 6 – WOOD, PLASTICS, AND COMPOSITES

Section	061000	Rough Carpentry	10/01/18
Section	062000	Finish Carpentry	10/01/18

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Section	071113	Bituminous Dampproofing	10/01/18
Section	072100	Thermal Insulation	10/01/18
Section	072700	Self Adhered Air Barriers	
Section	074113	Metal Roof Panels	
Section	074210	Metal Wall Panels (Siding)	
Section	074560	Fiber Cement Rainscreen System	
Section	075400	Single Ply Roof Membrane	
Section	076000	Flashing and Sheet Metal	
Section	078400	Firestopping	10/01/18
Section	079200	Joint Sealants	10/01/18

DIVISION 8 - OPENINGS

Section	081100	Metal Doors and Frames	10/01/18
Section	081400	Wood Doors	10/01/18
Section	083113	Access Doors and Frames	10/01/18
Section	083800	Traffic Doors	10/01/16
Section	085413	Fiberglas Sliding and Fixed Windows	
Section	087100	Door Hardware	10/01/18
Section	088000	Glazing	10/01/18

DIVISION 9 - FINISHES

Section	092900	Gypsum Board	10/01/18
Section	095113	Acoustical Panel Ceilings	10/01/18
Section	096500	Resilient Flooring	
Section	069723	Resinous Flooring	10/01/18
Section	099100	Painting	

DIVISION 10 - SPECIALTIES

Section	101404	Postal Signage	05/01/14
Section	101414	Miscellaneous Signage	05/01/14
Section	101453	Traffic Signage	05/01/14
Section	101500	Bulletin Boards	05/01/14
Section	102115	Toilet Compartments	10/01/16
Section	102600	Wall and Door Protection	05/01/14
Section	102613	Corner Guards	05/01/14
Section	102813	Toilet Accessories	05/01/14
Section	104400	Fire Protection Specialties	05/01/14
Section	105113	Metal Lockers	05/01/14
Section	107500	Flagpoles	05/01/14

DIVISION 11 – EQUIPMENT

Section	111300	Loading Dock Equipment	10/01/18
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DIVISION 12 - FURNISHINGS

Section	123216	Manufactured Plastic-Laminate-Clad Casework	05/01/14
Section	123504	Postal Casework	05/01/14

DIVISION 13 - SPECIAL CONSTRUCTION - NOT USED

DIVISION 14 - CONVEYING EQUIPMENT - NOT USED

DIVISION 20 – MECHANICAL - NOT USED

DIVISION 21 – FIRE SUPPRESSION

Section	210000	Fire Suppression	07/31/19
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DIVISION 22 – PLUMBING

Section	220500	Common Work Results for Plumbing	07/31/19
Section	220719	Plumbing Piping Insulation	07/31/19
Section	221000	Plumbing Piping and Pumps	07/31/19
Section	221116	Domestic Water Piping	07/31/19
Section	221119	Domestic Water Piping Specialties	07/31/19
Section	221316	Sanitary Waste and Vent Piping	07/31/19
Section	221319	Sanitary Waste Piping Specialties	07/31/19
Section	223300	Electric Domestic Water Heaters	07/31/19
Section	224000	Plumbing Fixtures	07/31/19

DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING

Section	230500	Common Work Results for HVAC	07/31/19
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Section	230593	Testing, Adjusting and Balancing for HVAC	07/31/19
Section	230713	Duct Insulation	07/31/19
Section	230800	Commissioning of HVAC	07/31/19
Section	230904	Instrumentation and Control for HVAC (CSF Medium)	07/31/19
Section	232300	Refrigerant Piping	07/31/19
Section	233100	HVAC Ducts and Casing	07/31/19
Section	233300	Air Duct Accessories	07/31/19
Section	233416	Centrifugal HVAC Fans	07/31/19
Section	233713	Diffusers, Registers and Grilles	07/31/19
Section	237470	Electric Heaters	07/31/19
Section	238126	Split-System Air Conditioners	07/31/19

DIVISION 25 – INTEGRATED AUTOMATION

Section	251304	Facility System Integration into Enterprise Energy Management System	07/31/19
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DIVISION 26 – ELECTRICAL

Section	260500	Common Work Results for Electrical	07/31/19
Section	260519	Low-Voltage Electrical Power Conductors and Cables	07/31/19
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Section	329113	Soil Preparation	10/01/15
Section	329200	Turf and Grasses	10/01/18
Section	329300	Plants	10/01/18

DIVISION 33 – UTILITIES

Section	331100	Water Utility Distribution Piping	10/01/18
Section	333000	Sanitary Sewerage Utilities	10/01/18
Section	334000	Storm Drainage Utilities	10/01/18
Section	334613	Foundation Drainage	10/01/18
Section	334913	Storm Drainage Manholes, Frames and Covers	10/01/18

END OF DOCUMENT

USPS CSF Specifications issued: 5/1/2014
 Last revised: 4/25/14

SECTION 011000
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor must provide all material, labor, tools, plant, supplies, equipment, transportation, superintendence, temporary construction of every nature, and all other services and facilities necessary to complete the construction of a postal facility for the Postal Service, including all incidental work described in the contract documents.
- B. The scope of work is attached to the Contract.
The scope of work includes, but is not limited to the following:
Remodel existing temporary Post Office Carrier Annex into a permanent facility. Building will remain occupied during construction which will require phasing.

Building demolition: Selective demolition of interior of building including interior partitions, ceilings which have insulation on them, flooring, mechanical and electrical.

Site demolition: Selective demolition of site which includes removal of concrete and asphalt paving, fencing, power operated gate, compressors, landscaping, etc.

Site work: Rebuilding of fenced in parking areas for loading and Carrier vehicle parking, rebuilding of small parking area on west side of building, installation of catch basins and storm pond with outfall into 37th, fencing and new power operated gate, on and off site asphalt overlay, site parking standards, flag pole and light, striping, wheel stops, concrete curbs, concrete apron, pipe bollards and dock bumper bollards, etc.

Interior work includes reconfiguration of building as shown on drawings, access to north end of building from existing workroom on south side of building, new doors and rework of some existing doors, insulated lid above suspended ceilings in portions of the building, ceilings and lighting as shown, sectional overhead doors, steel channel and steel tube door jambs, new and relocated double action doors, painting of entire occupied portion of the building (area not identified as no work area), GWB on some existing walls and on new walls shown, toilet accessories in two toilet rooms, scissors lifts and other dock equipment, etc.

Exterior work includes new doors in existing walls, security film on existing windows, painting building except for stone facing and metal roofing, stucco infill and stucco repair, concrete board siding, lighted post office signs, etc.

Postal Equipment: Provide new wall mounted USPS signs including 2 lighted postal sign to be hung on exterior wall.

Mechanical Scope of Work: Replace roof top units as shown, remove and reinstall ductwork as required to accommodate new ceiling and new insulated lid above new ceilings, cleaning of ductwork, controls for new equipment, etc.

Plumbing: Replace hand wash lavatories in toilet rooms, replace toilet seats, cleaning of existing plumbing fixtures to remain, new service sink, etc.

Electrical Scope of Work: Add electrical devices as shown for new configuration, lighting replacement and new lighting in new ceilings, power for replaced mechanical equipment, power for scissors lifts, dock lights, exterior lighting, lighted signs, etc.

CCTV: There is some existing equipment which may be reused as a part of the new system but will need to be upgraded and expanded for new design shown.

Data: Construct IDF with rack, pull wiring and installing data jacks as shown along with installation of rack and patch panels, and punch down at patch panels and testing.

Fire Alarm: Complete new fire alarm system.

- C. All work shall be in accordance with applicable codes and local regulations that may apply. In case of conflict in or between the Contract Documents and a governing code or ordinance, the more stringent standard shall apply.

1.2 POSTAL SERVICE FURNISHED – CONTRACTOR INSTALLED EQUIPMENT

- A. The Postal Service will furnish to the Contractor the equipment to be incorporated or installed in the work as identified in the Scope, Specifications, and/or drawings.
- B. The Contractor will complete the Postal Service Furnished – Contractor Installed Equipment form found in Attachment A, identifying quantities and desired delivery dates.
- C. Scheduling and installation must be in accordance with the terms and conditions of the contract provisions and clauses, including those concerning *Postal Service Property*.

1.3 MISCELLANEOUS CONTRACT EXPENSES

- A. In accordance with the terms and conditions of the contract provisions and clauses, including those concerning *Permits and Responsibilities* and, *Building Codes, Fees and Charges*, the Contractor must include in its price proposal a separate line item for the cost each of the of the following fees or charges payable to State, local, or special community development agencies:

Water service connection and meter fee	_____
Electrical company required fees	-----
Telephone company required fees	-----
ROW permit fees	\$6,000
Sanitary sewer connection fee	-----
Environmental Permits/Registrations	-----
Other permits or fees (fire alarm)	\$4,500

- B. If the actual cost of any item identified above is more or less than the amount listed, the contract price will be adjusted accordingly by a contract modification. The adjustment will not include overhead and profit. The Contractor must, within 30 days after incurring the expenses, inform the Contracting Officer that the payment has been made. Evidence of the actual amount paid must be provided. The contract amount will be adjusted upward or downward as necessary to accommodate actual charges from the utilities. The Contractor must provide all coordination with the utilities in accomplishing their work and must make all payments to the utilities for their work.
- C. The Contractor must include all additional fees, as required, in the price proposal.

1.4 USPS DIRECT VENDOR EQUIPMENT OR SUPPLIES

- A. In accordance with the terms and conditions of the contract provisions and clauses, including those concerning, *Direct Vendor / Pre-selected Sources*, the Contractor is solely responsible for contracting with the Direct Vendor and ordering, payment, receiving, accepting, storage and installation of United States Postal Service Direct Vendor equipment or supplies. Ordering instructions are included in each specification section.
- B. The Contractor will off-load, inspect the delivered equipment or supplies to make sure they are in good condition, acknowledge receipt, and accept the delivered goods.
- C. Direct Vendor items in this contract are limited to specific items, as shown in the drawings and listed below:
 - 1. Section 083800 - Traffic Doors
 - 2. Section 101404 - Postal Signage
 - 3. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System

1.5 USPS PRE-APPROVED VENDOR EQUIPMENT OR SUPPLIES

- A. The Contractor is solely responsible for contracting with the Pre-Approved Vendor and ordering, payment, receiving, accepting, storage and installation of United States Postal Service Pre-Approved Vendor equipment or supplies. Ordering instructions are included in each specification section.
- B. The Contractor will off-load, inspect the delivered equipment or supplies to make sure they are in good condition, acknowledge receipt, and accept the delivered goods.
- C. Pre-Approved Vendor items in this contract are limited to specific items, as shown in the drawings and listed below:
 - 1. Section 111300 – Scissors lifts

1.5 USPS PRE-APPROVED VENDOR EQUIPMENT OR SUPPLIES

- A. The Contractor is solely responsible for contracting with the Pre-Approved Vendor and ordering, payment, receiving, accepting, storage and installation of United States Postal Service Pre-Approved Vendor equipment or supplies. Ordering instructions are included in each specification section.
- B. The Contractor will off-load, inspect the delivered equipment or supplies to make sure they are in good condition, acknowledge receipt, and accept the delivered goods.
- C. Pre-Approved Vendor items in this contract are limited to specific items, as identified in the specifications.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 – GENERAL

1.1 SCHEDULING WORK

- A. Before any of the work is started, the Contractor must confer with the COR and agree on a sequence of procedures: means of access to premises and building; delivery of materials and use of approaches; use of corridors, stairways, elevators, and similar means of communication; and the location of partitions, eating spaces for Contractor's employees, and the like.
- B. No work can be done during the holiday mailing seasons without written permission from the COR.

1.2 CONSTRUCTION PROGRESS CHART

- A. In accordance with the terms and conditions of the contract provisions and clauses, including those concerning *Construction Progress Chart*, prepare and submit a progress chart within five (5) days after receipt of the Notice to Proceed to show the principal categories of work corresponding with those used in the Schedule of Values:
 - 1. The order in which the Contractor proposes to carry on the work.
 - 2. The date on which it will start each category of work.
 - 3. The contemplated dates for completion.
- B. The chart must be in suitable scale to indicate graphically the total percentage of work scheduled to be in place at any time. At intervals as directed by the COR the Contractor must:
 - 1. Adjust the chart to reflect any changes in the contract work.
 - 2. Enter on the chart the total percentage of work actually in place.
 - 3. Submit six (6) copies of the chart to the Contracting Officer or their designated representative.

1.3 CONTRACTOR-PREPARED NETWORK ANALYSIS SYSTEM - Include Contractor-Prepared Network Analysis System only if listed in Block 9 of Page 1 – *Offer and Award*. Modify as required for specific project scope.

- A. Prepare a Network Analysis System in accordance with the terms and conditions of the contract provisions and clauses concerning *Network Analysis System and Update*, to include, at a minimum, the elements described below. In preparation of this system, the scheduling of construction is the responsibility of the Contractor. The requirement for the system is included to ensure adequate planning and execution of the work and to assist the COR in appraising the reasonableness of the proposed schedule and evaluating progress of the work. The system must consist of diagrams and accompanying mathematical analyses.
- B. Diagrams must show the order and interdependence of activities and the sequence in which the work is to be done as planned by the Contractor. The basic concept of a network analysis diagram must be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of the following activities. In all cases, the project completion date must be shown on the diagrams as the latest completion date of all activities.
- C. The detailed network activities must include, in addition to construction activities, the submittal and approval of samples of materials and shop drawings, the procurement of critical materials and equipment, and the fabrication of special materials and equipment and their installation and testing. All activities of the Postal Service that affect progress and dates required by the contract for completion of all or parts of the work must be shown. The activities that compose the following separate buildings and features must be separately identifiable by coding or use of sub-networks or both.

Building or Feature	Minimum Number of Activities
Mail Processing Building	250
Site Work	70

- D. The selection and number of activities are subject to the COR's approval. Detailed networks must be drafted to show a continuous flow from left to right, with no arrows from right to left. The following information must be shown on the diagram for each activity, preceding the following event numbers: description of the activity, cost, activity duration, and workforce requirements in workdays.
- E. A summary bar chart must be provided on a 30-inch x 42-inch sheet, consisting of a minimum of 30 activities and based on and supported by detailed diagrams. The summary bar chart must be time-scaled, using units of approximately one-half inch to equal 1 week, or other suitable scale approved by the COR. Weekends and holidays must be indicated.
- F. Mathematical Analysis
1. The mathematical analysis of the network diagram must include a tabulation of each activity. The following information must be furnished as a minimum for each activity:
 - a. Numbers of preceding and following events.
 - b. Activity description.
 - c. Estimated duration of activities in days.
 - d. Earliest finish date.
 - e. Actual start date.
 - f. Actual finish date.
 - g. Latest start date.
 - h. Latest finish date.
 - i. Slack or float.
 - j. Monetary value of activity, with a labor and material cost breakdown.
 - k. Percentage of activity completed.
 - l. Contractor's earnings based on the portion of activity completed.
 - m. Workforce requirements in workdays.
 2. The program or means used in making the mathematical computation must be capable of compiling the total value of completed and partially completed activities and subtotals from separate buildings or features.
 3. The analysis must list the activities in sorts or groups as follows:
 - a. By the preceding event number, from lowest to highest, then in the order of the following event number.
 - b. By the amount of slack, then in order of preceding event number.
 - c. By responsibility in order of earliest allowance start date.
 - d. In order of latest allowable start dates, then in order of preceding event numbers, then in order of succeeding even numbers.
- G. Submission and approval of the system must be as follows:
1. A preliminary network defining the Contractor's planned operations must be submitted at the preconstruction conference after receipt of a Notice to Proceed.
 2. The complete network analysis must be submitted within 30 days after receipt of Notice to Proceed.
- H. The Contractor must submit at monthly intervals a report of actual construction progress by updating the mathematical analysis. Entering updated information into the mathematical analysis is subject to the approval of the COR.
- I. The report must show the activities or portion of activities completed during the reporting period and their total value as a basis for the Contractor's periodic request for payment. Payments made under the terms and conditions of the contract provisions and clauses, including those concerning *Payment (Construction)*, must be based on the total value of the activities or of partially completed activities after verification by the COR. The report must state the percentage of the work actually completed and scheduled on the report date and the progress along the critical path in terms of days ahead or behind

the allowable dates. If the project is behind schedule, progress along other paths with negative slack must also be reported. The Contractor must also submit a narrative report with the updated analysis, which must include, but is not limited to, a description of the problem areas, current and anticipated delaying factors and their impact, and an explanation of corrective actions taken or proposed.

- J. The sheet size of diagrams must be 30 inches x 42 inches. Each updated copy must show the date of the latest revision.
- K. Initial submittal and complete revisions must be submitted in three copies.
- L. Periodic reports must be submitted in two copies.
- M. Network analysis system revisions occurring as a result of modifications or changes in the work must be in accordance with the terms and conditions of the contract provisions and clauses, including those concerning *Network Analysis Systems and Update*.
- N. Float or slack is defined as the amount of time between the early start date and the late start date of any of the activities in the network analysis system schedule. Float or slack time is not time for the exclusive use or benefit of either the Postal Service or the Contractor. Extensions of time for performance required under the terms and conditions of the contract provisions and clauses, including those concerning *Changes; Differing Site Conditions; Termination for Convenience or Default; Excusable Delays; or Suspensions and Delays* may be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the total float or slack along the channels involved at the time that Notice to Proceed was issued for the change.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2018
Last revised: 10/1/2015

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 SCHEDULE OF SUBMITTALS

- A. In accordance with the terms and conditions of the contract provisions and clauses, including those concerning Shop Drawings, Coordination Drawings, *Record "As Built" Drawings, and Schedules*; within 30 days after receiving a Notice to Proceed, the Contractor must complete the Schedule of Submittals, in the format indicated below, in duplicate, listing all items that must be furnished for review and approval by the Postal Service. The schedule must indicate the type of items (such as sample, shop drawings, catalog cut, and so forth) and include the scheduled dates of submittal. In preparing the schedule, adequate time (10 business days or more, exclusive of time in the mails) must be allowed for review and approval and possible resubmittal. Also, the schedule must be coordinated with the approved construction progress chart. The Contractor must revise and/or update the schedule as directed. Such revised schedules must be made available to the COR for monitoring.
- B. Within 30 days after receiving a Notice to Proceed, the Contractor must complete and submit to the COR a listing of all subcontractors, including subcontractor name, address, telephone number, fax number and email address. Include an updated list with each progress payment request.
- C. Schedule of Submittals Format

Project _____

Contract No. _____

Project Description _____

Spec. Section	Spec. Description	Paragraph Number	*Submittal Type	Date		Action Taken	Assigned Number
				Submittal	Returned		

*Submittal Type:

C – Certificate

S – Sample

SD – Shop Drawing

CD – Catalog Data

PL – Spare Parts List

MM – Maintenance Manual

1.2 SHOP DRAWINGS AND RELATED DATA

- A. Submittal of shop drawings, samples and related data must conform to the requirements of the terms and conditions of the contract provisions and clauses, including those concerning, *Record "As Built" Drawings, and Samples*. Prior to submittal, the Contractor must stamp the submittal to indicate that it has been reviewed and approved. The Contractor must make any corrections required by the COR. If the Contractor considers any correction indicated on the drawings to constitute a change to the contract drawings or specifications, notice, as required under the terms and conditions of the contract provisions and clauses, including those concerning Changes must be given to the COR. [Four] [] prints of all approved shop drawings must be given to the COR. The approval of the drawings by the COR must not

be construed as a complete check but indicates only that the general method of construction and detailing is satisfactory. Approval of the shop drawings does not relieve the Contractor of responsibility for any error that may exist because the Contractor is responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all work. The submission by the Contractor must be accompanied by a transmittal letter of a type approved by the COR.

1. Each shop drawing must have a blank area of 5 by 5 inches, located adjacent to the title block. The title block must display:
 - a. Number and title of drawing;
 - b. Date of drawing or revision;
 - c. Name of project building or facility;
 - d. Name of Contractor and (if appropriate) of subcontractor submitting drawing;
 - e. Clear identity of contents and location on the work; and
 - f. Project title and contract number.
2. All drawings to be provided shall be clear and fully representative of the facility and fixed mechanization work.
3. Drawing files to be in .dwg and .pdf formats. .dwg files to be generated from Autocad revision 12 or other revision level concurred by USPS.
4. Documents other than drawings shall be provided in MicroSoft Word format.
5. Interim project documentation may be provide to USPS electronically
6. All final project documentation shall be provided to the USPS on a single CD or DVD media

1.3 EQUIPMENT ROOM LAYOUT DRAWINGS

- A. The Contractor must prepare and submit equipment room layout drawings as required by the technical provisions as well as for areas where equipment proposed for use could present interface or space difficulties. Room layout drawings must be submitted within 40 days after receiving a Notice to Proceed and must conform to the specified requirements for shop drawings. Submittals describing the various mechanical and electrical equipment items that are to be installed in the areas represented by the layout drawings must be assembled and submitted concurrently and must be accompanied by the room layout drawings. Room layout drawings must be consolidated for all trades, to scale, and must show all pertinent structural and fenestration features and other items, such as cabinets, that are required for installation and that affect the available space. All mechanical and electrical equipment and accessories must be shown to scale in the plan and also in elevation or section in their installation positions. Ductwork and piping must be shown.

1.4 MATERIAL, EQUIPMENT, AND FIXTURE LISTS

- A. When required by the technical provisions, lists of materials, equipment, and fixtures must be submitted by the Contractor in accordance with the requirements specified for shop drawings. The lists must be supported by sufficient descriptive material, such as catalogs, cuts, diagrams, and other data published by the manufacturer, as well as by evidence of compliance with safety and performance standards, to demonstrate conformance to the specification requirements. Catalog numbers alone are not acceptable. The data must include the name and address of the nearest service and maintenance organization that regularly stocks repair parts. No consideration will be given to partial lists submitted from time to time. Approval of materials and equipment is tentative, subject to submission of complete shop drawings indicating compliance with the contract documents.

1.5 CERTIFICATES OF COMPLIANCE

- A. Any certificates required for demonstrating proof of compliance of materials with specification requirements, including mail certificates, statements of application, and extended guarantees, must be signed and submitted 4 copies to the COR at least 10 days before delivery. The Contractor must review all certificates before submissions are made to the COR, to ensure compliance with the contract specification requirements and to ensure that the affidavit is properly signed. Each certificate must be signed by an official authorized to certify on behalf of the manufacturing company and must contain the

name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates must contain the name and address of the testing laboratory and the dates of tests to which the report applies. Certification must not be construed as relieving the Contractor from furnishing satisfactory material if, after tests are performed on selected samples, the material is found not to meet the specific requirements.

1.6 A-E'S REVIEW OF SUBMITTALS

- A. When submittals are reviewed by the A-E on behalf of the COR, each submittal must be returned to the Contractor stamped or marked by the A-E in one of the following ways:
 - 1. A Action: The Contractor is advised that "A Action" means that fabrication, manufacture, or construction may proceed, provided the work complies with the contract documents.
 - 2. B Action: The Contractor is advised that "B Action" means that fabrication, manufacture, or construction may proceed, provided the work complies with the A-E's notations and the contract documents.
 - 3. C Action: The Contractor is advised that "C Action" means that no work may be fabricated, manufactured, or constructed and that the Contractor must make a new submittal to the A-E. Any submission marked "C Action" is not permitted on the site.
- B. The A-E must return reproducibles stamped "A Action" or "B Action" to the Contractor, who is responsible for obtaining prints of them and for distributing them to the field and to subcontractors.
- C. In the case of shop drawings in the form of manufacturers' descriptive literature, catalog cuts, and brochures stamped "A Action" or "B Action," the A-E must return the stamped copies to the Contractor, who is responsible for distributing them to the field and to the subcontractors. If the shop drawings are stamped "C Action," the A-E will return stamped copies to the Contractor, who must submit new shop drawings to the A-E.
- D. In the case of samples stamped "A Action" or "B Action," the A-E must return one of the samples to the Contractor. In the case of samples stamped "C Action," the A-E must return all of the submitted samples.

1.7 SPARE PARTS DATA

- A. Spare parts data must be submitted in quadruplicate in accordance with the terms and conditions of the contract provisions and clauses, including those concerning *Spare Parts Data*.

1.8 SCHEDULE OF VALUES

- A. In accordance with the terms and conditions of the contract provisions and clauses concerning, *Construction Cost Breakdown*, the Contractor must submit a construction cost breakdown using the attached Schedule of Values. When applicable, a separate cost breakdown form must be submitted for each separate building. However, the total cost of site work for the facility must be included in the cost estimate breakdown for the main postal building. The number of items provided on the Systems Construction Cost Estimate Breakdown form are the minimum required. Additional subdivision of these items may be used by the Contractor.
- B. Submit the construction cost breakdown after contract award to the COR. A Sample Schedule of Values and Definitions is attached to this Section, as Attachment A.
- C. Do not delete items from the Schedule of Values form. However, expand the schedule "Description of Work" as necessary to allow evaluation of work or to make partial payments.

- D. If the contract price changes, the Schedule of Values must be revised to reflect the change(s) and forwarded to the COR.
- E. A current Schedule of Values must accompany all Contractor Requests for Payment.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2018
Last revised: 10/1/2015

Schedule of Values

Facility:
Contractor:
Date:

Item	Description of Work		Scheduled Value	Work Completed					Work Remaining	
				Previous Application	This Application		Total Completed and Stored	%	Balance to Finish	Retainage
					Work In Place	Stored Materials				
Division 01	General Conditions	%								
1.0	Overhead									
1.1	Profit									
1.2	Bonds & Insurance									
1.3	Bldg. Permits									
1.4	O. & M. manuals									
1.5	Training									
1.6	Subtotal, % only		-	-	-	-	-	-	-	-
Division 02	Existing Conditions									
2.0	Demolition									
Division 03	Concrete									
3.0	Site Concrete									
3.1	Building Concrete									
Division 04	Masonry									
4.0	Masonry									
Division 05	Metals									
5.0	Structural Steel									
5.1	Steel Joists									
5.2	Steel Deck									
5.3	Metal Studs									
5.4	Handrails & Railings									
Division 06	Wood, Plastics and Composites									
6.0	Rough Carpentry									
6.1	Finish Carpentry									
Division 07	Thermal & Moisture Protection									
7.0	Roofing System									
7.1	Wall Insulation & V.B.									
Division 08	Openings									
8.0	Doors & Frames									
8.1	Specialty & Grilles									
8.2	Impact Traffic Doors									
8.3	Storefronts									
8.4	Hardware									
8.5	Other Glazing									
8.6	Sectional Knockout Doors									
Division 09	Finishes									
9.0	Gypsum Board									
9.1	Tile									
9.2	Acoustical Ceiling									
9.3	Resilient & Carpet									
9.4	Painting									
Division 10	Specialties									
10.0	Toilet Accessories									
10.1	Flagpoles									
10.2	Exterior Signage									
10.3	Interior Signage									
10.4	Lockers									
10.5	Wall and Door Protection									
10.6	Toilet Compartment									
Division 11	Equipment									
11.0	Dock Equipment									
11.1	Food Service Equipment									
Division 12	Furnishings									

Item	Description of Work		Scheduled Value	Work Completed					Work Remaining	
				Previous Application	This Application		Total Completed and Stored	%	Balance to Finish	Retainage
					Work In Place	Stored Materials				
12.0	Casework									

Item	Description of Work		Scheduled Value	Work Completed					Work Remaining	
				Previous Application	This Application		Total Completed and Stored	%	Balance to Finish	Retainage
					Work In Place	Stored Materials				
Division 13	Special Construction									
13.0	Metal Building Systems									
13.2	Vaults									
Division 14	Conveying Equipment									
Division 21	Fire Suppression									
21.0	Fire Sprinkler System									
Division 22	Plumbing									
22.0	Plumbing									
Division 23	Heating Ventilating and Air Conditioning									
23.0	Duct Cleaning									
23.1	Air Handling Units									
23.2	Heating & Ventilation Units									
23.3	HVAC Pumps									
23.4	VAV Terminal Units									
23.5	Rooftop Units									
23.6	VRV Systems									
23.7	Unit Heaters									
23.8	Chillers									
23.9	Cooling Towers									
23.10	Water Treatment									
23.11	Controls Systems									
23.12	Ductwork and Duct Insulation									
23.13	HVAC Piping & Insulation									
23.14	Testing & Balancing, & Commissioning Assistance									
Division 25	Integrated Automation									
25.0	Building Automation System									
25.1	EEMS Integration									
Division 26	Electrical									
26.0	Electrical Power									
26.1	Electrical Lighting									
Division 27	Communications									
27.0	Communications Systems									
Division 28	Electronic Safety and Security									
28.0	IDS System									
28.1	Robbery Countermeasure CCTV									
28.2	Investigative CCTV									
28.3	Physical Access Control System (PACS)									
28.4	Fire Alarm System									
28.5	Security CCTV									
Division 31	Earthwork									
31.0	Site Clearing									
31.1	Earthwork (develop.)									
31.2	Earthwork (finish)									
Division 32	Exterior Improvements									
32.0	Paving (off-site)									
32.1	Paving									
32.2	Chain Link Fence & Gates									
32.3	Landscaping									
Division 33	Utilities									
33.0	Utilities & Fees (off-site)									
33.1	Utilities (on-site)									
33.2	Electrical (site)									
	Subtotal			(without General Conditions)						
Subtotal	Site Development			(#2.0, #31.0, #31.1, #32.0 and #33.0) x (100% + #1.7 percentage)						
	Site Improvement			(#3.0, #10.2, #31.2, #32.1, #32.2, #32.3, #33.1 and #33.2) x (100% + #1.7 percentage)						
	Building			(Construction costs not including Sitework cost) x (100% + #1.6 percentage)						
	Total		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -

Schedule of Values Definitions

Facility:	Facility name and state.
Contractor:	General Contracting company name.
Paving (off-site) #32.0:	Off-site improvements such as streets.
Utilities (off-site) #33.0:	Off-site utility improvements, relocation of utilities and site fees.
Earthwork (develop.) #31.1:	Rough grading, removal of unsuitable material and importation of fill.
Earthwork (finish) #31.2:	Storm water systems, septic systems and finish grading.
Electrical (site) #33.3:	Site lighting and related electrical work.
Paving #32.1:	Asphalt and concrete paving and striping.
Exterior signage #10.2:	Exterior and building mounted signage.
Landscaping #32.3:	Soil treatment, landscaping and irrigation systems.
Site Concrete #3.0:	Curbs and gutters, sidewalks, site pilings and retaining walls.
Building Concrete #3.1:	Foundations, building pilings, slab-on-grade, cast-in-place and precast concrete.
Site Development:	<p>Site construction costs that make the site usable and increase the value for the Postal Service and subsequent users. The prorated portion of General Conditions is included. This includes: Paving (off-site) #32.0, Utilities (off-site) #2.1, Site Clearing #31.0, Demolition #2.0 and Earthwork (development) #31.1</p>
Site Improvement:	<p>Site construction costs that are necessary for the construction of the project, but do not necessarily increase the value of the site for subsequent users. The prorated portion of General Conditions is included. This includes: Earthwork (finish) #31.2, Utilities (on-site) #33.1, Electrical (site) #33.2, Paving #32.1, Exterior signage #10.2, Fences & Gates #32.2, Landscaping #32.3 and Site Concrete #3.0</p>
Building Cost:	<p>Construction costs that do not include Sitework costs. The prorated portion of General Conditions is included.</p>

Schedule of Values

Facility:

FSM Project Number:

Contractor:

Date:

Item	Description of Work	Material	Labor	Total
Division 01	General Conditions			
1.1	Overhead		\$	-
1.2	Profit		\$	-
1.3	Bldg. Permits		\$	-
1.4	Testing		\$	-
1.5	Other		\$	-
Division 02	Existing Conditions			
2.1	Demolition		\$	-
Division 03	Concrete			
3.1	Site Concrete		\$	-
3.2	Building Concrete		\$	-
3.3	Other		\$	-
Division 04	Masonry			
4.1	Masonry		\$	-
Division 05	Metals			
5.1	Structural Steel		\$	-
5.1	Other		\$	-
Division 06	Wood, Plastics and Composites			
6.1	Carpentry		\$	-
6.2	Other		\$	-
Division 07	Thermal & Moisture Protection			
7.1	Roofing System		\$	-
7.2	Wall Insulation & V.B.		\$	-
7.3	Other		\$	-
Division 08	Openings			
8.1	Doors & Frames		\$	-
8.2	Specialty Doors		\$	-
8.3	Windows		\$	-
8.4	Other		\$	-
Division 09	Finishes			
9.1	Floors		\$	-
9.2	Walls		\$	-
9.3	Ceilings		\$	-
9.4	Painting		\$	-
Division 10	Specialties			
10.1	Signage		\$	-
10.2	Other		\$	-
Division 11	Equipment			
11.1	Dock Equipment		\$	-
11.2	Other		\$	-
Division 12	Furnishings			
12.1	Casework		\$	-
12.2	Other		\$	-
Division 13	Special Construction			
13.0	Metal Building Systems		\$	-
13.2	Vaults		\$	-
13.3	Other		\$	-
Division 21	Fire Suppression			
21.0	Fire Sprinkler System		\$	-
Division 22	Plumbing			
22.0	Plumbing		\$	-

Item	Description of Work	Material	Labor	Total
Division 23	Heating Ventilating and Air Conditioning			
23.0	Duct Cleaning			\$ -
23.1	Air Handling Units			\$ -
23.2	Heating & Ventilation Units			\$ -
23.3	HVAC Pumps			\$ -
23.4	VAV Terminal Units			\$ -
23.5	Rooftop Units			\$ -
23.6	VRV Systems			\$ -
23.7	Unit Heaters			\$ -
23.8	Chillers			\$ -
23.9	Cooling Towers			\$ -
23.10	Water Treatment			\$ -
23.11	Controls Systems			\$ -
23.12	Ductwork and Duct Insulation			\$ -
23.13	HVAC Piping & Insulation			\$ -
23.14	Testing & Balancing, & Commissioning Assistance			\$ -
Division 25	Integrated Automation			
25.0	Building Automation System			\$ -
25.1	EEMS Integration			\$ -
Division 26	Electrical			
16.0	Electrical Power			\$ -
16.1	Electrical Lighting			\$ -
16.2	Structured Wiring			\$ -
16.3	Other			\$ -
Division 27	Communications			
27.0	Communications Systems			\$ -
Division 28	Electronic Safety and Security			
28.0	IDS System			\$ -
28.1	Robbery Countermeasure CCTV			\$ -
28.2	Investigative CCTV			\$ -
28.3	EAS System			\$ -
28.4	Fire Alarm System			\$ -
Division 31	Earthwork			
31.0	Earthwork			\$ -
Division 32	Exterior Improvements			
32.0	Paving			\$ -
32.1	Landscaping			\$ -
	Total	\$ -	\$ -	\$ -

Schedule of Values

Facility:

FSM Project Number:

Contractor:

Date:

Item	Description of Work	Material	Labor	Total
Division 01	General Requirements			
1.1	Mobilization and Demobilization		\$	-
1.2	Interior Protection		\$	-
1.3	Taxes, Permits, Misc. Fees		\$	-
1.4	Bonds		\$	-
1.5	Allowance		\$	-
1.6	Contractor 2-Year Guarantee		\$	-
1.7	[other]		\$	-
Division 02	Existing Conditions			
2.1	Existing Roof Removal and Disposal		\$	-
2.2	Substrate Preparation Work		\$	-
2.3	Steel and Wood Deck Re-securement		\$	-
2.4	Removal and Disposal of Non-Friable ACM		\$	-
2.5	[other]		\$	-
Division 03	Concrete			
3.1	[other]		\$	-
Division 04	Masonry			
4.1	Masonry Repair		\$	-
4.2	[other]		\$	-
Division 05	Metals			
5.1	[other]		\$	-
Division 06	Wood, Plastics, and Composites			
6.1	Wood Blocking, Nailers, and Plywood		\$	-
6.2	[other]		\$	-
Division 07	Thermal and Moisture Protection			
7.1	Roofing Repairs		\$	-
7.2	Underlayment		\$	-
7.3	Roof Insulation and Cover Board		\$	-
7.4	Roofing Membrane, Flashing & Accessories		\$	-
7.5	Sheet Metal Flashing		\$	-
7.6	Sealant		\$	-
7.7	[other]		\$	-
Division 09	Finishes			
9.1	Painting		\$	-
9.2	Interior Ceiling Tile Replacement		\$	-
9.3	[other]		\$	-
Division 22	Plumbing			
22.1	Miscellaneous Plumbing Work		\$	-
22.2	[other]		\$	-
Division 23	Heating, Ventilating, and Air Conditioning			
23.1	Misc. HVAC Equipment and Ductwork Work		\$	-
23.2	[other]		\$	-
Division 26	Electrical			
26.1	Miscellaneous Electrical Work		\$	-
26.2	LP Displacement, Re-installation & Re-certification		\$	-
26.3	[other]		\$	-
Division 28	Electronic Safety and Security			
28.1	Security System/Fire Alarm System Work		\$	-
28.2	[other]		\$	-
	Total	\$	- \$	\$ -

SECTION 013543

ENVIRONMENTAL PROCEDURES

PART 1 – GENERAL

1.1 SCOPE

- A. This section is required in accordance with the terms and conditions of the contract provisions and clauses, including those concerning Safety & Health Standards, Accident Prevention, Protection of the Environment, Existing Vegetation, Structures, Utilities and Improvements, and Handling Asbestos and other Hazardous Materials. The work covered by this section consists of furnishing all labor, material, and equipment and performing all work required for compliance with environmental regulations and preventing pollution during, and as a result of, construction operations under this contract, in addition to those measures set forth in other technical provisions of these specifications.
- B. The Contractor and subcontractors must comply with all applicable federal, state and local laws and regulations related to the environment, health and safety.

1.2 NOTIFICATION

- A. The Contractor must, after receiving a notice of noncompliance with the foregoing provisions, immediately take corrective action. The notice, when delivered to its Contractor or its authorized representative at the site of the work, is deemed sufficient for this purpose. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost because of any such stop orders may be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is subsequently determined that the Contractor was in compliance and the Contractor demonstrates that it is otherwise entitled to an extension of time, excess costs or damages, under the applicable terms and conditions of the contract provisions and clauses.

1.3 ENVIRONMENTAL REGULATORY COMPLIANCE

- A. Within 30 days after receiving the notice to proceed or not less than 15 days prior to commencing on-site work, the Contractor must submit any environmental documents that are required by federal, state or local environmental regulations. Plans must be approved by the COR prior to commencing on-site work and must describe and include, but is not limited to, the following
 1. Erosion Control and Stormwater Management Plan that describes erosion control methods, surface drainage, storm water permitting requirements, and if applicable, protection of site wetlands and/or compliance with wetland permits. This must ensure any federal, state or local permitting requirements for site preparation, erosion control or surface drainage are met.
 2. Landscape Management and Protection Plan that ensures any site-specific beneficial landscaping requirements are met. The plan shall describe the prevention and restoration of landscape damage, temporary roads and embankments, and post construction cleanup as prescribed in the terms and conditions of the contract provisions and clauses, including those concerning *Protection of the Environment, Existing Vegetation, Structures, Utilities and Improvements*.
 3. Waste Minimization and Management Plan must describe how natural resources potentially impacted by construction will be protected or managed; construction wastes will be stored and disposed of or recycled; and pollutants associated with building materials will be controlled. The waste minimization and management section of the plan

must also list materials and construction debris to be recycled, and address the disposal of solid and hazardous wastes and materials, including asbestos and lead-based paint. It must also include tables applicable to the reclamation of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) in accordance with 1.4 (B) below.

1.4 ENVIRONMENTAL SITE CONTROLS

- A. Location of Hazardous Materials: The location of the Contractor's temporary storage of any hazardous materials and/or wastes must be appropriately marked and included in the health and Safety Plan (see Section 1.5 below).
- B. Refrigerant Recovery, Recycling, and Disposal: Any work involving the replacement or repair of equipment containing refrigerant shall meet the following requirements:
 - 1. Recover and recycle or dispose of refrigerant from equipment according to 40 CFR 82 and local regulations.
 - 2. The work shall be completed by a certified refrigerant recovery technician, per 40 CFR 82 and local regulations.
 - 3. Provide a statement signed by the certified refrigerant recovery technician that the work was completed per 40 CFR 82 and local regulations. Include the name and address of technician and date refrigerant was recovered.
- C. Post-construction Cleanup or Obliteration: The Contractor must remove and properly dispose of all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, excess or waste materials, or any other vestiges of construction as directed by the COR. No separate or direct payment may be made for post-construction cleanup and all associated costs must be considered included in the contract price.
- D. Historical and Archeological: Monuments, markers, and works of art must be protected. Items discovered that have potential historical or archeological interest must be preserved. The Contractor must leave the archeological find undisturbed and must immediately report the find to the COR so that the proper authority may be notified.
- E. Dust Control: The Contractor must keep the site free from dust in accordance with applicable federal, state and/or local regulations.
- F. Noise Minimization: The Contractor must perform demolition and construction operations to minimize noise including conducting work during less sensitive hours of the day in accordance with applicable noise control regulations.

1.5 HEALTH AND SAFETY

- A. Prior to commencing on-site work, the Contractor must submit an Occupational Safety and Health Administration (OSHA) Emergency Action Plan (EAP) to the Contracting Officer to demonstrate compliance by the Contractor and subcontractors with applicable OSHA regulations. If the Contractor is not required by OSHA to develop a written EAP, i.e. if 10 or fewer are employed for the construction project or any other specific regulations identified by OSHA, then the Contractor shall submit to the Contracting Officer a signed letter stating the Contractor shall meet OSHA's EAP requirements in a verbal communication to all employees.
- B. The Postal Service has provided a *Safety and Health Guide for Contractors*, as Attachment A to this section. Prior to commencing on-site work, Contractor must read the *Safety and Health Guide for Contractors* and must sign the attached Certificate of Understanding acknowledging and accepting the requirements stated therein.
- C. Prior to commencing on-site work, the Contractor must submit a project-specific Project Safety Plan to the Contracting Officer. The plan must include, but is not limited to, hazard communication, labeling, emergency response and preparedness and training.

- D. Copies of Material Safety Data Sheets (MSDSs) for any hazardous material(s), as defined by OSHA's Hazard Communications Standard, must be included whenever such materials arrive on-site. MSDSs must be kept together and maintained centrally on-site through to project completion. Provide a copy of each MSDS in the Operating and Maintenance Manual. The use of asbestos containing materials, in excess of one percent as defined by US Environmental Protection Agency regulations, is prohibited in the construction of this project. Provide an executed copy of the "Certificate of Asbestos and Lead-Based Paint (New Work)" in the Operating and Maintenance Manual and include a copy with the final payment request.
- E. The use of lead-based paint is prohibited in the construction of this project.
- F. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.
- G. In accordance with the terms and conditions of the contract provisions and clauses, including those concerning *Asbestos Free and Lead-Based Paint Free Certification*, the Contractor must sign and submit to the Contracting Officer the attached "Certification of Asbestos and Lead-Based Paint" for this project. The signed certificate is required to be included in the final payment request.
- H. Do not use any of the USPS targeted chemicals (see regulated and prohibited materials identified under Safety and Health and related environmental requirements).

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2018
Last revised: 9/17/2015

Safety and Health Guide for Contractors

Certificate of Understanding

This *Safety and Health Guide for Contractors* was developed by the Postal Service to provide guidance for contractors hired to perform repair, alteration, renovation, demolition, equipment installation, and other work requiring access to postal-owned or -leased property.

Distribution

A copy of this Certificate of Understanding should be signed by the Contractor's representative at the post award orientation conference or before the commencement of work. A copy of this guide should be readily accessible where the work is being performed. The contracting officer's representative (COR) should thoroughly brief the Contractor's representative on the Contract Safety and Health Requirements contained herein.

Contractor's Verification Statement

As a representative of _____ (Contractor's name), I have received the *Safety and Health Guide for Contractors* prepared by the Postal Service. As the Contractor's representative, I understand and accept the requirements contained herein, and I have reviewed each of the required sections of the guide with the COR and/or the designated Postal Service representative. I agree to review the contents of this guide with all subcontractors hired to perform work on postal property.

Contractor's Representative

Printed Name: _____ Contact Number: _____
Signature: _____ Date: _____

Designated Postal Service Representative

Printed Name: _____ Contact Number: _____
Signature: _____ Date: _____

Safety Representative (If Required by COR)

Printed Name: _____ Contact Number: _____
Signature: _____ Date: _____

Postal Service CO, COR, or Project Manager

Printed Name: _____ Contact Number: _____
Signature: _____ Date: _____

Maintain a copy of this signed form in the Postal Service and Contractor's project files.

Safety and Health and Related Environmental Requirements

The Contractor is required to meet all applicable OSHA, federal, state, and local safety, health, and related environmental requirements in addition to the US Postal Service requirement listed in this table.	
Issue	Postal Requirements
Asbestos	<p><i>Review of Facility Asbestos Survey:</i> Before any building maintenance, equipment installation, renovation, alteration, demolition, or other project begins, determine whether ACBM will be disturbed.</p> <p><i>Proper Work Practices:</i> If ACBM is present, follow proper control procedures and work practices.</p> <p><i>Consultation With Facility Asbestos Coordinator:</i> Consult with the facility manager or his or her designee before the start of any work likely to disturb ACBM. Disturbance means activities that crumble or pulverize ACBM or presumed asbestos-containing material (PACM) or generate visible debris. Operations may include drilling, abrading, cutting a hole, pulling cable, and crawling through tunnels or attics and spaces above the ceiling where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.</p> <p><i>Asbestos Work Authorization:</i> You must have an approved Form 8210, <i>Work Authorization - Asbestos</i>, before work begins within any building containing asbestos.</p>
Barricades, Barriers, and Warnings	Your barricades must meet the OSHA requirements. In addition, you assume control of your work area during your activities unless otherwise specified in writing by the contracting officer (CO) or contracting officer's representative (COR).
Confined Spaces	<p>Confined space work must meet the OSHA requirements. You must have a comprehensive confined space program that includes a written program, employee training, entry and testing equipment, and rescue capabilities.</p> <p>If you require access to confined space requiring a permit, then the trained, designated Postal Service representative must review and approve the project and permit. Entry into other confined spaces must be in accordance with OSHA regulations.</p>
Electrical Work	Lock or rope off work areas involving exposed energized equipment or have an attendant present to prevent accidental contact by unqualified people. Refer to the Barricade section of this guideline for additional information.
Elevated Work and Fall Protection	Follow strictly the applicable OSHA fall protection requirements.
Excavation	<p>All excavations 4 feet or more in depth must be properly shored or sloped and meet all OSHA requirements.</p> <p>Before any digging or drilling commences, inform the Postal Service COR and call Dig Safe or its local equivalent to determine whether any underground utilities are located in the work area. Submit documentation that these notifications have been performed. You must not begin digging or drilling until you have verified that underground utilities have been identified and are properly marked so that work may be accomplished in a safe manner.</p>
Fire Protection	<p>Do not block, remove, or otherwise prevent Postal Service fire extinguishers from being immediately accessible and usable.</p> <p>If a system must be impaired by a scheduled shutdown, notify the appropriate Postal Service representative and do not proceed without Postal Service authorization.</p>
Hazard Communication	<p>Inform the Postal Service before any chemicals are used. Before materials are brought on site, provide material safety data sheets (MSDSs) and an inventory of materials. For projects that are anticipated to use substantial quantities of hazardous materials, you may be required to provide a routing, storage, and waste disposal plan.</p> <p>Upon request, the Postal Service will make available to you MSDSs for hazardous materials the Postal Service uses in the Contractor work area.</p>
Hazardous Materials	<p>Follow all OSHA requirements regarding hazardous materials. Hazardous materials include, but are not limited to, flammable and combustible liquids, gasoline, diesel fuel, motor oil, lubricating oil, hydraulic oil, corrosive cleaners, and battery acid.</p> <p>Provide secondary containment for all containers of liquids that are over 5 gallons in capacity.</p> <p>Immediately report all hazardous material releases ("spills"), regardless of how small or where they occur, to the designated Postal Service representative. Releases include solids, liquids, and gases.</p>
Hot Work	<p>Do not begin any hot work until a Postal Service qualified person has completed and signed a Postal Service Hot Work Permit. The permit will be valid for only a single work shift. You must display the permit at the work site.</p> <p>You are prohibited from performing hot work (a) when the Postal Service has not authorized it, (b) in locations in which fire protection systems have been impaired, (c) in the presence of explosive or flammable atmospheres, or (d) in locations where large quantities of flammable</p>

	and combustible materials are unprotected.
Powered Industrial Trucks	<p>Powered industrial trucks and other mobile equipment must follow all traffic rules of the postal facility. The maximum speed limit for in-plant powered vehicles is 5 miles per hour. Many work areas have posted speed limits that you must strictly follow. Perform refueling only in authorized locations following safe procedures.</p> <p>As a general rule, the Postal Service does not allow gas- or diesel-powered industrial equipment inside postal facilities. Coordinate exceptions to the rule through the servicing safety office.</p>
Ladders	Strictly follow all OSHA requirements regarding ladders. Barricade the ladder use area to prevent contact with mobile equipment and employees.
Lead-Based Paint	<p><i>Review of Facility Lead Survey:</i> Before any construction, alterations, and/or repair activities begin, determine whether LBP will be disturbed. If the painted surface has not been tested, you must have it tested before beginning any activities that could potentially disturb LBP.</p> <p><i>Proper Work Practices:</i> If LBP is present, follow proper control procedures and work practices.</p> <p><i>Consultation With Facility Manager:</i> Consult with the facility manager or his or her designee before the start of any work likely to disturb LBP. Examples of activities that may affect LBP include paint removal by scraping, sanding, power tools, or heat guns; alterations that include removing drywall, structural steel, or other building materials coated with LBP; welding, cutting, or other hot work on coated metal surfaces; abrasive blasting of mail boxes and other equipment; and moving or cleaning of abrasive blasting enclosures.</p>
Lockout/Tagout	<p>Provide a copy of your lockout/tagout procedures, which must meet or exceed the OSHA Lockout/Tagout standard. You will be given access to and must review the Postal Service lockout/tagout program.</p> <p>If you encounter a Postal Service lockout/tagout device that prevents the continuation of work, do not make any attempts to remove, tamper with, or bypass the devices. Contact a Postal Service Maintenance official and make arrangements to have the lockout device removed in accordance with Postal Service lockout removal policies.</p>
Machinery and Equipment	<p>Postal facilities use state-of-the-art mail handling machinery, some of which may operate automatically. Hazards may include, but are not limited to, moving parts and power transmission apparatus, pinch points, electrical contact, and hot surfaces.</p> <p>Do not use machine surfaces as work platforms.</p> <p>Contact the designated Postal Service representative concerning facility machinery.</p>
Personal Protective Equipment	<p>Before beginning work, evaluate the work area for hazards, determine whether contract employees will be required to use personal protective equipment (PPE) to protect themselves from these hazards, and document the hazard assessment.</p> <p>Wear the PPE required by the postal facility in which you are working, regardless of your perception of hazard potential.</p>
Regulated And Prohibited Materials	<p><i>Pesticides.</i> The Postal Service has restricted the use of pesticides. Obtain prior approval of the district environmental compliance coordinator for special cases that may require the use of pesticide treatments.</p> <p><i>Chemical Prohibition.</i> Adhere to the Postal Service Hazard Communication Program and chemical prohibition policies. Do not use on postal property any of the chemicals prohibited by EPA unless a Postal Service person authorizes its use (each of these chemicals must be authorized separately). The USPS Office of Sustainability can supply the list.</p> <p><i>Asbestos-Free Products.</i> Install no asbestos-containing products or materials in postal facilities.</p> <p><i>Lead.</i> Apply no lead-based paint in postal facilities.</p>
Scaffolding	<p>Follow strictly the applicable OSHA scaffolding requirements.</p> <p>Provide adequate barrier protection around the scaffolding to prevent hazards to postal workers.</p>
Walking and Working Surfaces	If the project requires temporary modifications to the means of egress, inform the designated Postal Service representative before performing such actions, provide appropriate alternative means of egress, and communicated these to all employees.

Emergency Procedures

Preparations for Emergency	<p>Be prepared for emergency situations.</p> <p>Ensure that emergency telephone numbers are site specific, readily available, easily read, and communicated to all employees.</p> <p>Train and authorize employees to implement emergency procedures.</p>
Medical Emergencies	<p>Have procedures and medical supplies to provide emergency medical services for your own personnel.</p> <p>Determine how to contact emergency medical services before work begins, and have on-site capabilities to contact such services immediately.</p>
Fires	<p>See Fire Protection above.</p> <p>In the event of a fire, you must:</p> <ul style="list-style-type: none"> - Immediately remove personnel from the area or building following Postal Service evacuation procedures. - Immediately contact the nearest postal employee and inform him or her of the fire. You may also activate an emergency alarm in the area. If no postal employees are on-site, immediately contact the local fire department. <p>Personnel trained in the use and limitations of fire extinguishers may attempt to extinguish the fire if it is safe to do so.</p>
Chemical Releases	<p>See Hazardous Materials above.</p> <p>If the event of a hazardous material release, you must:</p> <ul style="list-style-type: none"> - Immediately remove personnel from the area or building following Postal Service evacuation procedures. - Immediately contact the designated Postal Service representative and inform him or her of the release. You may also activate an emergency alarm in the area. If no postal employees are on-site, immediately contact the local fire department. <p>Contractor personnel should not respond to the release unless specifically trained and protected to perform hazardous material response.</p>
Power Outages	<p>In the event of a power outage, you must:</p> <ul style="list-style-type: none"> - Immediately stop work and assemble for a head count and possible facility egress. - Inform all contract employees that equipment may automatically restart when power resumes. - Immediately contact the designated Postal Service representative and inform him or her of the status of contract work and personnel head count. Relay at this time all hazards created due to the power outage. <p>When power resumes evaluate the status of operations that were being performed relative to hazard potential. For example, the interruption of ventilation in confined spaces may generate atmospheric hazards.</p>
Accident Investigation and Reporting	<p>As soon as is practical after an accident, investigate and document an accident investigation. The documentation must describe the incident and identify the causes and the corrective actions that will prevent future incidents.</p> <p>Report all accidents, whether or not they result in injury. Give the written report to the Postal Service COR within 24 hours of the accident or incident.</p>

Certificate of Asbestos and Lead-Based Paint

(New Work)

To: Contracting Officer, United States Postal Service

Subject: Certification for new construction

Postal facility name: _____

Postal facility address: _____

Certification for new construction:

This Contractor/Owner hereby certifies that no asbestos-containing material in excess of 1 percent as defined by applicable US Environmental Protection Agency regulations, and no lead-based paint has been furnished or installed at the referenced project.

Contractor/Owner name: _____

Signature: _____

Address: _____

Telephone: _____ Date executed: _____

The penalty for making a false statement is prescribed by 18 USC 1001.

SECTION 014000

QUALITY REQUIREMENTS

PART 1 – GENERAL

1.1 CONTRACTOR QUALITY CONTROL

- A. Contractor Quality Control: The Contractor is responsible for the overall quality of all its own work and the work performed by their subcontractors working under this contract. The quality of any part of the work installed must not be less than that required by the technical divisions of this specification. If the COR determines that the quality of work does not conform to the applicable specifications and drawings, the Contractor will be advised in writing of the areas of nonconformance, and within 7 days the Contractor must correct the deficiencies and advise the COR in writing of the corrective action taken.
- B. Noncompliance with Quality Control Requirements: Failure of the Contractor to comply with the above requirements may be cause for termination for default as defined in the terms and conditions of the contract provisions and clauses, including those concerning, *Termination for Convenience or Default*, of the general contract clauses.

1.2 SUBMITTALS

- A. Prior to the start of on-site work, the Contractor must submit to the Contracting Officer a Contractor Quality Control Plan that includes the following information:
 - 1. Quality Control Organization: In chart form, showing relationship of Quality Control organization to other elements of Contractor's organization.
 - 2. Names and qualifications of personnel in Quality Control organization, including Contractor Quality Control Representative, inspectors, Independent Testing and Inspection Laboratory, and Independent HVAC Test and Balance Agency.
 - 3. Procedures for reviewing coordination drawings, shop drawings, certificates, certifications, or other submittals.
 - 4. Testing and inspection schedule, keyed to Construction Schedule, indicating tests and inspections to be performed, names of persons responsible for inspection and testing for each segment of work including preparatory, initial, and follow-up.
 - 5. Proposed forms to be used including Contractor's Daily Report, Contractor Test and Inspection Report and Non-Compliance Check-Off List.
- B. INDEPENDENT TESTING AND INSPECTION LABORATORY: Submit the following.
 - 1. Name.
 - 2. Address.
 - 3. Telephone number.
 - 4. Names of full time registered engineer.
 - 5. Responsible officer.
 - 6. Copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by inspection.

1.3 QUALITY CONTROL PROCEDURES

- A. Monitor quality control over Contractor staff, subcontractors, suppliers, manufacturers, products, services, site conditions, and workmanship.
- B. Comply fully with manufacturer's published instructions, including each step in sequence of installation.

- C. Should manufacturer's published instructions conflict with Contract Documents, request clarification from COR before proceeding.
- D. Comply with specified standards as a minimum quality for work, except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons who are thoroughly qualified and trained in their respective trade, to produce workmanship of specified quality.
- F. Perform tests required by governing authorities having jurisdiction and utilities having jurisdiction.

1.4 TESTING AND INSPECTION LABORATORY SERVICES

- A. Selection and Payment:
 - 1. The Contractor shall pay for services of an Independent Testing and Inspection Laboratory to perform specified testing and inspection.
 - 2. Employment of Independent Testing and Inspection Laboratory in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.
- B. Quality Assurance:
 - 1. Comply with requirements of all applicable ASTM standards.
 - 2. Laboratory: Authorized to operate in State in which Project is located.
 - 3. Laboratory Staff: Maintain a full time registered engineer on staff to review services.
 - 4. Testing Equipment: Calibrated at reasonable intervals with devices of and accuracy traceable to either National Bureau of Standards or accepted values of natural physical constraints.
- C. Laboratory Responsibilities. Contractor shall ensure the Laboratory has the following responsibilities and limits on authority:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at Project site. Cooperate with COR and Contractor in performance of services.
 - 3. Perform specified sampling, testing, and inspection of Products in accordance with specified standards.
 - 4. Determine compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Contractor Quality Control Representative and COR of observed irregularities or non-conformance of work or Products.
 - 6. Submit one copy of all test results directly to the COR.
 - 7. Perform additional tests as required by COR.
 - 8. Attend appropriate preconstruction meetings and progress meetings.
- D. Limits on Authority. Contractor shall ensure the Laboratory has the following limits on authority:
 - 1. Laboratory may not release, revoke, alter, or expand on requirements of Contract Documents.
 - 2. Laboratory may not approve or accept any portion of work.
 - 3. Laboratory may not assume any duties of Contractors.
 - 4. Laboratory has no authority to stop work.

1.5 CONTRACTOR FIELD INSPECTION AND TESTING

- A. Contractor: Test and Inspect work provided under this Contract to ensure work is in compliance with Contract requirements. Required tests and inspections are indicated in each individual Specification Section.
- B. Preparatory Inspection: Performed prior to beginning work and prior to beginning each segment of work and includes:
 - 1. Review of Contract requirements.

2. Review of shop drawings and other submittal data after return and approval.
 3. Examination to assure materials and equipment conform to Contract requirements.
 4. Examination to assure required preliminary or preparatory work is complete.
- C. Initial Inspection: Performed when representative portion of each segment of work is completed and includes:
1. Performance of required tests.
 2. Quality of workmanship.
 3. Review for omissions or dimensional errors.
 4. Examination of products used, connections and supports.
 5. Approval or rejection of inspected segment of work.
- D. Follow-Up Inspections: Performed daily, and more frequently as necessary, to assure non-complying work has been corrected.
- E. Testing and Inspection: Perform testing and inspection in accordance with requirements in individual Specification Sections.

1.6 CONTRACTOR'S DAILY REPORT

- A. In accordance with the terms and conditions of the contract provisions and clauses, including those concerning *Performance and Superintendence of Work by Contractor*, the Contractor shall submit daily report to COR, for days that work was performed. Include the following information:
1. Date, weather, minimum and maximum temperatures, rainfall, and other pertinent weather occurrences.
 2. Daily workforce of Contractor and subcontractors, by trades.
 3. Description of work started, ongoing work, and work completed by each subcontractor.
 4. Coordination implemented between various trades.
 5. Approval of substrates received from various trades.
 6. Nonconforming and unsatisfactory items to be corrected.
 7. Remarks, to include at a minimum, any potential delays, schedule changes, workplace incidents or other items of note. However, nothing reported herein shall relieve the Contractor of the separate responsibility under other terms and conditions of the Contract provisions and clauses to provide specific notice to the Contracting Officer,

1.7 CONTRACTOR'S TEST AND INSPECTION REPORTS

- A. Prepare and submit, to COR, a written report of each test or inspection signed by Contractor Quality Control Representative performing inspection within 2 days following day inspection was made.
- B. Include the following on written reports of inspection:
1. Cover sheet prominently identifying that inspection "CONFORMS" or "DOES NOT CONFORM" to Contract Documents.
 2. Date of inspection and date of report.
 3. Project name, location, solicitation number, and Contractor.
 4. Names and titles of individuals making inspection, if not Contractor's Project Field Superintendent.
 5. Description of Contract requirements for inspection by referencing Specification Section.
 6. Description of inspection made, interpretation of inspection results, and notification of significant conditions at time of inspection.
 7. Requirements for follow-up inspections.

1.8 NON-COMPLIANCE CHECK-OFF LIST

- A. Maintain check-off list of work that does not comply with Contract Documents, stating specifically what is non-complying, date faulty work was originally discovered, and date work was corrected. No requirement to report deficiencies corrected same day it was discovered. Submit copy of Non-Compliance Check-Off List of non-complying work items to COR on a weekly basis.

1.9 COMPLETION AND INSPECTION OF WORK

- A. Prior to final acceptance by Contracting Officer, submit a certification signed by Contractor to Contracting Officer stating that all work has been inspected and all work, except as specifically noted, is complete and in compliance with Contract Documents.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2018
Last revised: 9/23/2015

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1 SUMMARY

- A. The Contractor must provide all temporary facilities and services required to complete the work and to comply with OSHA and other applicable regulations.
- B. The Contractor must maintain temporary facilities in a proper, safe, operating and sanitary condition for the duration of this Contract. Upon completion of this Contract, all such temporary work and facilities shall be removed in their entirety and the premises will be restored to its prior condition.

1.2 PROJECT SIGN

- A. The Contractor must provide and maintain a construction project sign at the location directed by the COR. The sign must conform to the Construction Sign as detailed in the Contract drawings. The information needed to complete the wording on the sign is provided by the COR and will be essentially as shown on the cover of the specification. The sign must be erected within 15 days after receiving a Notice to Proceed. The sign will remain the property of the Contractor and must be removed upon completion of the work and the premises will be restored to its prior condition.
- B. Construction Site Sign:
 - 1. Silk-screened, painted or pressure-sensitive vinyl letters applied to Medium Density Overlay plywood sign.
 - 2. Red: Match Benjamin Moore OP-67.
 - 3. Blue: Match PPG 7062 Federal Blue.
 - 4. White background.
- C. The Contractor must construct and erect a minimum of two hard hat signs at locations designated by the COR. The signs must be erected prior to the commencement of on-site work.

1.3 BULLETIN BOARD

- A. A weatherproof bulletin board, not less than 36 inches wide and 30 inches high, with hinged glass door must be provided adjacent to, or mounted on, the Contractor's project office. If adjacent to the office, the bulletin board must be securely mounted on not less than two posts. The bulletin board and posts must be painted or have approved factory finish. The bulletin board must be easily accessible at all times and must contain wage rates, equal opportunity notice, and other items required to be posted.
- B. The Contractor must maintain the bulletin board in good condition throughout the life of the project. The bulletin board will remain the property of the Contractor and upon completion of the project must be removed from the site and the premises will be restored to its prior condition.

1.4 CONSTRUCTION-USE UTILITIES

- A. The Contractor may use existing site utilities. The Contractor must, at its own expense, make all temporary connections and install distribution lines. All temporary lines must be maintained by the Contractor in a manner satisfactory to the COR and must be removed by the Contractor in like manner before final acceptance of the construction.

1.5 TEMPORARY ELECTRICITY

- A. Service Required: The Contractor may use existing electrical panels.
- B. Safety: The Contractor must provide and maintain lights and signs to prevent damage or injury and must illuminate all hazardous areas. Safety lights must be kept burning from dusk to dawn.
- C. Use of Permanent System: The Contractor must regulate any part of the permanent electrical system that is used for construction purposes in order to prevent interference with safety and with the orderly progress of the work. The Contractor must leave permanent electrical services in a condition as good as new.
- D. Materials: The materials may be new or used but must be adequate in capacity for the purposes intended and must not create unsafe conditions or violate the requirements of applicable codes. At the Contractor's option, patented specialty materials may be used if UL-approved.
- E. Conductors: The Contractor must use wire, cable, or busses of appropriate type, sized in accordance with the National Electrical Code for the applied loads. Use only UL-approved wire.
- F. Equipment: In compliance with NEMA standards, the Contractor must provide an appropriate enclosure for the environment in which the equipment is used.
- G. Installation: The Contractor must provide all required facilities, including transformers, conductors, poles, conduits, raceways, fuses, switches, fixtures, and lamps, located so as to avoid interference with cranes and materials-handling equipment, storage areas, traffic areas, and work under other contracts. The Contractor must install all work to have a neat and orderly appearance and to make it structurally sound throughout. The Contractor must maintain it to give continuous service and to provide safe working conditions. The Contractor must modify the service as required by the progress of the job.
- H. Removal: The Contractor must remove all temporary equipment and materials upon completion of construction, repair all damage caused by the installation, and the premises will be restored to its prior condition.

1.6 TEMPORARY HEATING AND VENTILATION

- A. The Contractor must provide cold weather protection and temporary heat and fuel as required to carry on the work expeditiously during inclement weather, protect all work and materials against damage from dampness and cold, dry out the building, and provide suitable working conditions for the installation and curing of materials until final acceptance by the Contracting Officer. The Contractor must refer to requirements in detailed specifications for temperatures to be provided and maintained for installation and curing of work under the various trades.
- B. The Contractor must provide temporary heat consisting of smokeless heating appliances satisfactory to the COR. The Contractor must furnish and pay for all necessary fuel and attendants in any trade and must maintain temporary heat at temperatures adequate for the intended purpose.
- C. When the permanent heating system is operable and the Contractor elects to use it, the Contractor must provide all labor, materials, services, equipment, and attendants necessary to operate the permanent heating system for temporary heat and to maintain a minimum temperature as specified in the terms and conditions of the contract provisions and clauses, including those concerning *Heat*. If the permanent system is used to provide temporary heating and ventilation, the Contractor must replace all filters and restore the system to a condition satisfactory to the COR.

1.7 TEMPORARY WATER

- A. The Contractor must provide and maintain a temporary water supply system for building purposes, extending branches to convenient points and terminating them with a proper stop and hose connection. Before any paving is laid, the temporary supply must be removed and the tap in the main supply properly capped.

1.8 SANITARY PROVISIONS

- A. The Contractor must provide and keep in neat and sanitary condition conveniences and accommodations for the use of the construction personnel necessary to comply with the requirements and regulations of the local department of health and of other bodies having jurisdiction.

1.9 APPROACHES AND EXITS

- A. The Contractor must provide all necessary approaches and exits required to properly execute the work.
- B. In connection with these, the Contractor must provide for temporary drainage to keep the site free from standing water at all times.

- 1.10 PROJECT PHOTOS - Required on construction contracts that exceed \$10,000.00. The number of photographs, and their content, shall be appropriate to the Contract Scope of Work, with their intended purpose being to illustrate, generally, the work in place for which this payment application applies.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2018
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SECTION 016000

PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Refer to the terms and conditions of the contract provisions and clauses, including those concerning *Optional Materials or Methods (Construction), Materials and Workmanship, Information On "Equal" Products and Brand Name or Equal*.
- B. Provide Products that comply with Contract Documents, which are undamaged and new at time of installation.
- C. Provide Products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.
- D. Substitutions may be considered when the Contractor:
 - 1. Becomes aware of a product or procedure that is more environmentally sensitive or is otherwise advantageous to the Postal Service;
 - 2. Represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
 - 3. Will provide the same guarantee for the substitution that he would for that specified; and
 - 4. Will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects, at no additional cost to the Postal Service and at no extension of the Contract completion date.

1.2 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle Products in accordance with manufacturer's instructions, using means and methods that will prevent damage, deterioration and loss, including theft.
- B. Schedule Product delivery to minimize long-term storage at Project site and prevent overcrowding of construction spaces.
- C. Coordinate Product delivery with installation schedule to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- D. Deliver Products to Project site in undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- E. Promptly inspect shipments to ensure that Products comply with project requirements, quantities are correct, Products are undamaged, and properly protected.
- F. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.3 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect Products in accordance with manufacturers' published instructions, with seals and labels intact and legible.

- B. Store Products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's published instructions.
- C. For exterior storage of fabricated Products, place on sloped supports, above ground.
- D. Provide off-site storage and protection when Project site does not permit on-site storage or protection.
- E. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Products.
- F. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- G. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- H. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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Last revised: 9/23/2015

SECTION 017300

EXECUTION

PART 1 – GENERAL

1.1 LAYOUT OF WORK

- A. The Contractor must lay out its work from Postal Service-established base lines and benchmarks indicated on the drawings and is responsible for all measurements based on them. The Contractor must furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor as may be required in laying out any part of the work from the base lines and benchmarks established by the Postal Service. The Contractor is responsible for the execution of the work to those lines and grades established or indicated by the COR.

1.2 CONTRACTOR'S TEMPORARY USE OF FACILITIES AND EQUIPMENT

- A. No new facilities or equipment intended for the permanent installation, including materials-handling vehicles, may be used for temporary purposes unless specified in the Contract or unless the Contractor has the written permission of the COR.

1.3 FOR CONTRACT WORK PERFORMED IN AN EXISTING OCCUPIED POSTAL FACILITY

- A. The Postal Service will continue to operate the facility during performance of the work. Accordingly, the Contractor must arrange and schedule contract work to facilitate such continued use of the site and building, with minimal disruption to Postal operations. Contract work that cannot be performed during normal Postal operating hours and must be performed after hours or during periods when the facility is normally closed, must be coordinated with the COR.
- B. If contract work is being performed on the roof, or above or near electronic equipment or mail processing equipment, Contractor must provide temporary interior protection above and/or around such equipment as appropriate or as indicated in construction documents. Interior protection shall be anti-static 6-mil poly. Remove temporary protection upon completion of the work. Coordinate interior protection with local management.

1.4 CLEANING

- A. Refer to the terms and conditions of the contract provisions and clauses, including those clauses *Debris and Clean Up*.
- B. Cleaning During Construction:
 - 1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
 - 2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
 - 3. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
 - 4. Collect and remove waste materials, debris, and rubbish from site as specified in the Environmental Compliance and Management Plan as required in Section 013543 - Environmental Procedures.

C. Final Cleaning:

1. Use cleaning materials and agents recommended by manufacturer or fabricator of surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.
2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's published instructions.
3. Complete following cleaning operations before requesting COR inspection for Substantial Completion.
 - a. Clean Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
 - b. Remove tools, construction equipment, machinery and surplus material from Project Site.
 - c. Remove snow and ice to provide safe access to building.
 - d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
 - f. Broom clean concrete floors in unoccupied spaces.
 - g. Provide final cleaning, waxing, and buffing of resilient tile, in accordance with manufacturer's requirements.
 - h. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo if required.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent labels.
 - k. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
 - l. Wipe surfaces of mechanical and electrical equipment, and other similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace air disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - o. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
 - p. Leave Project clean and ready for occupancy.
4. Engage an experienced licensed exterminator to make a final inspection, and rid Project of rodents, insects, and other pests. Comply with regulations of local authorities having jurisdiction.
5. Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction.
6. Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from Project Site and dispose of in accordance with requirements of local authorities having jurisdiction.
7. Where extra materials of value remain after completion of construction, they become Postal Service property and these materials should be stored as directed by COR.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2018
Last revised: 8/8/2017

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Procedures for achieving the most environmentally conscious Work feasible within the limits of the Construction Schedule, Contract Sum, and available materials, equipment, and products.
 - 1. Participate in promoting efforts of Postal Service to create an energy-efficient and environmentally-sensitive structure.
 - 2. Use recycled-content, toxic-free, and environmentally-sensitive materials and equipment.
 - 3. Use environmentally-sensitive procedures.
 - a. Protect the environment, both on-site and off-site, during demolition and construction operations.
 - b. Prevent environmental pollution and damage.
 - c. Effect optimum control of solid wastes.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 013200 - Construction Progress Documentation.
 - 2. Section 014000 - Quality Requirements: Contractor's Daily Report.
 - 3. Section 015000 - Temporary Facilities And Controls: Temporary ventilation, progress cleaning and waste removal.
 - 4. Section 016000 - Product Requirements: Substitutions.
 - 5. Section 017704 - Closeout Procedures and Training: Record submittals.
 - 6. Section 024113 - Selective Site Demolition.

1.2 DEFINITIONS

- A. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of dust fumes, vapors, or gases.
- B. Construction and demolition waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.
 - 1. Rubbish: Includes both combustible and noncombustible wastes but excludes recyclable materials such as paper, boxes, glass, metal, lumber scrap and metal cans.
 - 2. Debris: Includes both combustible and noncombustible wastes, such as leaves and tree trimmings, stumps and rubble that result from construction or maintenance and repair work.
- C. Chemical waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
- D. Diversion: Redirection of waste ordinarily deposited in a municipal landfill to a recycling facility or to another destination for reuse.
- E. Environmental pollution and damage: The presence of chemical, physical, or biological elements or agents, which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.

- F. Hazardous materials: Includes pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).
- G. Interior final finishes: Materials and products that will be exposed at interior, occupied spaces; including flooring, wallcovering, finish carpentry, and ceilings.
- H. Municipal Solid Waste Landfill: A permitted facility that accepts solid, non-hazardous waste such as household, commercial, and industrial waste, including construction and demolition waste.
- I. Packaged dry products: Materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.
- J. Sediment: Soil and other debris that has been eroded and transported by storm or well production runoff water.
- K. Sanitary wastes:
 - 1. Garbage: Refuse and scraps resulting from preparation, cooking, distribution, or consumption of food.
 - 2. Sewage: Domestic sanitary sewage.
- L. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, and special coatings.

1.3 SUBMITTALS

- A. Solid Waste Management and Environmental Protection Plan: Prepare and ***submit at the Preconstruction Meeting*** a Solid Waste Management and Environmental Protection Plan including, but not limited to, the following:
 - 1. Procedures for Recycling/Re-Use Program.
 - 2. Schedule for application of interior finishes.
 - 3. Revise and resubmit Solid Waste Management and Environmental Protection Plan as required by Postal Service.
 - a. Approval of the Contractor's Solid Waste Management and Environmental Protection Plan, will not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.
 - 4. Any permits required by local, state or federal agencies.
- B. With each Contractor's Report as specified in Section 014000 – Quality Requirements, submit an updated Summary Of Solid Waste Disposal And Diversion. Submit on form in Appendix A of this Section. Include manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material for:
 - 1. Municipal Solid Waste Landfills.
 - 2. Recycling/Reuse Facilities.
- C. With Record Submittals as specified in Section 017704 - Closeout Procedures and Training, submit the following:
 - 1. Final Summary Of Solid Waste Disposal And Diversion. Submit on form in Appendix A of this Section.
 - 2. Resource Conservation and Recovery Act Project Summary. Submit on form in Appendix B of this Section.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1 RECYCLING AND REUSE

- A. Collection: Implement a recycling/reuse program that includes separate collection of waste materials of the following types as appropriate to authorized local and regional recycling/reuse facilities:
 - 1. Asphalt.
 - 2. Concrete.
 - 3. Metal.
 - a. Ferrous.
 - b. Non-ferrous.
 - 4. Wood.
 - 5. Debris.
 - 6. Glass.
 - 7. Clay brick.
 - 8. Paper/Cardboard.
 - 9. Plastic.
 - 10. Gypsum.
 - 11. Paint.
 - 12. Carpet.
 - 13. Others as appropriate.
- B. Recycling/reuse centers: Contact state and/or local governmental solid waste offices, Environmental Protection Agency (EPA) regional offices, and authorized applicable non-profit organizations.
 - 1. Asphalt
 - 2. Concrete.
 - 3. Metal.
 - 4. Wood.
 - 5. Debris.
 - 6. Glass.
 - 7. Clay brick.
 - 8. Paper/Cardboard.
 - 9. Plastic.
 - 10. Gypsum.
 - 11. Paint.
 - 12. Carpet.
 - 13. Others as appropriate.
- C. Handling:
 - 1. Clean materials which are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
 - 2. Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- D. Participate in re-use programs: identify local and regional re-use programs, including but not limited to non-profit organizations such as schools, local housing agencies, and public arts programs, that accept used materials. The following are examples for Contractor's information only.
 - 1. National materials exchange network, such as CAL-MAX, a free service provided by various state and regional offices, designed to help businesses find markets for materials

that traditionally would be discarded. The premise of the program is that material discarded by one business may be a resource for another business.

- a. Items and regions covered by materials exchange programs may vary. Contact the applicable regional materials exchange program. In California, contact CAL-MAX at (916) 255-2369.
 2. Habitat For Humanity, a non-profit housing organization that rehabilitates and builds housing for low income families.
 - a. Sites requiring donated materials vary. Contact the national hotline (800) HABITAT.
- E. Rebates, tax credits, and other savings obtained for recycled or re-used materials accrue to Contractor.

3.2 ENVIRONMENTAL CONTROLS

- A. Protection of natural resources: Preserve the natural resources within the Project boundaries and outside the limits of permanent Work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by Postal Service, upon completion of the Work.
1. Confine demolition and construction activities to work area limits indicated on the Drawings and as directed by COR.
 - a. Temporary construction: As specified in Section 015000 - Temporary Facilities And Controls.
 - b. Demolition and salvage operations: As specified in Section 024119 - Selective Structure Demolition.
 - c. Disposal operations for demolished and waste materials that are not identified to be salvaged, recycled or reused:
 - 1) Remove debris, rubbish, and other waste materials resulting from demolition and construction operations, from site.
 - 2) No burning permitted.
 - 3) Transport materials with appropriate vehicles and dispose off-site to areas which are approved for disposal by governing authorities having jurisdiction.
 - 4) Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage and sweep, wash, or otherwise clean project site, streets, or highways.
 - 5) Comply with applicable federal, state and/or local regulations.
 2. Water resources as follows:
 - a. Comply with requirements of the National Pollutant Discharge Elimination System (NPDES) and the State Pollutant Discharge Elimination System (SPDES).
 - b. Oily substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water.
 - 1) Store and service construction equipment at areas designated for collection of oil wastes.
 - c. Mosquito abatement: Prevent ponding of stagnant water conducive to mosquito breeding habitat.
 - d. Prevent run-off from site during demolition and construction operations.
 3. Land resources: Prior to construction, identify land resources to be preserved within the Work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from Postal Service.
 4. Air Resources: Prevent creation of dust, air pollution, and odors.
 - a. Use water sprinkling, temporary enclosures, and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.
 - 1) Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.

- b. Do not use any hazardous chemicals on USPS property when it is a shared work space with USPS employees. If chemicals are authorized for use, store volatile liquids, including fuels and solvents, in closed containers.
- c. Properly maintain equipment to reduce gaseous pollutant emissions.
- d. Interior final finishes: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible in accordance with Postal Service approved Solid Waste Management and Environmental Protection Plan.
- e. Temporary Ventilation: As specified in Section 015000 - Temporary Facilities And Controls, and as follows:
 - 1) Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
 - 2) Provide adequate ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by the COR.
- f. Pre-occupancy ventilation: After final completion and prior to initial occupancy, provide adequate ventilation for minimum 5 days. Pre-occupancy ventilation procedures:
 - 1) Use supply air fans and ducts only.
 - 2) Temporarily seal exhaust ducts.
 - 3) Temporarily disable exhaust fans.
 - 4) Provide exhaust through operable windows or temporary openings.
 - 5) Provide temporary exhaust fans as required to pull exhaust air from deep interior locations. Stair towers may be used for exhausting air from the building during the temporary ventilation.
 - 6) After pre-occupancy ventilation and prior to final testing and balancing of HVAC system, replace air filters and make HVAC system fully operational.
- 5. Fish and Wildlife Resources: Manage and control construction activities to minimize interference with, disturbance of, and damage to fish and wildlife.
- 6. Noise Control: Perform demolition and construction operations to minimize noise. Perform noise producing work in less sensitive hours of the day or week as directed by Postal Service .
 - a. Repetitive, high level impact noise will be permitted only between the hours of 8:00 a.m. and 6:00 p.m. Do not exceed the following dB limitations:

Sound Level in dB

70

80

Time Duration of Impact Noise

More than 12 minutes in any hour

More than 3 minutes in any hour

- b. Provide equipment, sound-deadening devices, and take noise abatement measures that are necessary for compliance.

END OF SECTION

USPS Master Specifications, issued: 10/1/2018
Last revised: 9/17/2013

017419-5

USPS

Date: 10/1/2018

CONSTRUCTION WASTE
MANAGEMENT AND DISPOSAL

Appendix A

SUMMARY OF SOLID WASTE DISPOSAL AND DIVERSION

Project Name: _____

FMS Project Number: _____

Contractor Name: _____

License Number: _____

Contractor Address: _____

Solid Waste Material	Date Material Disposed/ Diverted	Amount Disposed/ Diverted (ton or cu. yd)	Municipal Solid Waste Facility (name, address, & phone number)	Recycling/Reuse Facility (name, address, & phone number)	Comments (if disposed, state why not diverted)
Asphalt					
Concrete					
Metal					
Wood					
Debris					
Glass					
Clay brick					
Paper/ Cardboard					
Plastic					
Gypsum					
Paint					
Carpet					
Other:					

Signature: _____

Date: _____

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USPS

Date: 10/1/2018

CONSTRUCTION WASTE
MANAGEMENT AND DISPOSAL

RESOURCE CONSERVATION AND RECOVERY ACT - PROJECT SUMMARY.

Project Name: _____ FMS Project Number: _____
 Contractor Name: _____ License Number: _____
 Contractor Address: _____

1.0 EPA GUIDELINE ITEMS

A. Fly Ash:

1. Total dollar amount of concrete and cement provided for this project. \$_____.
2. Total dollar amount of concrete and cement containing fly ash provided for this project.
\$_____.
3. Were there any technical impediments to increasing the amount of concrete and cement containing fly ash provided for this project? _____.
 a. If yes, please explain. _____

 _____.

B. Building Insulation Products:

1. Total dollar amount of building insulation products provided for this project. \$_____.
2. Total dollar amount of building insulation products containing recycled materials provided for this project. \$_____.
3. Were there any technical impediments to increasing the amount of building insulation products containing recycled materials provided for this project? _____.
 a. If yes, please explain. _____

 _____.

C. Carpet:

1. Total dollar amount of carpet provided for this project. \$_____.
2. Total dollar amount of carpet containing recycled materials provided for this project.
\$_____.
3. Were there any technical impediments to increasing the amount of carpet containing recycled materials provided for this project? _____.
 a. If yes, please explain. _____

 _____.

D. Floor Tiles (resilient):

1. Total dollar amount of floor tile (resilient) provided for this project. \$_____.
2. Total dollar amount of floor tile (resilient) containing recycled materials provided for this project. \$_____.
3. Were there any technical impediments to increasing the amount of floor tile (resilient) containing recycled materials provided for this project? _____.

a. If yes, please explain. _____

_____.

E. Floor Tiles (ceramic):

1. Total dollar amount of floor tile (ceramic) provided for this project. \$_____.
2. Total dollar amount of floor tile (ceramic) containing recycled materials provided for this project. \$_____.
3. Were there any technical impediments to increasing the amount of floor tile (ceramic) containing recycled materials provided for this project? _____.

a. If yes, please explain. _____

_____.

F. Hydraulic Mulch:

1. Total dollar amount of hydraulic mulch provided for this project. \$_____.
2. Total dollar amount of hydraulic mulch containing recycled materials provided for this project. \$_____.
3. Were there any technical impediments to increasing the amount of hydraulic mulch containing recycled materials provided for this project? _____.

a. If yes, please explain. _____

_____.

G. Compost:

1. Total dollar amount of compost provided for this project. \$_____.
2. Total dollar amount of compost containing recycled materials provided for this project. \$_____.
3. Were there any technical impediments to increasing the amount of hydraulic mulch containing recycled materials provided for this project? _____.

a. If yes, please explain. _____

_____.

2.0 SPECIFICATIONS

NOT USED

3.0 SOLID WASTE PREVENTION

- A. Total dollar amount of solid waste disposed (landfill) for this project. \$_____.
- B. Total weight of solid waste disposed (landfill) for this project. \$_____.

4.0 RECYCLING

- A. Total dollar value of solid waste diverted from landfill and recycled or reused for this project. (Express as total dollar amount for solid waste disposal in landfill for equivalent type and amount of diverted waste.)
\$_____.
- B. Total weight of solid waste diverted from landfill and recycled or reused for this project. (Express as total weight for solid waste disposal in landfill for equivalent type and amount of diverted waste.)
Tons_____.

5.0 COMMENTS

- A. Comments and suggestions for increasing amount of recycled materials used in construction materials.

_____.
- B. Comments and suggestions for improving solid waste prevention and recycling efforts during construction.

_____.

Signature: _____ Date: _____

SECTION 017704

CLOSEOUT PROCEDURES AND TRAINING

PART 1 – GENERAL

1.1 MANUALS

- A. Purpose: Operation and maintenance manuals are for the training of, and use by, Postal Service employees in the operation and maintenance of the systems and related equipment as specified below. The manuals must consist of instruction on systems and equipment. A separate manual or chapter must be prepared for each of the following classes of equipment or system:
1. Landscaping.
 2. Roof system.
 3. Doors.
 4. Security system.
 5. Fire protection.
 6. Plumbing systems.
 7. Mechanical systems.
 8. Electrical systems.
 9. Miscellaneous building equipment and systems.
 10. Mechanization (for requirements for mechanization maintenance manuals, see Mechanization Specification M-5000).
- B. Content: Unless otherwise indicated, each chapter must contain the following, as applicable:
- Introduction.
 - Table of contents.
 - Description of system (including design intent and considerations).
- C. Preparation: The outline below is intended as a general guide for preparing the manuals. The manuals must be prepared to provide for the optimum operation and maintenance of the various systems. The description of systems and general operating instructions for plumbing and electrical manuals may cover only complicated or unusual parts of these systems, such as sewage ejectors, transformers, high tension switchgear, and signal and alarm systems. Manufacturer's literature and data must be those of the actual equipment installed under contract for the particular facility. Further guidance is available in the ASHRAE Handbook, 1984, Systems Volume, Chapter 39, Mechanical Maintenance.
- D. Suggested Outline for Operation and Maintenance (O&M) Manuals: This is a suggested outline, with general requirements of O&M manuals. The outline is presented to indicate the extent of material to be covered and the individual items required in manuals for Mail Processing Facilities. The outline may be modified to suit specific installations; however, the purpose of the manual must be fulfilled. The manual is not intended to duplicate manufacturers' data, but proper references must be made in the text of the O&M manual to indicate that that information is applicable and where it is located.
1. Part I. Description and Design Intent
 - a. Introduction
 - 1) Provide a brief description of project and purpose of the maintenance manual. The following statements must be included: "Operation and maintenance of this equipment must be performed in accordance with this manual and posted instructions, subject to compliance with applicable technical guides and standards issued by USPS. It is recognized that minor changes in control points and settings will be required, based on actual operating experience, to correct varying conditions and improve operation. When such changes appear necessary, they must be submitted to the maintenance manager for consideration. Upon approval of any changes, the applicable portions of

all copies of the manual and proposed instructions must be revised and reissued, and any change in operating procedure brought to the attention of all operating personnel."

- 2) "This manual is specifically developed to assist the Postal official in charge at the facility to operate and maintain the building systems and equipment. Manufacturers' recommendations set forth for certain components must be followed during the complete warranty period for that equipment."
- 3) Contents of Manual. This portion of the introduction must explain that the manual is to contain complete operating, maintenance, and safety instructions for all equipment listed. It must also contain any other appropriate references as required to outline an explanation of the manuals and major categories of reference material required with the manuals.

b. Table of Contents

- 1) The table of contents must list numbers and titles of chapters, sections, and main paragraphs, with their page numbers. Each volume in a set of manuals must contain its own table of contents. Publications containing 10 or more illustrations or tables must include a list of illustrations or tables, as applicable. These lists must show number, title, and page number of each illustration and table. Following is a typical table of contents:
 - a. Landscaping
 - 1.) Irrigation system
 - 2.) Lawns and grasses
 - 3.) Exterior plants
 - 4.) Plant maintenance
 - b. Roof System
 - 1.) Roof and flashing type
 - 2.) Local inspection (frequency and what is included)
 - 3.) Maintenance (when manufacturer performs, if USPS performs what methods compatible materials, etc.)
 - c. Doors
 - 1.) Overhead coiling doors
 - 2.) Folding closures
 - 3.) Sectional overhead doors
 - 4.) Impact traffic doors
 - 5.) Automatic entrance doors
 - 6.) Specialized hardware
 - d. Security Systems
 - 1.) CCTV system
 - 2.) Intrusion detection
 - 3.) Electronic article surveillance
 - 4.) Access control
 - e. Fire Protection System
 - 1.) Water supply and distribution
 - 2.) Exterior fire hydrants
 - 3.) Sprinklers
 - 4.) Fire Department connections
 - 5.) Fire extinguishers
 - 6.) Exit signs
 - f. Plumbing Systems
 - 1.) Potable water
 - 2.) Domestic hot water
 - 3.) Roof and sanitary drains
 - g. Mechanical Systems
 - 1.) Space conditioning

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- 2.) Heating
 - 3.) Central chilled water and distribution
 - 4.) HVAC instrumentation and controls
 - h. Electrical Systems
 - 1.) Incoming Service
 - 2.) Electrical power distribution
 - 3.) Lighting and lighting controls
 - 4.) Fire alarm
 - 5.) Emergency lighting unit
 - i. Miscellaneous Building Equipment
 - 1.) Postal Parcel Lockers
 - 2.) Floor mats
 - 3.) Dock equipment
 - 4.) Window Treatments
 - 5.) Elevators
 - 6.) Scales
 - 7.) Dust collectors
 - 8.) Vehicle maintenance equipment
- 2. Part II. Operating Sequence and Procedures
 - a. Contents: Each chapter must describe the procedures necessary for Postal Service personnel to operate the system and equipment covered in that chapter.
 - b. Operating Procedures: The operating procedures must be divided into four subsections: Startup, Operation, Emergency Operation, and Shutdown.
 - 1) Startup: Give complete instructions for energizing the equipment and making initial settings and adjustments whenever applicable. If equipment is fully automatic, a statement to that effect is all that is required. If a specific sequence of steps must be performed, give step-by-step instructions in the proper sequence. If timing- (such as warm-up between power-on and adjustment) is important, clearly state the specific minimum time required at the proper point in the procedure. Refer to controls and indicators by panel; make references consistent with the nomenclature used in illustrations and tables of controls and indicators. If preliminary settings differ for different modes of operations, give procedures for each mode.
 - 2) Operation: Give detailed instructions in proper sequence for each mode of operation. When, for a given action on the part of the operator, alternate equipment responses are possible, give the appropriate operation reaction to each.
 - 3) Emergency Operation: If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under these conditions. Include here only those alternate methods of operation (from normal) that the operator can follow when there is a partial failure or malfunctioning of components, or other unusual condition.
 - 4) Shutdown: Include instructions for stopping and securing the equipment after operation. If a particular sequence is required, give step-by-step instructions in that order.
- 3. Part III. Maintenance Instructions and Requirements
 - a. Contents: Each chapter must describe the procedures necessary for Postal Service personnel to perform the maintenance on the systems and equipment covered in that chapter. Emphasis must be placed on the method of mechanical control of systems and equipment from a maintenance standpoint. References must be made, as appropriate, to drawings, schematics, and sequences of operation included as part of the construction Contract drawings and specifications that show piping and equipment arrangements and items of control.

Prints of these drawings must be reduced to 11 inches x 17 inches for insertion in the manuals. Drawings must represent the "as-built" condition.

- b. Maintenance Procedures: The maintenance procedures must be divided into two categories: Preventive Maintenance and Corrective Maintenance.
 - 1. Preventive Maintenance
 - a. Provide a schedule for preventive maintenance. State, preferably in tabular form, the recommended frequency of performance for each preventive maintenance task (cleaning, inspection, and scheduled overhauls).
 - b. Provide instruction and schedules for all routine maintenance cleaning and inspection, with recommended lubricants.
 - c. If periodic inspection of equipment is required for operation, cleaning, or other reasons, indicate the items to be inspected and give the inspection criteria for, but not limited to, the following:
 - 1.) Motors
 - 2.) Controls
 - 3.) Filters
 - 4.) Heat exchangers
 - 2. Provide instruction for minor repairs or adjustments required for preventive maintenance routines. Minor repair and adjustment must be limited to repairs and adjustments that may be performed without special tools or test equipment and that require no special training or skills. Identify test points and give values for each.
- c. Corrective Maintenance
 - 1. Corrective Maintenance: Corrective maintenance instructions must be predicated upon a logical effect-to-cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime. Instructions and data must appear in the normal sequence of corrective maintenance, for example, troubleshooting first, repair and replacement of parts second, and then the parts list.
 - 2. Troubleshooting: This information must describe the general procedure for locating malfunctions and must give, in detail, any specific remedial procedures or techniques. The data shown are intended to isolate only the most common equipment deficiencies. Troubleshooting tables, charts, or diagrams may be used to present specific procedures. A guide to this type must be a three-column chart. The columns must be entitled Malfunction, Probable Cause, and Recommended Action. The information must be alphabetically arranged by component, and each component must, in turn, list deficiencies that may be expected. Each deficiency must contain one or more problems with a recommended correction.
 - 3. Repair and Replacement: Indicate the repair and replacement procedures most likely to be required in the maintenance of the equipment. Information included here must consist of step-by-step instructions for repair and replacement of defective items. Include all information required to accomplish repair or replacement, including information such as torque values. Identify all tools, special equipment, and materials that may be required. Identify uses for maintenance equipment. The paragraphs must contain headings to identify the topics covered.
 - 4. Safety Precautions: This subsection must comprise a listing of safety precautions and instructions to be followed before, during, and after repairs or adjustments are made or routine maintenance is performed.
- d. Manufacturers' Brochures: Include manufacturers' descriptive literature covering devices used in the system, together with illustrations, exploded views, and renewal parts lists. This section must also include special devices manufactured by the Contractor.

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- e. Special Maintenance: Provide information of a maintenance nature covering warranty items that have not been discussed elsewhere.
 - f. Shop Drawings: Provide a copy of all approved shop drawings covering approval of equipment for the project with the manufacturers' brochures.
 - g. Spare Parts Lists: Include a recommended spare parts list for all equipment furnished for the project. The parts list must include a tabulation of descriptive data for all the electrical-electronic spare parts and all the mechanical spare parts proposed for each type of equipment or system. Each part must be properly identified by part number and manufacturer.
 - h. Warranty: Include a copy of the "special" or extended warranty in the operation and maintenance manual.
- E. Submittal, In both "hard" and electronic USB disc:
- 1. Preliminary Submittal: Two draft copies of the completed manuscript for items in this outline must be submitted to the COR for review within 60 days after approval of equipment to be provided. One copy will be returned to the Contractor within 30 days after submittal and, if required, must be revised and resubmitted within 30 days.
 - 2. Final Submittal: four complete sets of manuals must be furnished to the COR not later than 90 days before completion of the project.
 - 3. Final Submittal must be accepted by the COR before training can begin.

1.2 POSTED OPERATING INSTRUCTIONS

- A. General. Operating instructions and diagrams must be prepared for posting near the equipment. Posted operating instructions must be photographic or equal non-fading reproductions framed under glass or encased in non-discoloring plastic and must be mounted in locations as directed. Copies of the posted operating instructions must also be used with the O&M manuals as a basis for training Postal Service personnel in the operation and maintenance of systems and related equipment installed under contract at the facility.
- B. Posted operating instructions must consist of simplified, consolidated equipment, control, and power diagrams graphically representing the entire system and actual equipment installed, including concise written instructions on how to start and stop systems, what settings and conditions are to be observed, and what control adjustments are to be made or maintained by the operation. Posted operating instructions must include, but are not limited to the following:
 - 1. Boiler and burner controls.
 - 2. Refrigeration controls.
 - 3. Heating, ventilating, and air-conditioning controls for each system.
 - 4. Controls for dust collection systems.
 - 5. One-line schematic diagrams of water supply (plumbing).
 - 6. One-line diagrams of steam distribution and hot water and chilled water systems, including risers, main shutoff valves, balancing cocks, and the like.
 - 7. One-line isometric diagrams of sanitary drainage.

1.3 TRAINING

- A. The Contractor must train Postal Service personnel in the operation and maintenance of mechanical and electrical equipment. Coordination must be maintained with systems designers for developing the hours of instruction and scope of material to be covered. Training of Postal Service personnel must not begin until the COR has approved the final submittal copy of each O&M manual.
- B. Schedule Submittal: The proposed scope of training and materials and instruction schedule must be submitted for review and approval approximately 30 days before the scheduled completion of

the buildings. Mutually agreeable dates for training must be arranged with the COR, but the training must be completed before final acceptance of the facility.

- C. Scope of Training: Training must include classroom and on-the-job instructions by qualified installation and maintenance personnel having the necessary knowledge, experience, and teaching skills. The use of recording on digital media (DVD or CD discs) during the instruction.
- D. Time Period of Training: The minimum specific hours of training time required for each category of major equipment and systems is indicated below. Past experience indicates a workable ratio in the vicinity of approximately 25 percent classroom to 75 percent application, except that the ratio may be reversed for control systems. The COR must have the option of redistributing the training times, subject to the total time specified. Training must be presented on an 8-hour per day, 5-day per week schedule, with all reading assignments and review to be within this period.

1.4 TRAINING PERIOD

Item	Time (Hours)
1. Roofing	4
2. Special Doors	2
3. Dock Equipment	2
4. Security Equipment	2
5. Ventilation	4
Covers air-handling units with heating and cooling coils, fans, and all other air-handling equipment, together with associated operating and limit controls.	
6. Overall Control System	4
Covers central control center, coordinating respective controls of heating, cooling, and ventilation systems, and shows how these controls work together to provide an integrated overall control of the complete air-conditioning system, both heating and cooling, as well as all other utility control systems.	
7. Electrical System	4]
Covers all building services, lighting, lighting controls, and intercommunications, and security system.	
8. Elevators	4
Covers operation of the different types installed, demonstrations in the machine room on the various operating and control equipment installed, and explanation of the use of the electric circuit diagrams (of sufficient size) to ensure proper operation and assistance in troubleshooting.	
9. Piping and Plumbing	2
Includes, but is not limited to, domestic water supply, storm and sanitary drainage systems, cold-water supply systems, sprinkler systems, and the like.	
10. Miscellaneous	4
Includes, but is not limited to, vehicle maintenance equipment, fire protection and alarm equipment, dust collection systems, compressed air systems, automatic door operators, dock levelers, truck scales, data collection center, and all other equipment not specifically covered above.	

1.5 TRAINING PARTICIPATION SHEETS

- A. Submit to the COR sign-in sheets with the dates and names of all training participants. Training sheets must be reviewed and certified by an authorized facility manager.

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1.6 OTHER CLOSEOUT SUBMITTALS

- A. Additional requirements for Systems Manuals, Operating Instructions, Training and other deliverables are contained in individual Specification Sections. All closeout requirements must be provided to and accepted by the COR prior to requesting final payment. Examples of additional closeout requirements include, but are not limited to, the following
1. Final Punch-List with all items certified as complete.
 2. In accordance with the terms and conditions of the contract provisions and clauses, including those concerning *Record "As Built" Drawings*, the Contractor shall submit certified As-Built Record Drawings and Specifications in the quantities and media specified.
 3. In accordance with the terms and conditions of the contract provisions and clauses, including those concerning *Warranty*, the Contractor shall submit all transferable guarantees and warranties for equipment, materials and installations furnished by any manufacturer, supplier, or installer.
 4. Signed Asbestos and Lead-Based Paint Certificate.
 5. RE-4 Certification of Accessibility (CoA) and Facility Accessibility Survey Report.
 6. Material Safety Data Sheets.
 7. Signed and sealed Contractor Release of Claims.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Master Specifications, issued: 10/1/2018
Last revised: 9/17/2013

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SECTION 024113

SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition of designated site structures, retaining walls, fences, and foundations.
 - 2. Demolition and removal of pavements, curbs and gutters, drainage structures, drainage pipe, utilities, site signs, and landscaping.
 - 3. Disconnecting and capping or removal of identified utilities.
 - 4. Filling voids in subgrade created as a result of removals or demolition.
 - 5. Disposal of demolished materials.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 013543 - Environmental Procedures: Recycling and reuse of waste materials.
 - 2. Section 015000 - Temporary Facilities and Controls: Temporary protection and barriers. Removal and disposal of demolished materials. Coordination of temporary utilities.
 - 3. Section 311000- Site Clearing: Clearing outside periphery of structures.
 - 4. Section 312000 - Earth Moving: Fill material.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to applicable local code for demolition of structures, safety of adjacent buildings and structures, dust control and runoff control.
 - 2. Obtain required permits and licenses from authorities having jurisdiction. Pay associated fees including disposal charges.
 - 3. Notify affected utility companies before starting work and comply with utility company requirements.
 - 4. Do not close or obstruct roadways, sidewalks or fire hydrants without permits.
 - 5. Barricade and mark hazards as necessary.
 - 6. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials. Notify Contracting Officer immediately upon discovery of hazardous or contaminated materials. Do not commence removals, remediation, or abatement without authorization from Contracting Officer.

1.3 PROJECT CONDITIONS

- A. Existing Conditions:
 - 1. Structures indicated for demolition will be discontinued in use and vacated prior to start of Work.
 - 2. United States Postal Service assumes no responsibility for condition of structures to be demolished.
 - 3. Unless otherwise indicated in the Contract Documents or specified by the Contracting Officer, remove items of salvageable value to Contractor from project site and structure. Storage or sale of removed items on project site not permitted.
 - 4. Burning or fires of any nature not permitted.

5. Do not bring explosives on site without written approval of authorities having jurisdiction. Such written approval will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. Comply with governing regulations for use of explosives. Notify company of procedures and schedule in advance of explosive use.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

- A. Refer to in Section 312000.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Site Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
 1. Locate existing utilities as specified in Section.312000
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to United States Postal Service.

3.2 PREPARATION

- A. Provide, erect, and maintain erosion control devices, dust control measures, temporary barriers, and security devices at locations indicated on Drawings and as specified in Section. 015000
- B. Protect appurtenances and structures which are not indicated to be demolished. Repair damage caused by demolition operations at no additional cost to United States Postal Service.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as required.
- D. Mark location of utilities. Protect and maintain, in safe and operable condition, utilities to remain. Provide temporary services during interruptions to existing utilities acceptable to governing authorities and United States Postal Service.
- E. Clear areas around items and structures indicated to be demolished as specified in Section 311000.

3.3 CONSTRUCTION

- A. Demolition Requirements:
 1. Conduct demolition to minimize interference with adjacent structures or pavements.
 2. Stop operations immediately if adjacent structures appear to be in danger. Notify Contracting Officer immediately. Do not resume operations until directed by Contracting Officer.

3. Conduct operations with minimum interference to public or private access. Maintain access and egress at all times.
4. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.
5. Sprinkle soil and demolition work area with water to minimize dust. Provide hoses and water connections for this purpose.
6. Comply with governing regulations pertaining to environmental protection.
7. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

B. Demolition:

1. Disconnect and remove designated utilities within demolition areas.
2. Notify inhabitants of on-site structures of intent to demolish two weeks prior to demolition and verify property is vacated prior to starting demolition.
3. Verify structures are unoccupied; then demolish structures completely and remove from site using methods as required to complete work within limitations of governing regulations. Small structures may be removed intact when acceptable to Contracting Officer and authorities having jurisdiction.
4. Proceed with demolition in systematic manner, from top of structure to ground.
5. Locate demolition equipment and remove materials using procedures to prevent excessive loading to supporting walls, floors, or framing.
6. Demolish concrete and masonry in small sections. Break up concrete slabs-on-grade that are 2 or more feet below proposed subgrade.
7. Demolish and remove below grade construction and concrete slabs on grade to a minimum depth of two feet below proposed subgrade.

C. Filling Voids:

1. Completely fill below grade areas and voids existing or resulting from demolition or removal of structures (pits, wells, cisterns, etc.) using approved select fill materials consisting of stone, gravel, and sand free from debris, trash, frozen materials, roots, and other organic matter.
2. Remove standing water, frost, frozen, or unsuitable material, trash, and debris from areas to be filled before fill placement.
3. Place fill materials in horizontal layers and compact each layer at optimum moisture content of fill material to proposed density as specified in Section. 312000
4. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

D. Disposal of Demolished Materials:

1. Collect, recycle, reuse and dispose of demolished materials as specified in Section 013543-Environmental Procedures and as approved by the U.S. Postal Service in the Solid Waste Management and Environmental Protection Plan.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/21/2015

SECTION 024119
SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Procedures for demolition and removal of existing building elements.
 - 2. Salvaged items for re-use.
- B. Related Documents: The Contract Documents, as defined in Section 011000- Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 013543- Environmental Procedures: Recycling and reuse of waste materials.

1.2 SYSTEM DESCRIPTION

- A. The extent of Selective Demolition Work is that Work necessary, and required to facilitate the new construction indicated.
- B. Demolition shall be such that all construction, new and existing, can be performed, and completed in accordance with the construction documents.
- C. The contractor shall visit the project site and familiarize himself with the existing conditions and project requirements.
- D. Verify the scope of the Work under this Section including salvage material. The United States Postal Service will be responsible for removing all materials and equipment which the United States Postal Service wishes to salvage prior to the beginning of this Work.
- E. The existing fire protection sprinkler system shall remain in place.

1.3 QUALITY ASSURANCE

- A. Engage only personnel who can demonstrate not less than five years successful experience in Work of similar character.
- B. Performance Criteria:
 - 1. Requirements of Structural Work: Do not cut structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.
 - 2. Operational and Safety Limitations: Do not cut operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in a manner intended or resulting in a decreased operational life, increased maintenance or decreased safety.
 - 3. Visual Requirements: Do not cut work which is exposed on the exterior or exposed in occupied spaces of the building in a manner resulting in a reduction of visual qualities or resulting in substantial evidence of the demolition work judged by the Architect to be cut and patched in a visually unsatisfactory manner.

4. Loading: Do not superimpose loads at any point upon existing structure beyond design capacity including loads attributable to materials, construction equipment, demolition operations and shoring and bracing.
5. Vibration: Do not use means, methods, techniques or procedures which would induce vibration into any element of the structure.
6. Fire: Do not use means, methods, techniques or procedures which would produce any fire hazard unless otherwise approved by Contracting Officer.
7. Water: Do not use means, methods, techniques or procedures which would produce excessive water run-off, and water pollution.
8. Air Pollution: Do not use means, methods, techniques or procedures which would produce uncontrolled dust, fumes or other damaging air pollution.

1.4 PROJECT SITE

- A. Indicated "Existing Construction" was obtained from existing drawings or other information which may not reflect actual conditions. The Contractor shall verify all existing conditions and notify the Contracting Officer of discrepancies before proceeding with the Work.
- B. Perform the removal, cutting, drilling, etc., of existing work with extreme care, and using small tools in order not to jeopardize the structural integrity of the building.
- C. Occupancy: Contractor shall not have full use of the facility during construction.
- D. Condition of Structure: The United States Postal Service assumes no responsibility for the actual condition of portions of the structure to be demolished.
- E. Partial removal: Items of salvageable value to the Contractor may be removed from the structure as the work progresses if not claimed by the United States Postal Service. Salvaged items must be transported from the site as they are removed.
- F. Protection: Make sure that the safe passage of persons around the area of demolition is maintained during the demolition operation. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

1.5 PROTECTION OF EXISTING CONSTRUCTION

- A. Provide temporary protection of existing construction (floors, roof, and walls) when adjoining new work and in traffic areas.
- B. Provide temporary construction, constructed of framing and plywood, to protect existing construction and surrounding surfaces from damage by movement of materials and personnel.
- C. The contractor is responsible for all damage to existing structure and shall replace or repair all areas of damage.
- D. Repair, replace, or rebuild existing construction as required or as directed which has been removed, altered or disrupted to allow for new construction. Existing construction shall be corrected to match adjacent construction, new or existing.
- E. Perform cutting of existing concrete and masonry construction with saws and core drills. Do not use jack-hammers or explosives.

1.6 SHORING AND BRACING

- A. Provide temporary shoring of existing construction to allow removal of existing structural elements. Maintain shoring until new structural elements are in place and accepted.

PART 2 - PRODUCTS

2.1 SALVAGED ITEMS FOR RE-USE

- A. Materials and items scheduled for re-use which are damaged by the contractor to the extent which they cannot be re-used shall be replaced by the Contractor at no additional cost to the United States Postal Service.
- B. Contractor shall remove and salvage the existing double action doors for re-use. Store on site in protected area for reinstallation as indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Temporary Support: Provide adequate temporary support for work to be cut to prevent failure. Do not endanger other work.
- B. Provide adequate protection of other work during selective demolition to prevent damage and provide protection of the work from adverse weather exposure.

3.3 PROCEDURE

- A. Employ only skilled tradesmen to perform selective demolition.
- B. Cut work by methods least likely to damage work to be retained and work adjoining.
- C. In general, where physical cutting action is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete and masonry work.
- D. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

- E. Where selective demolition terminates at a surface or finish to remain, completely remove all traces of material selectively demolished, including mortar beds. Provide smooth, even, substrate transition.

3.4 POLLUTION CONTROLS

- A. Use temporary enclosures and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level.
- B. Comply with governing authorities pertaining to environmental protection.
 - 1. Protect natural resources as specified in Section 013543 - Environmental Procedures.
- C. Clean adjacent portion of the structure and improvement of dust, dirt and debris caused by demolition operations, as directed by Contracting Officer and governing authorities. Return adjacent areas to conditions existing prior to the start of the work.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. Collect, recycle, reuse, and dispose of demolished materials as specified in Section 013543 - Environmental Procedures and as approved by the U.S. Postal Service in the Solid Waste Management and Environmental Protection Plan.

3.6 SCHEDULE OF SELECTIVE DEMOLITION

- A. Slab on Grade:
 - 1. Where indicated, saw cut perimeter of existing slab minimum of 50 percent of slab thickness to provide a breaking point to remove existing concrete.
 - 2. Break concrete slab to be removed into portions easily removed, maximum 3 foot dimensions in any side.
 - 3. Remove all concrete pieces within removed area down to the existing subgrade.
- B. Exterior Masonry or Concrete:
 - 1. Locate portion of existing masonry or concrete wall to be removed.
 - 2. Using small power tools, remove only that portion of the exterior wall which is required for the indicated new construction.
- C. Interior Floor Finishes:
 - 1. Remove all interior floor tile finish material.
- D. Interior Walls and Partitions:
 - 1. All interior wall and partitions shall be removed unless otherwise indicated on drawings.
 - 2. Remove all top and bottom framing tracks and over head braces.
- E. Mechanical System:
 - 1. Remove all mechanical equipment and related ductwork.
 - 2. Provide temporary weathertight protection of all openings in roof and exterior walls.
 - 3. Remove all accessories to the mechanical system including hanger straps.
- F. Plumbing:
 - 1. Remove all plumbing fixtures and accessories including all exposed supply, waste, and vent piping.
 - 2. Concealed piping within and below slab construction shall be identified, and capped a minimum of 3 inches (8 cm) below finish floor.

- G. Electrical Service:
 - 1. All electrical circuits within the existing structure shall be abandoned from the existing service entrance section, beyond.
 - 2. Remove all abandoned electrical conduit, boxes, and wiring back to the existing electrical service which is to remain.
- H. Provide additional selective demolition as indicated and required by the Contract Documents and as required for indicated new construction.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/21/2015

SECTION 031000

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
 - 2. Openings for other work.
 - 3. Form accessories.
 - 4. Form stripping.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 032000 - Concrete Reinforcement: Coordination between formwork and reinforcement.
 - 2. Section 033000 - Cast-in-Place Concrete: Supply of concrete accessories for placement by this section.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 - Structural Concrete for Buildings.
 - 2. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 3. ACI 347 - Recommended Practice For Concrete Formwork.
- B. United States Department of Commerce Product Standard (PS):
 - 1. PS 1 - Construction and Industrial Plywood.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Provide data on void form materials and installation requirements. Submit data on form-coating materials.
 - 2. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347.
- B. Where necessary, design formwork under direct supervision of a Professional Engineer experienced in design of formwork and licensed in State where Project is located.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver void forms and installation instructions in manufacturer's packaging.
- C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Formwork: Reuse forms to greatest extent possible without damaging structural integrity of concrete and without damaging aesthetics of exposed concrete.

PART 2 - PRODUCTS

2.1 WOOD FORMS

- A. Forms for Exposed Finish Concrete: Plywood panels, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
 - 1. Plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Lumber: Construction grade; with grade stamp clearly visible.

2.2 ACCESSORIES

- A. Form Ties: Factory-fabricated, removable or snap-off type, metal, of fixed or adjustable length as applicable, with cone ends. Designed to prevent form deflection and to prevent spalling concrete upon removal. Back break dimension, 1-1/2 inch from exposed concrete surface. Provide ties that, when removed, will leave holes not larger than 1 inch diameter in concrete surface.
- B. Form Release Agent: 100 percent biodegradable colorless agent which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of subsequent coatings intended for use on concrete surfaces. Zero VOC.
 - 1. Envirolux by Conspec, Kansas City, KS, (800) 348-7351 or (913) 287-1700.
 - 2. SMD-10 Soy Form Release by Strategic Market Development (800) 959-1071 or (815) 935-0863.
 - 3. Bio-Form by Leahy-Wolf, Franklin Park, IL, (888) 873-5327 or (847) 455-5710.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Corners: Chamfered, wood strip 3/4 x 3/4 inch size; maximum possible lengths.
- D. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
 - 1. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to United States Postal Service.

3.2 FORMWORK INSTALLATION

- A. Install formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 347R.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Furnish in largest available sizes to minimize number of joints and to conform to joint system indicated on Drawings.
- E. Obtain Contracting Officer approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners of concrete members, to produce uniform, smooth lines and tight edge joints.

3.3 FORM RELEASE AGENT APPLICATION

- A. Apply form release agent on formwork in accordance with manufacturer's published instructions.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.4 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.

- C. Coordinate with work of other sections in forming and placing openings, slots, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories in accordance with manufacturer's published instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.6 CONSTRUCTION

- A. Site Tolerances:
 - 1. Construct formwork to maintain tolerances required by ACI 301 and ACI 347.
 - 2. Camber slabs and beams 1/4 inch per 10 feet in accordance with ACI 301.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection and testing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

3.8 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/22/2015

SECTION 032000
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing steel bars.
 - 2. Steel wire fabric.
 - 3. Reinforcement accessories.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 031000 - Concrete Forming and Accessories: Coordination between formwork and reinforcing.
 - 2. Section 033000 - Cast-in-Place Concrete: Coordination between concrete placement and reinforcing.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 - Structural Concrete for Buildings.
 - 2. ACI 318 - Building Code Requirements For Reinforced Concrete.
 - 3. ACI SP-66 - American Concrete Institute - Detailing Manual.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 2. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
 - 3. ASTM A 704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
- C. American Welding Society (AWS):
 - 1. AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- D. Concrete Reinforcing Steel Institute (CRSI):
 - 1. CRSI - Manual of Practice.
 - 2. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.
 - 3. CRSI 65 - Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

1.3 SUBMITTALS

- A. Section 013300 – Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel [and wire fabric, bending and cutting schedules, and supporting and spacing device. Include special reinforcement required for openings through concrete structures.
 - 2. Assurance/Control Submittals;
 - a. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - b. Submit certified copies of mill test report of reinforcement materials analysis.
 - c. Welder's Certificates.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice ACI 301, ACI SP-66, ACI 318, and ASTM A 184.
- B. Design reinforcement under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State where the Project is located.
- C. Welders' Certificates: Submit certificate, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615, 60 ksi yield grade; deformed billet steel bars, unfinished.
- B. Reinforcing Steel Mat: ASTM A 704, ASTM A 615, 60 ksi yield grade; steel bars or rods, unfinished.
- C. Reinforcing Steel Mesh: ASTM A185; 6X6, w 1.4 X w 1.4.
- D. Dowels at Construction Joints: 1/4" x 4.5" Diamond Dowels by PNA Construction Technologies or approved equal.

2.2 ACCESSORIES

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type(CRSI, Class 1) or stainless steel protected(CRSI, Class 2); size and shape as required.

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI SP-66 and ACI 318.
- B. Weld reinforcement in accordance with AWS D1.4.
- C. Locate reinforcing splices not indicated on drawings, at point of minimum stress. Review location of splices with Contracting Officer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.

- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to United States Postal Service.

3.2 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing in accordance with ACI 318.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspect reinforcing locations, bar types and sizes, wire ties, and welding (if applicable).

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/22/2015

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes all labor, materials and appliances, and perform all operations in connection with the installation of Concrete Work, and all related work incidental to the completion thereof, as shown on the drawings, complete, in strict accordance with the drawings and as specified herein. Section Includes:
 - 1. Cast-in-place (CIP) concrete in building frame elements, walls, foundations, foundation walls, slabs-on-grade, and mechanical equipment pads.
 - 2. Finishing of concrete floor slabs and toppings. Concrete liquid surface treatment, sealer, and slip-resistant coatings.
 - 3. Expansion and contraction, control joints in CIP concrete.
 - 4. Concrete curing and protection.
 - 5. Non-shrink grout including installation and forming.
 - 6. Testing related services.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents and References in Section 1.2.
- C. Related Sections: Related work specified elsewhere includes but may not be limited to
 - 1. Section 031000: Concrete Forming and Accessories
 - 2. Section 032000: Concrete Reinforcement

1.2 REFERENCES

- A. General:
 - 1. The publications listed below form a part of this specification to the extent referenced.
 - 2. Where a date is given for reference standards, the edition of that date shall be used. Where no date is given for reference standards, the latest edition available on the date of Notice Inviting Bids shall be used
- B. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO M182, "Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats."
- C. Unless otherwise shown or specified, the work shall conform to the following standards and recommendations of the American Concrete Institute (ACI), latest editions adopted:
 - 1. ACI 117, "Standard Specification for Tolerances for Concrete Construction and Materials."
 - 2. ACI 121R, "Quality Assurance Systems for Concrete Construction."
 - 3. ACI211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - 4. ACI 212.2R, "Guide for Use of Admixtures in Concrete."
 - 5. ACI 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete."
 - 6. ACI 301, "Specification for Structure /Concrete."
 - 7. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
 - 8. ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete."
 - 9. ACI 304.2-R, "Placing Concrete by Pumping Methods."

10. ACI 305, "Hot Weather Concreting."
 11. ACI 306, "Cold Weather Concreting."
 12. ACI 306.1 "Standard Specification for Cold Weather Concreting."
 13. ACI 308, "Standard Practice for Curing Concrete."
 14. ACI 309R, "Guide for Consolidation for Concrete."
 15. ACI 315, "Details and Detailing of Concrete Reinforcement."
 16. ACI 318, "Building Code Requirements for Structural Concrete."
 17. ACI 347, "Guide to Formwork for Concrete."
 18. ACI 347.2R "Guide for Shoring/Reshoring of Concrete Multistory Buildings."
 19. ACI 503.2, "Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive."
 20. ACI SP-15, "Field Reference Manual" which includes ACI 301 "Specifications for Structural Concrete for Buildings" and reference standards specified therein.
- D. American Welding Society (AWS)
1. AWS D1.4, "Structural Welding Code Reinforcing."
- E. American Society for Testing and Materials (ASTM).
1. ASTM A615, "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement."
 2. ASTM C31, "Standard Practice for Making and Curing Concrete Test Specimens in the Field."
 3. ASTM C33, "Standard Specification for Concrete Aggregates."
 4. ASTM C39, "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."
 5. ASTM C42, "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete."
 6. ASTM C94, "Standard Specification for Ready-Mixed Concrete."
 7. ASTM C109, "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)"
 8. ASTM C114, "Standard Test Method for Chemical Analysis of Hydraulic Cement."
 9. ASTM C138, "Standard Test Method for Unit Weight, Yield, and Air Content of Concrete (Gravimetric) of Concrete."
 10. ASTM C143, "Standard Test Method for Slump of Hydraulic Cement-Cement Concrete."
 11. ASTM C150, "Standard Specification for Portland Cement."
 12. ASTM C156, "Standard Test Method for Water Retention by Concrete Curing Materials."
 13. ASTM C171, "Standard Specification for Sheet Materials for Curing Concrete."
 14. ASTM C173, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method."
 15. ASTM C231, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method."
 16. ASTM C260, "Standard Specification for Air Entraining Admixtures for Concrete."
 17. ASTM C309, "Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete."
 18. ASTM C311, "Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete."
 19. ASTM C387, "Standard Specification for Packaged, Dry, Combined Materials for Mortars and Concrete."
 20. ASTM C457, "Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete."
 21. ASTM C494, "Standard Specification for Chemical Admixtures for Concrete."
 22. ASTM C618, "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete."
 23. ASTM C920, "Standard Specification for Elastomeric Joint Sealants."
 24. ASTM C685, "Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing."
 25. ASTM C989, "Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars."

26. ASTM C1260, "Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)."
27. ASTM C1567, "Standard Test Method for Potential Alkali Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)."
28. ASTM E154, "Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Slabs, On Walls, or as Ground Cover."
29. ASTM E1155, "Standard Test Method for Determining F Floor Flatness and FL Floor Levelness Numbers"
30. ASTM D2240, "Standard Test Method for Rubber Property-Durometer Hardness."

- F. Concrete Reinforcing Steel Institute (CRSI),
1. CRSI "Manual of Standard Practice."

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
1. Review of submittals will cover general design only. In no case shall submittal review relieve the Contractor of the responsibility for strength of concrete, general or detailed dimension, quality or quantity of materials, or any other conditions, functions, performance or guarantees required.
 2. Product Data:
 - a. Manufacturers' literature containing product and installation specifications and details.
 - b. Where Manufacturer's specifications, recommendations, and/or directions are required in this specification, deliver to the Contracting Officer two (2) copies of such printed specifications, recommendations, and/or directions for approval before any work is commenced.
 - c. Sources of fine and coarse aggregate. Once approved, the source of fine and coarse aggregate shall not be changed without written approval of the Engineer.
 - d. List of manufacturers and brand names for cement, mineral and liquid admixtures, bond breakers, curing compounds, joint sealants, and materials other than aggregates and reinforcing steel. Include product data sheets, instructions, and specifications for use.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
1. Project Record Documents: Accurately record the following:
 - a. Shop drawings shall be corrected to reflect actual field changes and become part of the "Record As-Built Drawings".
 2. Extra Products: Submit extra products as specified in this Section.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials in unopened containers with labels identifying contents.
- C. Store powdered materials in dry area and in manner to prevent damage. Protect liquid materials from freezing or exceeding maximum storage temperatures set by product manufacturer.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Jobsite Requirements:

1. Conform to ACI 305 R when placing concrete during hot weather.
2. Conform to ACI 306 R when placing concrete during cold weather.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Environmental Impact:

1. Concrete placement accessories:
 - a. Mixing equipment: Return excess concrete to supplier; minimize water used to wash equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:

1. Applied Concrete Technology, Inc., Post Office Box 548, Grayslake, IL 60030, Toll Free: 800-228-6694, Phone: 847-548-2444, Fax: 847-548-2555. www.protecrete.com
2. The Euclid Chemical Company, 19218 Redwood Road, Cleveland, OH 44110, Phone: 216-1-9222, Toll Free: (800) 321-7628, Fax: 216-531-9596 www.euclidchemical.com.
3. Fortifiber Corporation, 419 W. Plumb Lane, Reno, NV 89509, Toll Free: 800-773-4777, Fax: 775-333-6411, Website: www.fortifiber.com.
4. ChemRex Inc., Shakopee, Minnesota 55379, Toll Free: 800-433-9517, Fax: 800-496-6067.
5. BASF Construction Chemicals North America (former Master Builders), 23700 Chagrin Boulevard, Cleveland, OH 44122, Phone: 216-839-7500, Fax: 216-839-8821.
6. W.R. Meadows, Inc., PO Box 338, Hampshire, Illinois 60140-0338, Toll Free: 800-342-5976, Phone: 847-683-4500.
7. Reef Industries, 9209 Alameda Genoa, Houston, Texas 77075, Phone: 713-507-4251, Toll Free: 800-231-6074, Fax: 713-507-4295.
8. Stego Industries LLC, 27442 Calle Arroyo Suite A, San Juan, Capistrano, CA 92675, Phone: 877-464-7834, Fax: 949-493-5165, www.stegoindustries.com.
9. L & M Construction Chemicals, Inc. 14851 Calhoun Rd., Omaha, NE 68152-1140; Phone: 402-453-6600, Fax: 402-453-0244.
10. Curecrete Chemical Company, Inc., 1203 W. Spring Creek Pl., Springville, UT Phone: 801- 489-5663.
11. Midwest Floor Care Inc., 17202 Princeton Rd, Adams, NE 68301, Phone: 402-788-2820.
12. General Resource Technology, Inc., 2978 Center Court, Eagan, MN 55121, Phone: 800-324-8154, Fax: 651-454-4252, www.grtinc.com.

B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 CONCRETE MATERIALS

A. Concrete:

1. Concrete shall be in accordance with ASTM C94. If a conflict exists between ASTM C94 and these specifications, these specifications shall govern.

B. Portland Cement: ASTM C150 – Type I unless otherwise specified or approved by the Engineer.

1. Assume full responsibility for the quality and soundness of cement. Cement is to be of one type and from the same mill; it is to be of uniform color for all concrete with permanently exposed concrete finishes.

- C. Liquid admixtures: All admixtures shall be used in conformance with the manufacturer's recommendations. When air entraining admixtures, water reducing admixtures, high range water reducing admixtures, and non-corrosive accelerating admixtures are used in any combination, all products shall be from the same manufacturer or the ready-mix concrete producer shall certify that they are compatible. The following admixtures are permitted when approved in writing prior to use or are required as specified herein and shall be used in strict accordance with the manufacturer's specifications or recommendations:
1. Calcium chloride: Conform to ACI 301. The water-soluble chloride ion level shall not exceed 0.3 percent by weight of cement.
 2. Air-entraining admixtures: ASTM C260 shall be used to achieve the specified air content in all permanently exposed exterior concrete. For steel hard trowel interior slab finish, do not use air entrainment admixtures. The total air entrainment (entrained and entrapped air) must not exceed 3 percent. For steel trowel exterior slab finish, comply with ACI 318 and ACI 302.
 - a. Euclid: AEA-92 or Air Mix 200.
 - b. BASF: Micro-Air, MBVR-Standard, and MB AE 90.
 - c. Sika: Sika AEA-14, Sika AEA-15, and Sika Air.
 - d. W.R. Grace: Darex EH, Darex II AEA, Daravair AT60, Daravair 1400, and Daravair 1000.
 3. Water-reducing admixtures: Conform to ASTM C494, Type A, containing not more chloride ions than allowed in paragraph C., above.
 - a. Euclid: Eucon WR series or Eucon MR.
 - b. BASF: Masterpave, Masterpave N, PolyHeed 997, Pozzoloth 220N, and Glenium 7500.
 - c. W.R. Grace: Daracem 55 and Daracem 65, WRDA 82 and WRDA with HYCOL.
 - d. Sika: Sikament HP, Plastocrete 161, and Sikament 686.
 - e. General Resource Technology: Polychem 400 NC and Polychem 1000.
 4. Water-reducing/accelerating admixtures: Conform to ASTM C494, Type C or E having long-term test results showing non-rusting on metal deck and reinforcing steel.
 - a. Euclid: Accelguard series.
 - b. BASF: Pozzutec 20+, Pozzoloth NC 534, and Rheocrete CNI.
 - c. Sika: Sika Rapid-1 and Plasocrete 161FL.
 - d. W.R. Grace: Lubricon NCA, Polarset, and DCI.
 5. Water-reducing/retarding admixtures: Conform to ASTM C494, Type D containing not more than 1 percent chloride ions.
 - a. Euclid: Eucon Retarder series.
 - b. BASF: Delvo Stabilizer, Masterpave series, and Pozzoloth 100XR, 200N, 220N and 322N.
 - c. Sika: Plastimet.
 - d. W.R. Grace: Daratard 17, WRDA-64, and WRDA-82.
- D. Fly ash: Conform to ASTM C618. The use of a quality fly ash will be permitted as a cement-reducing admixture (minimum 15 percent and maximum 25 percent). Fly ash used in concrete shall be from a single source and of a single class in combination with Portland cement of a single source and single class unless otherwise approved by the Engineer. The fly ash shall meet all of the requirements of ASTM C618, Class C or Class F, with the following special requirements: The loss on ignition in Table 1 shall not exceed 3 percent. Compliance to Table 1A shall apply. The amount retained on the 325 sieve in Table 2 shall not exceed 34 percent. Where a Type II low-alkali cement is specified, the total C₃A shall be less than 8 percent of total cementitious material. The chemical analysis of the fly ash shall be reported in accordance with ASTM C311. Quality assurance testing and reports for a minimum of six months shall be submitted by the fly ash supplier. The option to use fly ash must be approved prior to use.

- E. Granulated Blast Furnace Slag is an alternative to fly ash and shall conform to ASTM C989 Grade 100 or 120. Granulated blast furnace slag may be used as a substitute for a maximum of 30 percent of Portland cement.
- F. Certification: Certification of the above requirements is required from the admixture manufacturer prior to mix design review and approval by the Contracting Officer. Upon request by the Contracting Officer, a qualified representative is to be provided to assure proper use of admixtures. Use of admixtures, other than listed above will be permitted only when approved.
- G. Aggregates:
 - 1. Normal-weight concrete - ASTM C33. For slabs, also conform to combined aggregate grading recommendations of ACI 302 and ACI 302.1R, unless otherwise permitted.
 - 2. All concrete exposed to the weather shall conform to the limits of deleterious substances and physical properties of Table 3, ASTM C 33.
 - 3. Local aggregates: Local aggregates not complying with ASTM C33, but which have been shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Contracting Officer.
 - 4. The nominal size of an aggregate particle shall not exceed:
 - a. 20 percent of the narrowest dimension between sides of forms.
 - b. 33 percent of the depth of slabs.
 - c. 75 percent of the dimension between reinforcing bars.
 - d. 75 percent of the dimension between reinforcing bars and forms.
 - 5. Maximum size of coarse aggregates and minimum cementitious contents: ACI 301 and ACI 302.1R.
 - 6. Concrete aggregate alkali-silica reactivity (ASR) shall be tested in accordance with ASTM C1260 with a 14-day expansion (no supplementary cementing materials) or ASTM C1567 (with supplementary cementing materials) of less than 0.1 percent. Materials (cement, supplementary cementing materials, and aggregates) to be used in the concrete shall be tested. Coarse aggregates and fine aggregates shall be individually tested. If two grades of coarse aggregates are blended they shall be individually tested.
 - 7. Abrasive aggregates non-slip finishes: Fused aluminum oxide grits, or crushed emery, as abrasive for non-slip finish with emery aggregate containing not less than 40 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, non-glazing, and unaffected by freezing, moisture, and cleaning materials.
- H. Water:
 - 1. Clean, potable, and free of injurious amounts of oil, acid, alkali, organic or other deleterious matter not detrimental to concrete; drinkable.
 - 2. Water shall contain no more than 650 parts per million of chlorides as Cl or more than 1000 parts per million of sulfates as SO₄. In no case shall the water contain an amount of impurities that will cause a change in the setting time of Portland cement of neither more than 25 percent nor a reduction in compressive strength of mortar at 14 days of more than 5 percent when compared to the results obtained with distilled water when tested in accordance with ASTM C109.
 - 3. Water used for curing shall not contain impurities in amounts to cause discoloration of the concrete or mortar or to produce etching of the surface.
 - 4. Recycled water shall conform to ASTM C94.

2.3 GROUT/MORTARS

- A. Cement grout: Conform to ASTM C387 "Dry packaged mixtures" or:
 - 1. Mix at the site, in composition of one volume of Portland cement to 2-1/2 volumes of fine aggregate.
 - 2. Mix the materials dry; then add sufficient water to make the mixture flow under its own weight.
 - 3. Submittals: The following laboratory test results shall be submitted to show compliance with the requirements of this specification:
 - a. Initial setting time: 8 hours maximum

- b. Vertical shrinkage: 0
- c. Compressive strength: 4500 psi 1 day
- d. Compressive strength: 8500 psi 7 days
- e. Compressive strength: 10,000 psi 28 days
- 4. Field service: When required by the contracting officer, provide a qualified concrete technician employed by the Grout Manufacturer to assist in the initial grouting operations.
 - a. Euclid: NS Grout or Hi Flow Grout or E3 Grout series.
 - b. Sika: SikaGrout #212.
 - c. BASF: Masterflow 555 and Masterflow 928.

2.4 CURING/SEALING/HARDENERS

- A. Dissipating liquid membrane-forming compounds for curing concrete; Conform to ASTM C309, Type 1. Curing compound shall be compatible with floor sealer or finish used. Low VOC.
 - 1. Euclid: VOX Kurex DR VOX series; waterborne products.
 - 2. W.R. Meadows: 1100-Clear series.
 - 3. Edoco: Burke Aqua Resin Cure.
 - 4. L&M Construction Chemicals: Cure R.
 - 5. BASF: Kure 200W
 - 6. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Method of curing shall be approved by the finish flooring applicator where finishes are indicated.
- C. Exterior Sealers: applied to horizontal concrete surfaces permanently exposed to salts, deicer chemicals and moisture, including parking decks. The manufacturer shall provide a five-year labor and materials warranty on performance of the sealer. Sealer shall be compatible with the curing compound used.
 - 1. Euclid: Eucoguard or Diamond Clear or Super Diamond Clear.
 - 2. ChemREX: Hydrozo Clear 40.
 - 3. Substitutions: Permitted.
- D. Liquid Densifier/Sealer/Hardener: to be applied on exposed concrete floors cured with dissipating membrane forming curing compound to harden and densify concrete surfaces. Sealers are to be clear, chemically reactive, a waterborne solution of silicate or silicate materials and proprietary components, odorless, and colorless.
 - 1. ChemMasters: Chemisil Plus
 - 2. Conspec Marketing and Manufacturing Co., Inc. Intraseal
 - 3. Euclid Chemical Company: Euco Diamond Hard (Liquid Sealer and Hardener)
 - 4. L&M Construction Chemicals: Seal Hard (Liquid Sealer and Hardener)
 - 5. Curecrete Chemical Company: Ashford Formula (Liquid Sealer and Hardener)
 - 6. W.R. Meadows, Inc.: Liqui-Hard
 - 7. Sika: Sikafloor 3S
 - 8. Sonneborn: Kure-N-Harden
 - 9. Symons Corporation: Buff Hard
 - 10. Or approved equal.

2.5 JOINTS AND EMBEDDED ITEMS:

- A. Construction and Contraction Joints: Comply with ACI 301 and recommendations of ACI 302.1R. Sealant shall be two-part semi-rigid epoxy and shall have minimum Shore A Hardness of 80 when measured with ASTM D2240.

- B. Isolation Joints: Fillers shall consist of 1/8-inch width strips of neoprene, synthetic rubber, or approved substitute, extending the full depth of the slab. Sealant shall be two-part elastomeric type, polyurethane base.

2.6 VAPOR BARRIER/RETARDER

- A. Provide cover over prepared soil, above aggregate subbase material at slabs-on-grade, where shown on the plans. Use only materials which are resistant to decay when coated in accordance with ASTM E154.
 - 1. Vapor Retarder: Polyethylene sheet not less than 10 mils thick, or
 - 2. Vapor Barrier:
 - a. Stego: Stego Wrap Vapor Barrier 10 –mil
 - b. Fortifiber: Moistop and Moistop Ultra 10.
 - c. Insulation Solution Viper Vaporcheck 10.
 - 3. Or approved equal.

2.7 PROPORTIONING

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If laboratory trial batch method is used, use an independent testing facility acceptable to Contracting Officer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing and inspection unless otherwise acceptable to Contracting Officer.
- B. Concrete types and strengths: Minimum 28 Day Compressive Strength shall be per design requirements but not less than:
 - 1. Paving base, columns, beams, walls, foundations, and footings: 3,500 psi.
 - 2. Slab-on-grade: 4,000 psi.
 - 3. Normal or Lightweight concrete on metal deck: 3,000 psi.
 - 4. Tilt-up: 4,000 psi.
 - 5. All concrete exposed to weather shall be air entrained (ASTM C260).
 - 6. All concrete shall be normal weight except as noted above.

When the concrete mix design is developed from laboratory trial batching, adjust proportions to produce a design mix at least 1200 psi greater than the specified strength.

When the field experience method is used, the required average compressive strength shall be determined in accordance with ACI 318. Documentation that proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength shall consist of a field strength test record representing materials and proportions to be used for this project. A field strength test record shall consist of at least 10 consecutive tests encompassing a period of time of not less than 45 days and made within the past 12 months.

Also, see general and specific notes on structural drawings.

- C. Weights: All concrete shall be normal-weight concrete unless otherwise designated on the structural drawings.
- D. Aggregate gradation: For slabs, also conform to combined aggregate grading recommendations of ACI 302.1R, unless otherwise permitted. For all other concrete not otherwise noted the coarse aggregate gradation shall conform to ASTM C33 size no. 57 or larger.
- E. Durability: Conform to ACI 301.
 - 1. All concrete exposed to potentially destructive weathering, such as freezing and thawing, or to de-icer chemicals is to be air-entrained, 6 percent \pm 1 percent, a minimum six sacks cementitious per cubic yard of concrete, 0.45 maximum water-cementitious ratio, and, 4-inch maximum slump.

2. Water-cement ratio: For concrete subject to freezing and thawing or deicer chemicals, the water-cement ratio shall not exceed 0.53 by weight including any water added to meet specified slump in accordance with the requirements of ASTM C94 unless otherwise noted.
- F. Slump: Conform to ACI 301.
1. 3 ½ inch maximum for consolidation by vibration
 2. 5 inch maximum for consolidation by other methods
 3. 8 inch maximum for flowable concrete. Concrete containing HRWR admixture (super plasticizer): 3 inch maximum before addition of HRWR
 4. Where field conditions require slump to exceed that specified above, the increased slump shall be obtained by the use of a superplasticizer only, and the Contractor shall obtain written approval from the Contracting Officer who may require an adjustment to the mix.
- G. Slab-On-Grade
1. Concrete shall conform to ACI 302.1R except that the minimum 28-day compressive strength shall be 4000 psi.
 2. The minimum cementitious content shall be in accordance with ACI 302.1R Table 6.2.
 3. The maximum water-cementitious ratio shall be 0.48.
 4. The maximum water content shall not be greater than 250 lbs per cubic yard of concrete.
 5. The air content shall be less than 3 percent.
- H. Production of concrete: Conform to ACI 301:
1. Cast-in-place concrete used in the work shall be produced at a single off-site batching plant or may be produced at an on-site batch plant.
 2. All concrete shall be proportioned conforming to the approved mix designs and of the materials contained in those approved mixes. A certified copy of the design weights for each mix shall be kept at the producing plant for each class of concrete used on the project.
 3. Plant equipment and facilities are to conform to the "Check List for Certification of Ready -Mixed Concrete Production Facilities" of the National Ready-Mixed Concrete Association (NRMCA) and have NRMCA or approved certification within the past year.
 4. Coarse aggregates shall be washed and, if necessary, shall be uniformly moistened just before batching. Each size of coarse aggregate shall be batched from separate bins as required to produce the combined grading requirements.
 5. Prior to adding a high-range water reducer (super plasticizer), slump shall not exceed the working limit. The high-range water reducing admixture shall be accurately measured and pressure-injected into the mixer as a single dose. If added at the jobsite, the field dispensing system shall conform to the same requirements as a plant system and tested prior to each day's operation. After the addition of the high-range water reducer, the concrete shall be mixed at mixing speed for a minimum of 5 minutes.
 6. Ready-mixed and on-site batched concrete shall be batched, mixed, and transported in accordance with ASTM C94.
 - a. Truck mixers and their operation shall ensure that the discharged concrete is uniformly within acceptable limits of consistency, mix, and grading. All mechanical details of the mixer, such as water-measuring and discharge apparatus, conditions of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum shall be checked before the use of the unit will be permitted.
 - b. Truck mixers shall be equipped with approved revolution counters by which the number of revolutions of the drum or blades may readily be verified. The water tank system of the truck shall be equipped with gauges that permit accurate determination of the tank contents.
 - c. Each batch of concrete shall be mixed in a truck mixer for not less than 80 revolutions of the drum or blades and at the rate of rotation designated as mixing speed by the manufacturer of the equipment. Additional mixing, if any, shall be at the speed designated as the agitating speed by the manufacturer of the equipment. All materials, including mixing water but excluding any high-range water reducers added onsite, shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.

- d. The concrete producer shall furnish duplicate delivery tickets, one for the Contractor and one given to the Owner's Representative for each batch of concrete. The information provided on the delivery ticket shall include the quantity of materials batched including the amount of free water in the aggregate and any water added onsite. Show the date, time of day batched, and if ready-mixed the time of discharge from the truck. The quantity of water that can be added at the site without exceeding the maximum water-cementitious ratio specified shall be noted on the delivery ticket.
7. Concrete produced by on-site volumetric batching and continuous mixing if approved shall conform to ASTM C685.
8. The Engineer may increase the mixing time when the charging and mixing operations fail to produce a delivered batch in which variations of consistency, mix, or grading are within the limits specified.
9. Variations in consistency during the discharge of a single batch shall not exceed 1 inch of slump, except that a greater variation will be permitted if the slump of the concrete decreases and no water is added. Variations in mix and in grading of different parts of the delivered batch shall be within limits stated in ASTM C94.
10. Water shall be introduced prior to, during, and following mixer-charging operations.
11. When a mixer produces unsatisfactory results, it shall be repaired promptly and effectively, or it shall be replaced.
12. Mixers shall not be loaded in excess of their rated capacity.
13. Overmixing, such as to require addition of water to preserve the required consistency or to reduce slump, will not be permitted.
14. All other concrete: Conform to ACI 301
15. Use of accelerating admixtures in cold weather and retarding admixtures in hot weather shall not relax placement requirements specified herein.
16. All concrete placed at ambient temperatures below 50 degrees F is to contain an approved accelerator. The concrete temperature when delivered at the site shall be at least 50 degrees F.
17. All concrete placed at ambient temperatures above 80 degrees F is to contain an approved retarder.
18. All concrete required to be air-entrained is to contain an approved air-entraining admixture.
19. When improved workability, pumpability, lower water-cement ratio, or high ultimate and/or early strength is required, the HRWR admixture (super plasticizer) may be used.
20. Ensure air content for slabs with steel trowel finish is less than 3.0 percent.
21. The concrete shall be of such consistency and composition that it can be worked readily into the corners and angles of the forms and around reinforcement without permitting materials to segregate or free water to collect on the surfaces. Within the limiting requirements, adjust the consistency of the concrete as may be necessary to produce mixtures which will be placeable with reasonable methods of placing and compacting. Maintain on the job at all times adequate extra cement to be used at rate of 1/2 sack cement per cubic yard concrete for each 2" slump increase for corrections due to wetness desired or obtained. No water shall be added to concrete except under the direct awareness of the project inspector.
22. No water shall be added to concrete except under the direct awareness of the project inspector. The water-cementitious ratio stated on the approved mix designs shall not be exceeded unless approved by the Engineer. Re-tempered concrete shall be mixed for not less than 80 revolutions of the drum or blades and at the rate of rotation designated as mixing speed by the manufacturer of the equipment.
23. Adjustments to concrete mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant at no additional cost to Contracting Officer. Laboratory test data for revised mix design and strength results must be submitted and accepted before using in work.

2.8 FORMWORK

A. Section 031000: Concrete Forming and Accessories

2.9 REINFORCING MATERIALS

- A. Section 032000: Concrete Reinforcement

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - GENERAL

- A. Install all cast-in-place concrete work in accordance with ACI 301 except as herein specified.
- B. All bearing materials shall be inspected by the Geotechnical Engineer prior to placing concrete. The Geotechnical Engineer shall be the sole judge as to the suitability of the bearing material.
- C. Compact stone base aggregate to thickness indicated on drawings. Roll poof stone screenings topping to provide smooth hard surface on which to place slab. Surface should not show footprints or truck tracks when driven over
- D. Immediately before placing concrete, spaces to be occupied by concrete shall be free from standing water, ice, mud, and debris.
- E. Concrete shall not be deposited under water or where water in motion may injure the surface finish of the concrete.
- F. Immediately before placing concrete for exterior sidewalk, curb and gutter, pavements, and slab-on-grade, subbases and compacted subgrades shall be thoroughly moistened, but not muddied, by sprinkling with water. Surfaces shall be kept moist by frequent sprinkling, as required, up to the time of placing of concrete.
- G. Forms and the reinforcement shall be thoroughly cleaned of ice and other coatings. Remove surplus form releasing agent from the contact face of forms.
- H. Notify all trades concerned and the Owner's Representative sufficiently in advance of the scheduled time for concrete placement to permit installation of all required work by other trades.
- I. Before placing concrete, all required embedded items, including dovetail anchor slots, anchors, inserts, curb angles, metal frames, fixtures, sleeves, drains, stair nosings, accessory devices for Mechanical and Electrical installations shall be properly located, accurately positioned and built into the construction, and maintained securely in place.
- J. Build into construction all items furnished by the Owner and other trades. Provide all offsets, pockets, slabs, chases and recesses as job conditions require.
- K. Place and properly support reinforcing steel and anchor bolts.
- L. The alignment, orientation, spacing, and embedment length of mechanical load transfer devices in slab-on-grade and pavements shall conform to dimensions and tolerances shown on the drawings.
- M. The Contracting Officer Representative should attend the first concrete pour.

3.3 INSTALLATION - FORMWORK

- A. Section 031000 - Concrete Forming and Accessories
- B. Construction and Contraction Joints: Conform to ACI 301 and recommendations of ACI 302.1R.

3.4 REINFORCEMENT

- A. Placement: Section 032000 - Concrete Reinforcement

3.5 METHODS OF PLACEMENT AND PLACING CONCRETE

- A. Placement: Conform to ACI 301:
 - 1. Maintain concrete cover around reinforcing as per Section 3.3 above and ACI 301.
 - 2. The methods and equipment used for transporting concrete to the site work and the time that elapses during transportation shall not cause segregation of coarse aggregate or slump loss in excess of 1 inch when measured at the point of discharge.
 - 3. Concrete shall be placed within 90 minutes after the water has been added to the cement and aggregates. Concrete shall be placed prior to initial concrete set.
 - 4. Placing of concrete will not be permitted during rainfall or when rain appears imminent. If rain should fall subsequent to placement, the concrete shall be completely protected until curing is complete.
 - 5. Cold-Weather Placement: Comply with provisions of ACI 306.1 "Standard Specifications for Cold-Weather Concreting" and as follows.
 - a. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - b. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature during the first 24 hours.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
 - d. Concrete shall not be placed on frozen ground or placed when the ambient temperature is 40 deg F or less and dropping.
 - e. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - f. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures using vented heaters and insulating blankets.
 - g. Vent heater exhaust gases that contain carbon dioxide outside of enclosed areas.
 - h. Concrete temperatures shall be maintained above 50 degrees F for the first 7 days of curing.
 - 6. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305R "Standard Specification for Hot-Weather Concreting" and as specified.
 - a. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice of a size that will melt completely during mixing 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.
 - b. Reject any concrete that has a temperature at the point of placement above 90 deg F, unless approved otherwise by the Construction Project Manager. When air temperatures are between 80 and 90 deg F the maximum mixing and delivery time is reduced to 75 minutes. When air temperatures exceed 90 deg F, the maximum mixing and delivery time is reduced to 60 minutes.

- c. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
- d. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
- e. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Contracting Officer.
- f. Spray evaporative retardants, wind breaks, misters, or shade concrete when the rate of surface evaporation when calculated in accordance with ACI 305.5 exceeds 0.2 lb/sq. foot per hour.

B. Depositing Concrete

- 1. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Hoppers, tremies, pump line, ducts, chutes, or other methods approved by the Engineer shall be used to deposit concrete in its final position within the specified time limits and without segregation of the mix.
- 2. The sequence of concrete placement and the number, type, position, and design of joints shall be approved by the Engineer prior to concrete placement.
- 3. Place floor slabs-on-grade by "strip cast" method.
- 4. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to re-handling or flowing. No concrete shall have a free fall of over three feet from truck, mixer, or buggies.
- 5. The concreting shall be carried on at such a rate that the concrete is plastic at all times and flows readily into the spaces between reinforcing bars. No concrete that has partially hardened or been contaminated by foreign materials shall be deposited in the work.
- 6. When concreting is started, it shall be carried on as a continuous operation until the placing of the section is completed.
- 7. Except as intercepted by joints, concrete shall be placed in continuous layers. The depth of layers shall not exceed 20 inches. Succeeding layers shall be placed while the previous layer is still plastic. Concrete placement shall begin at the lowest point in each section of concrete to be placed.
- 8. Protect adjacent surfaces from concrete drippings, spillage, and splashes. Hardened or partially hardened splashes or accumulations of concrete on forms or reinforcement shall be removed before the work proceeds. Clean all damaged surfaces immediately.
- 9. All conveyances shall be thoroughly cleaned at frequent intervals during the placement of the concrete, and before the beginning a new run of concrete all hardened concrete and foreign materials shall be removed from the surfaces.
- 10. The Superintendent or Foreman in charge of concrete work shall mark on the drawings the time and date of the placing of each concrete pour. Locations where concrete test cylinders are made shall also be noted on the drawings. Such drawings shall be kept on file at the job until its completion and shall be subject to the inspection of the Owner's Representative at all times.

C. Conveyor Belts and Chutes

- 1. Chutes or conveyor belts shall not be used except as approved by the Engineer.
- 2. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation and loss of material.
- 3. Chutes longer than 50 feet and conveyor belts longer than 110 feet will not be permitted.
- 4. Equipment for conveying and chuting concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery point without separation of material.
- 5. Provide runways or other means for wheeled equipment to convey concrete to point of deposit. Construct runways so that supports will not bear upon reinforcement or fresh concrete.
- 6. The minimum slope of chutes shall enable concrete of the specified consistency to readily flow.
- 7. Ends of chutes, hopper gates, and other points of concrete discharge throughout the conveying, hoisting, and placing system shall be designed and arranged so that concrete passing from them will not fall separated into whatever receptacle immediately receiving the concrete. Adequate headroom provision must be made at such points for a vertical drop and for proper baffling.

8. If a conveyor belt is used, it shall be wiped clean by a device operated so that none of the mortar adhering to the belt will be wasted.

D. Pumping of Concrete

1. The type and operation of a concrete pump shall be subject to the approval of the Engineer. The equipment used in placing the concrete and the method of its operation shall introduce the concrete into the forms without high velocity. Placing equipment shall be operated only by experienced operators.
2. During pumping, the Contractor shall have on-site a standby placing system, acceptable to the Engineer, to ensure that in the event of breakdown of the primary placing equipment, the concrete placement can continue without cold joints.
3. The minimum diameter of the hose or conduit shall be 4 inches unless otherwise approved by the engineer. Aluminum conduits shall not be used for conveying the concrete. Pumping equipment, hoses, and conduits that are not functioning properly shall be replaced.

E. Joints

1. Joints shall be vertical in walls and horizontal in slabs.
2. Dowel bars and tie bars shall be inspected
3. Control joints for controlling concrete shrinkage shall be provided in floor slabs, walls, decks, conduits, and channels as shown on the plans or approved by the Engineer.
4. Joint spacing and sawcut depth for slab-on-grade and concrete pavement shall conform to that shown on the pour sequencing plan and/or drawings.
 - a. Sawed control (contraction) joints for pavements and slab-on-grade shall be installed as soon as practical so as not to ravel the concrete but less than 12 hours.
 - b. The minimum sawcut joint depth shall be 1/4 of the slab thickness unless an early-entry SOFF-CUT saw is used in accordance with manufacturer recommendations (typically sawed between 1 to 4 hours after finishing to a 1-inch minimum depth.
 - c. Joint spacing shall not exceed 15 feet on center each way unless otherwise approved by the Engineer.
 - d. The long dimension of a slab shall not exceed 1.5 times the short dimension unless otherwise approved by the Engineer.
5. Joints in slabs shall align with column lines and joints in adjoining walls unless otherwise approved by the Engineer or shown in the drawings. Joints shall also line up with architectural reveals and form lines. All corners shall be relieved by cutting joint to adjacent control joint.
6. When not otherwise shown on the drawings or specified, concrete placement for walls shall be constructed in segments no longer than 30 unless otherwise approved by the Engineer.
7. If there is a delay in casting but prior to concrete initial set, the concrete placed after the delay shall be thoroughly spaded and consolidated at the edge of that previously placed to avoid cold joints. Concrete shall then be brought to correct level and struck off with a straight edge. Bullfoats shall be used to smooth slab surfaces, leaving it free of humps or hollows.
8. Where placing concrete is interrupted long enough for the concrete to take its initial set, the working face shall be made a construction joint.
 - a. Preparation and disposition of unplanned cold joints in walls shall be approved by the Engineer.
 - b. For slab-on-grade, pavements, sidewalk, and curb and gutter, concrete shall be removed back to the nearest planned joint and a construction joint installed.
9. Unless otherwise noted on the drawings, where concrete is to be placed against existing concrete, except in the case of expansion joints, the joint face of the existing concrete shall be roughened.
 - a. Before new concrete is placed against hardened concrete, the bonding surface of the existing concrete shall be roughened to an amplitude of 0.25 inch using bush hammers, abrasive blasting, or high-pressure water blasting.
 - b. Fresh concrete may be green-cut with water blasting and hand tools to remove concrete laitance and spillage and to expose sound aggregate.
 - c. The prepared surfaces of hardened concrete shall be kept thoroughly wet during the 24-hour period immediately prior to the placement of the new concrete. Wetting shall be accomplished by continuous sprinkling or by covering exposed surfaces with wet burlap.

- d. Where shown on the drawings or permitted by the Engineer, bond-preventing compound shall be applied by brush in accordance with the manufacturer's printed instructions.
10. Corner sections of walls shall not be placed until the adjoining wall sections have cured at least 14 days.

F. Consolidation

1. All concrete shall be thoroughly consolidated by internal mechanical vibrators during the placing operation and shall be thoroughly worked around the reinforcement and embedded fixtures and into corners of the forms.
2. Concrete for slabs 8 inches thick or less may be consolidated with vibrating screeds. Slabs between 8 to 12 inches thick shall be compacted with internal vibrators and (optionally) with vibrating screeds.
3. Concrete shall be consolidated by vibration to the maximum practicable density. The concrete shall be free from pockets of coarse aggregate and entrapped air.
4. Vibrators shall have a minimum diameter of 3 inches with a frequency of at least 7000 vibrations per minute and with an amplitude adequate to consolidate the concrete in the section being placed.
5. Forms shall contain sufficient windows or shall be limited in height to allow visual observation of the concrete during placement. Sufficient illumination shall be provided in the interior of forms so that at the places of concrete deposition the concrete shall be visible from the deck or runway.
6. Vibrators shall not be secured to forms or reinforcement.
7. Keep a minimum of two standby vibrators in operable condition on the job during concreting operations.
8. Consolidation shall be carried on continuously with the placing of concrete.
9. The number of vibrators employed shall be sufficient to consolidate the concrete within 15 minutes after it is deposited in the forms.
10. When consolidating each layer of concrete, the vibrator shall be operated at regular and frequent intervals 18 to 30 inches apart.
11. The vibrator shall be kept in nearly a vertical position as practicable. The use of vibrators to shift or drag concrete after deposition will not be permitted. Vibrators shall not be laid horizontally or laid over.
12. The vibrator head shall penetrate 6 to 8 inches into the preceding layer and then be withdrawn at a slow rate. The top part of each layer shall be re-vibrated systematically at the latest time the concrete can be made plastic by means of vibration.
13. Concrete shall not be placed until the previous layer has been vibrated.
14. Unless directed otherwise by the Engineer, the top 2 feet of walls shall be re-vibrated approximately 1 hour after placement of concrete and while a running vibrator will still sink under its own weight into the concrete and liquefy it momentarily.

G. Protection of cast concrete: Conform to ACI 301.

H. Repair of surface defects: ACI 301.

1. Inspect concrete surfaces and surfaces to be painted immediately upon removal of forms. Irregularities shall be immediately rubbed or ground to secure a smooth, uniform, and continuous surface.
2. Clean surfaces of tie holes. Tie holes shall be filled solid with patching mortar.
3. Surfaces to be smoothed shall not be plastered or coated.
Patch imperfections as needed or as directed by the Contracting Officer. Repairs in accordance with Section 3.8 shall not be made until the surface has been inspected and repair methods have been approved by the Contracting Officer.

3.6 FINISHING

A. Finishing of formed surfaces: ACI 301:

1. Tops of forms:
 - a. Strike concrete smooth at tops of forms.

- b. Float to texture comparable to formed surfaces.
 - 2. Formed surfaces:
 - a. Finished formed surfaces shall conform accurately to the shape, alignment, grades, and sections shown on the drawings or prescribed by the Engineer.
 - b. Surfaces shall be free from fins, bulges, ridges, honeycombing, or roughness of any kind and shall present a finished, smooth, continuous hard surface.
 - c. Permanently exposed surfaces: ACI 301 - "Smooth Form Finish" with the fins ground smooth and air holes shall be filled with a non-shrink mortar. The color of the patch material shall match the color of the surrounding concrete. Surfaces in unfinished areas unexposed to public view: ACI 301- "Rough Form Finish".
- B. Slabs: Minimum slab surface tolerance must satisfy ACI 301 and ACI 302.1R as measured in accordance with ASTM E1155.
 - 1. Slabs-on-grade:
 - a. For exposed slabs, install semi-rigid epoxy sealant in construction and contraction joints after slab has a minimum of 60 days or otherwise approved by the Engineer.
 - b. Separate slabs-on-grade from vertical surfaces with 1/2-inch-thick joint filler. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.
 - c. Allowable tolerance for slab on grade surfaces, measured in accordance with ACI 117 and ASTM E1155, shall meet or exceed an overall value of FF35/FL25, with minimum local value of FF24/FL17.
 - 2. Concrete Finishes:
 - a. The following will not be permitted on slab or floor finishes:
 - 1) Dusting dry cement or sand on the surface to absorb excess moisture.
 - 2) Use of a mortar finishing coat.
 - 3) Excessive troweling or manipulation that brings water or a large amount of fines to the surface.
 - 4) Use of a Fresno.
 - 5) Addition of water to the surface during the finishing operation.
 - 6) Use of the floor during construction in a manner that leads to marring or staining the finish.
 - b. Surface preparation
 - 1) The concrete shall be brought up evenly to slightly above finished grade and shall be thoroughly compacted and consolidated. The top shall be struck off to accurately established grade strips or grade blocks. Complete screeding before any excess moisture or bleedwater is present on the surface.
 - 2) After bull floating, defer additional finishing operations until the concrete has stiffened sufficiently to sustain foot traffic pressure with an indentation of not more than 1/4 inch.
 - c. Floor Slabs: Steel trowel finish unless otherwise noted on the plans. As soon as the moisture sheen has disappeared from the floated surface and the concrete has hardened sufficiently to prevent drawing moisture and fine materials to the surface, the surface shall be steel troweled to produce a smooth, hard, uniform finish. Final steel troweling shall be conducted after the concrete is hard enough that no mortar accumulates on the trowel when manipulated with heavy pressure. Machine finishing may be used for troweling.
 - d. Exposed concrete slabs sealed or sealed and hardened using a liquid compound compatible with the curing method used.
 - e. Exterior Concrete Finishes: Unless otherwise noted on the drawings, floors, walkways, and roof finishes shall be sloped a minimum 0.125 inch per foot to drain water. A light steel trowel with broom finish unless otherwise noted on the plans. Apply exterior sealer to surfaces exposed to deicer chemicals that is compatible with the curing method used.
 - f. Exposed Ramps, Landings and Stair Treads: A light steel trowel with broom finish unless otherwise noted on the plans. Surfaces shall be sealed or sealed and hardened using a liquid compound compatible with the curing method used.
 - g. A heavy broom finish shall be provided on disabled person ramps, utility ramps, and around exterior loading docks.

3.7 CURING, PROTECTION, LIQUID HARDNERS AND SEALERS

A. Temperature, Wind, and Humidity

1. When concrete slabs and other unformed concrete is placed in warm, dry, dusty, or windy conditions, concrete surfaces shall be protected from rapid drying by use of windbreaks, shading, fogging with properly designed nozzles, or a combination of these measures. Hot weather concreting procedures provided in ACI 305R shall be used when ambient conditions dictate.
2. Cold weather concreting procedures provided in ACI 306R shall be used when ambient conditions dictate.
3. Changes in air temperature immediately adjacent to the concrete during and immediately following the 7-day initial curing period shall be kept as uniform as possible and shall not exceed 5 deg. F in any 1 hour or 50 deg. F. in any 24-hour time period.

B. Curing Compound

1. All curing methods shall be placed immediately after final finishing (i.e., within two hours). Contractor's attention is directed to the fact that experience shows the most important time of curing is from three to four hours after placing and extending five to six hours thereafter. It is extremely important, therefore, to prevent loss of moisture, particularly during this period when concrete is especially vulnerable to plastic shrinkage cracks. All exposed surfaces of concrete including floor slabs, whether or not they receive a finish flooring, shall be protected from premature drying for a minimum of seven days.
2. Apply the specified curing compound in strict accordance with manufacturer's written instructions. Curing compound shall not be diluted by the addition of solvents or thinners, nor shall it be altered in any other manner. Curing compound that has become chilled and is too viscous for satisfactory application shall be heated by steam or hot water bath until it has proper fluidity. The temperature of the compound shall not exceed 100 °F. Curing compound shall not be heated by direct exposure of the container to fire.
3. When used on an unformed concrete surface, application of the first coat of curing compound shall commence immediately after finishing operations have been completed. When curing compound is used on a formed concrete surface, the surface shall first be moistened with a fine spray of water immediately after the forms have been removed. The spray shall be continued until the surface does not readily absorb further water. As soon as the surface film of water has disappeared and the surface is almost dry, the first coat of curing compound shall be applied. In the event that application is delayed on either formed or unformed surfaces, the surface shall be kept continuously moist until the compound has been applied or the specified period of water curing has elapsed.
4. Surfaces shall be sprayed uniformly with 2 coats of curing compound. Each coat shall provide a minimum coverage of 1 gallon per 250 square feet of surface. As soon as the first coat has become dry, a second coat shall be applied in the same manner. The direction of application of the second coat shall be perpendicular to the first coat. The curing compound shall be sprayed using approved pneumatic or pump driven equipment having the following characteristics:
 - a. Separate lines to the nozzle for material and for compressed air
 - b. A filtering system for the removal or entrapment of contaminants
 - c. A constant application pressure
5. Curing compound shall not be used on any concrete surface specified to receive additional concrete, coatings, grout, and chemical treatment

C. Protection

1. Freshly placed concrete shall be protected against wash by rain.
2. Dust control shall be provided in the surrounding areas during placement. If, in the opinion of the Engineer, these conditions are not satisfactory met, concrete shall not be placed.
3. During the first 2-day period of curing, no traffic on or loading of the floors will be permitted.
4. The contractor shall allow no traffic and take precautions to avoid damage to the membrane of the curing compound for a period of not less than 28 days. Damage shall be repaired immediately to the satisfaction of the Engineer.
5. Special care shall be taken to prevent avoid damaging the surfaces and joints due to load stresses from construction equipment, heavy shock, and excessive vibration. During construction

- activities, concrete shall be protected against damage with plywood or other approved materials until final acceptance by the Engineer.
6. Precautions shall be taken to prevent overloading floors, pavements, slabs, beams, and other members. The Contractor shall comply with the Engineer's instructions regarding the loads that will be permitted on these members during construction.
 7. Self-supporting structures shall not be loaded in such a way to overstress the concrete.
- D. All floor slabs shall be cured using products and methods compatible with selected floor adhesives, toppings, and other finish materials.
- E. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
1. Remove curing compounds per the manufacturer's instructions after curing is complete as required to ensure compatibility of any finish treatments, paints, or coatings.
 2. Remove sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 3. Apply liquid in accordance with manufacturer's instructions and until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water to remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- F. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instruction.

3.8 PATCHING AND REPAIR

- A. Concrete will be considered by the Engineer as not conforming to the intent of the drawings and specifications for the following reasons:
1. Concrete this is not formed as shown on the drawings.
 2. Concrete this is not in true alignment or level.
 3. Concrete which exhibits a defective surface.
 4. Concrete with defects that reduce the structural integrity of a member or members.
 5. Concrete jointed slabs with uncontrolled random cracking.
- B. Non-conforming concrete to required thickness, lines, details, and elevations will be rejected by the Contracting Officer and shall be modified or replaced with concrete that conforms to the contract requirements without a claim by the Contractor for additional cost or extension of contract time.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Contracting Officer for each individual area. Should the Contracting Officer grant permission for the Contractor to attempt restoration of a defective area by patching or other repair methods, such permission shall not be considered a waiver of the Contracting Officer's right to require complete removal of the defective area if, in the Engineer's opinion, the restoration does not provide the structural or aesthetic integrity of the member or members.
- D. All repairs of defective areas shall conform to ACI 301. On areas requiring treatment of defects and until such repairs have been completed, only water cure will be permitted
- E. At any time prior to final acceptance, concrete found to be defective, damaged, or not in accordance with the specifications shall be repaired or removed and replaced with acceptable concrete.
- F. If approved by the Contracting Officer, repair or replace concrete with excessive honeycombing due to improper placement.
1. Honeycombed areas shall be removed down to solid concrete a minimum of 1 inch over the entire area. Feathered edges will not be permitted. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut.
 2. Laitance and soft material shall be removed prior to patching with a pea gravel concrete mix and bonding agent approved by the Engineer.
 3. The area to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching materials.
 4. If a cement slurry bonding grout is approved, the heavy-cream consistency grout shall then be rigorously brushed into the surface. The concrete patch material shall be installed prior to the bonding grout skimming over or drying.

5. If approved, a bonding admixture, bonding compound, or epoxy adhesive may be used in strict accordance with the manufacturer's preparation and application recommendations. Comply with ACI 301 and ACI 503.2 for standard specifications for bonding plastic concrete to hardened concrete with a multiple component epoxy adhesive.
6. The repair concrete shall be thoroughly consolidated in place and struck off so as to leave the patch slightly higher than the surrounding surface. The concrete shall be left undisturbed for at least 1 hour to permit initial shrinkage then finished.
7. The patched area shall be kept damp for 7 days.
8. The color of the patch material shall match the color of the surrounding concrete. Repairs shall be made promptly while the base concrete is less than 28 days old
9. Metal tools shall not be used in finishing a patch in a formed wall that will be exposed.
- G. Areas requiring patching shall not exceed 2 sq. ft. per 1000 sq. ft. of surface area and shall be widely dispersed. Areas showing excessive defects as determined by the Contracting Officer shall be removed and replaced.
- H. High spots identified in the floor flatness and levelness survey may be removed with bump grinding. Areas to be ground shall not exceed more than 10 percent of any one slab nor more than 5 percent of the total slab-on-grade area. There are no limitations for exterior concrete pavement areas requiring grinding.
- I. Random hairline cracks in up to 3% of the slab panels will be accepted. Cracks in these panels shall be routed and filled with semi-rigid joint filler. If more than 3% of panels contain cracks, the number of panels exceeding the 3% limit shall be demolished and replaced at the direction of the Contracting Officer, crack repairs will not be accepted. Any panels that contain cracks wider than 0.022" shall be demolished and replaced.
- J. Interior slab-on-grade hairline cracks allowed to be repaired that are subjected to lift truck traffic shall be routed and sealed with a semi-rigid epoxy sealant. Exterior slabs may be routed and sealed with the flexible joint sealant to be installed in pavement joints.

3.9 GROUTING

- A. After steel columns have been installed and leveled, grout the space between the bottom of the plate and concrete, using cement grout completely filling the space and forming solid bearing for the column base plate.

3.10 EVALUATION AND ACCEPTANCE OF CONCRETE

- A. Comply with ACI 301 and modifications in this section.
- B. Compressive strength
 1. Sets of standard-cured quality assurance cylinders will be taken by the Engineer during the progress of the work. The number of cylinder sets taken for each concrete mix design placed each day shall not be less than one set per day, nor less than one set for each 150 cu yds of concrete nor less than one set for each 5000 sq ft of surface area for slabs or walls.
 2. A set of cylinders consists of five cylinders cured in accordance with ASTM C31: one to be tested at 7 days and two to be tested and their strengths averaged at 28 days in accordance with ASTM C31. The fourth and fifth cylinders may be used to test at other ages or to verify strength after 28 days in the event the 28-day strengths are low.
 3. A 28-day compressive strength test shall consist of the average strength of at least two cylinders fabricated from a single load of concrete.
 4. The strength level of the concrete will be considered satisfactory so long as the averages of all sets of three consecutive strength tests equal or exceed the specified strength, f'_c , by more than 500 psi, not more than 10 percent of the tests are less than the specified 28-day strength, and no individual test is more than 500 psi below the 28-day specified strength.
 5. Should cylinder tests fail to meet the strength acceptance requirements or if deficient construction is suspected, core tests may be required and the costs of such tests paid by the Contractor. The

Engineer shall identify core locations to least to impair the strength of the structure. Four-inch diameter cores shall be tested in accordance with ASTM C42.

6. At least three representative cores shall be drilled from each member or area of concrete that is considered potentially deficient. If before testing, one or more cores shows evidence of having been damaged subsequent to or during the removal from the structure, it shall be replaced.
 7. Concrete in the area represented by core tests will be considered adequate if the average strength of the cores is equal to or at least 85 percent of and if no single core is less than 75 percent of the specified strength.
 8. Concrete that is deficient shall be isolated and retested to establish the boundary of deficient concrete. Concrete in the deficient area shall be removed and replaced.
 9. Core holes shall be repaired as directed by the Engineer.
- C. Air content will be determined in accordance with ASTM C231. The air content shall be taken with each set of test cylinders. If the air content is outside the specified range, the concrete shall be rejected. If concrete is to be air entrained for freeze-thaw durability, cores will be located to isolate deficient concrete by evaluating the air-void system in accordance with ASTM C457. Concrete in the deficient area shall be removed and replaced.
- D. Slump tests will be performed prior to placing the concrete. Such tests shall be made for each set of test cylinders defined for compressive strength. If the slump is outside the specified range, the concrete shall be rejected.
- E. The frequency of testing shall be increased if concrete fails to meet the acceptance criteria or if deemed by the Engineer to be too variable.

3.11 ACCEPTANCE OF STRUCTURE

- A. Comply with ACI 301 and modifications in this section.
- B. Completed concrete work, which meets all applicable requirements, will be accepted without qualification.
- C. Completed concrete work which fails to meet one or more requirements but which has been repaired to bring it into compliance will be accepted without qualification.
- D. Completed concrete work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected by the Contracting officer. In this event, modifications may be required to assure that remaining work complies with the requirements.
- E. The costs of any additional tests or analysis, including additional architectural and engineering services, performed to prove the adequacy of the concrete work, shall be borne by the Contractor without extension of contract time.

3.12 MISCELLANEOUS CONCRETE

- A. Curbs: Provide monolithic finish to interior surface of curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- B. Equipment bases and foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment with template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

3.13 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Requirements:
 - 1. Provide and maintain an adequate program of quality control for the materials, production methods, and workmanship to assure conformance of all work to the project contract documents. ACI 121R outlines the essential elements of the Material Control portion of the QA program.
 - 2. All materials, equipment, and methods shall be subject to verification inspections and/or testing as specified herein; ACI 121R.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 8/27/2018

SECTION 051200
STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural steel framing members, support members, with required bracing, welds, and fasteners.
 - 2. Steel channel and Steel tube door jambs and frames.
 - 3. Base plates.
 - 4. Grouting under base plates.
- B. Related Sections:
 - 1. Section 033000 – Cast-In-Place Concrete: Anchorages cast in concrete. Grouting base plates and bearing plates.
 - 2. Section 055000 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.2 REFERENCES

- A. American Institute of Steel Construction (AISC):
 - 1. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
 - 2. AISC - Code of Standard Practice - Manual of Steel Construction - Allowable Stress Design (ASD).
 - 3. AISC - Section 10 - Architecturally Exposed Structural Steel.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A36/A36M - Specification for Structural Steel.
 - 2. ASTM A53 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A108 - Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality.
 - 4. ASTM A123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5. ASTM A153 - Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
 - 6. ASTM A242/A242M - Specification for High-Strength Low-Alloy Structural Steel.
 - 7. ASTM A 307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - 8. ASTM A 325 - Specification for Structural Bolts, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 9. ASTM A449 - Specification for Quenched and Tempered Steel Bolts and Studs.
 - 10. ASTM A490 - Specification for Heat-Treated Steel Structural 150 ksi Minimum Tensile Strength.
 - 11. ASTM A 500 - Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 12. ASTM A 501 - Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - 13. ASTM A514/A514M - Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
 - 14. ASTM A529/A529M - Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
 - 15. ASTM A563 - Specification for Carbon and Alloy Steel Nuts.
 - 16. ASTM A568/A568M - Specification for Steel, Sheet, Carbon and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
 - 17. ASTM A572/A572M - Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

- C. American Welding Society (AWS):
 - 1. AWS D1.1 - Structural Welding Code.
 - 2. AWS A2.4 - Symbols for Welding, Brazing, and Nondestructive Examination.
- D. Factory Mutual (FM):
 - 1. FM - Roof Assembly Classifications.
- E. Underwriters Laboratories, Inc. (UL):
 - 1. UL - Fire Resistance Directory.
- F. Steel Structures Painting Council (SSPC):
 - 1. SSPC - Painting Manual.
 - 2. SSPC-Paint 20 Type II - Zinc Rich Primers - Organic.
 - 3. SSPC-Paint 22 - Epoxy Polyamide Paints.
 - 4. SSPC-Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil, and Alkyd Primer.
 - 5. SSPC-SP 2 - Hand Tool Cleaning.
 - 6. SSPC-SP 6 - Commercial Blast Cleaning.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - b. Connections.
 - c. Cambers and loads.
 - d. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.
 - 2. Assurance/Control Submittals:
 - a. Erection Procedure: Submit descriptive data to illustrate structural erection procedure including sequence of erection and temporary staying and bracing.
 - b. Field Welding Equipment: Submit descriptive data for field welding equipment including type, voltage, and amperage.
 - c. Test Reports: Submit the following reports directly to Contracting Officer from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
 - 1) Welding inspection.
 - 2) Bolted connection inspection.
 - d. Certificates: Certify welders employed on Work, verifying AWS qualification within previous 12 months.
 - e. Qualification Documentation: Submit documentation of fabricator and erector experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Fabricator: Company specializing in performing the work of this section with minimum 5 years documented experience.
 - 2. Erector:
 - a. A company specialized in performing the work of this section with a minimum of 5 years documented experience.
 - b. A qualified company that participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CASE or CSE.
 - 3. Qualifications for Welding Work: Qualify welding operators in accordance with AWS Standard Qualification Procedures. Provide certification that welders employed in work have satisfactorily

passed AWS qualification tests within previous 12 months. If rectification of welders is required, provide without additional cost to Owner.

- B. Fabricate structural steel members in accordance with AISC Code of Standard Practice.
- C. Perform Work in accordance with AISC Section 10.
- D. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in State where Project is located.
- E. Survey: Employ Professional Engineer registered in State in which Project is located, experienced in survey work, to establish permanent bench marks as shown and as necessary for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Owner. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Store steel above ground on platforms, skids, or other supports.
- C. Protect steel from corrosion.
- D. Store packaged materials in their original, unbroken packages or containers.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural Steel Shapes, Plates and Bars: ASTM A 36.
- B. Structural Tubing: ASTM A 500, Grade B.
- C. Bolts, Nuts, and Washers: AISC Specification Section 1.4.4.
 - 1. Unfinished Bolts: ASTM A 307.
 - 2. High Strength Bolts: ASTM A 325 or A 490.
 - 3. Anchor Bolts and Nuts: ASTM A 307 Grade A.
 - 4. High Strength Anchor Bolts: ASTM A 490.
- D. Welding Materials: AWS D1.1; type required for materials being welded or as indicated on Drawings.
- E. Rivets: AISC Specification Section 1.4.3.
 - 1. Steel Structural Rivets: ASTM A 502.
- F. Grout: Specified in Section 033000.
- G. Shop and Touch-Up Primer: AISC Specification Section 1-24.

2.2 FABRICATION

- A. Fabricate structural steel members in accordance with AISC Code Section 6 and AISC Specification.

- B. Connections not detailed on Drawings: Engineer by fabricator, which is subject to review.
- C. Fabricator's Responsibility:
 - 1. Errors of detailing, fabrications, and for correct fitting of structural steel members.
 - 2. Do not splice structural steel members. Members having splice not indicated on Drawings will be rejected.
- D. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- E. Fabricate connections for bolt, nut, and washer connectors.
- F. Develop required camber for members.

2.3 FINISH

- A. Clean, prepare, and shop prime structural steel members in accordance with SSPC - Painting Manual. Do not paint surfaces in contact with concrete, or surfaces specified to be galvanized.
- B. Shop prime structural steel members. Do not prime surfaces that will be field welded, in contact with concrete, and high strength bolted.

2.4 SOURCE QUALITY CONTROL AND TESTS

- A. Provide shop testing of structural steel sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Supply items required to be cast into concrete or embedded in masonry with setting diagrams to appropriate Sections.

3.3 ERECTION

- A. Erect structural steel in accordance with AISC Code, Section 7, and AISC Specification Section 1.25 except as specified herein.
- B. Make provision for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Do not field cut or alter structural members without approval of Contracting Officer.
- D. Field weld components indicated on Drawings.
- E. Field connect members with threaded fasteners; torque to required resistance.
- F. After erection, prime welds, abrasions, and surfaces not shop painted that are to receive finish painting, except surfaces to be in contact with concrete. Use a primer consistent with shop coat.
- G. Anchor Bolts: Install anchor bolts and other connectors required for securing structural steel to foundations and other in-place work. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.
- H. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surfaces of base and bearing plates.
 - 1. Set loose and attached base plates and bearing plates for structural members on steel wedges or other adjusting devices.
 - 2. Tighten anchor bolts after the 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 grouting.
 - 3. Grout solidly between bearing surfaces and bases of plates immediately after erecting member and before additional load is placed on member. Finish exposed surfaces, protect installed materials, and allow to cure. For proprietary grout materials, comply with manufacturer's installation instructions.
 - 4. Slide bearings: Permanently affixed to member and support, respectively, by welding or bolting as indicated. Align and level member faces to maintain full contact between surfaces before completing installation.
- I. High-strength Bolting: Comply with specifications for Structural Joints using ASTM A 325 or A 490 Bolts.
- J. Erection Bolts:
 - 1. Comply with ASTM A 307.
 - 2. On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
- K. Touch-up Painting: Immediately after erection, clean exposed field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

3.4 CONSTRUCTION

- A. Site Tolerances:
 - 1. Maximum Variation From Plumb: 1/4 inch.
 - 2. Maximum Offset From True Alignment: 1/4 inch.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.

- B. Quality Assurance Program:
 - 1. AISC Code Section 8 and AISC Specification Section 1.26.
 - 2. AISC Quality Criteria and Inspection Standards, except as specified herein.
- C. Welding:
 - 1. AWS D1.1 Section 6.
 - 2. Inspectors: AWS Certified in accordance with AWS QCI, Standard for Qualifications and Certification of Welding Inspectors.

END OF SECTION

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SECTION 055000
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Miscellaneous framing and supports.
 - 2. Pipe Bollards.
 - 3. Access Ladders.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Institute of Steel Construction (AISC):
 - 1. Specifications for the Design, Fabrication and Erection of Structural Steel for Building
- B. American National Standards Institute (ANSI):
 - 1. ANSI A14.3, "Ladders, Fixed, Safety Requirements."
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A36, "Structural Steel."
 - 2. ASTM A53, "Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless."
 - 3. ASTM A123, "Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."
 - 4. ASTM A153, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware."
 - 5. ASTM A307, "Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength."
 - 6. ASTM A500, "Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes."
 - 7. ASTM A568, "Specification for General Requirements for Steel Sheet, Carbon, and High-Strength, Low Alloy Hot-Rolled and Cold Rolled."
 - 8. ASTM A627, "Specification for Homogeneous Tool-Resisting Steel Bars for Security Applications."
 - 9. ASTM A780, "Practice for Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings."
 - 10. ASTM B221, "Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tube."
- D. American Welding Society (AWS):
 - 1. AWS D1.1 - Structural Welding Code.
- E. Steel Structures Painting Council Specification (SSPC):
 - 1. Steel Structures Painting Manual.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Submit complete descriptive data for all stock items.
 - 2. Shop Drawings:

- a. Prepare Shop Drawings under seal of professional structural engineer registered in state where Project is located for products requiring structural engineering.
- b. Include profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories, erection drawings, elevations, welded connections using standard AWS welding symbol with net weld lengths.
- c. Take field measurements prior to preparation of shop drawings and fabrication when possible. Allow for trimming and fitting whenever taking of field measurements before fabrication might delay construction.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel plates, angles, and other structural shapes shall conform to ASTM A36.
- B. Steel pipe shall conform to ASTM A53, Grade B, Schedule 40.
- C. Galvanized steel pipe and tube shall conform to ASTM A53.
- D. Steel Tubing shall conform to ASTM A500.
- E. Sheet Steel, Galvanized: ASTM A446.
- F. Sheet and Strip Steel, Hot Rolled: ASTM A568.
- G. Welding Materials: AWS D1.1; type required for materials being welded.
- H. Anchors
 1. Threaded Type Concrete Inserts: Galvanized malleable iron or cast steel capable of receiving 3/4 inch diameter machine bolts.
 2. Slotted Type Concrete Inserts: Welded box type fabricated with minimum 1/8 inch thick galvanized pressed steel plate with slot to receive 3/4 inch diameter square head bolt and knockout cover.
 3. Expansion Shield for Masonry Anchorage: FS FF-2-325.
 4. Toggle Bolts: FS FF-B-588.
- I. Fasteners
 1. Bolts, Nuts and Washers for Exterior Locations: ASTM A307, galvanized in accordance with ASTM A153.
 2. Bolts, Nuts and Washers for Interior Locations: ASTM A307, Grade A, regular hexagon head.
 3. Bolts, Round Head: ANSI B-18.5
 4. Wood Screws, Flat Head Carbon Steel: ANSI B-18.6.1.
 5. Plain Washers, Helical Spring Type Carbon Steel: FS FF-W-84.
- J. Primers:
 1. Primer for Painting: One of following:
 - a. Tnemec, Kansas City, MO, (816) 474-3400: No. 99 red primer.
 - b. Chessman-Elliot Company: Ceco No. 15 Primox.
 - c. Rowe Products, Inc.: No. 7-C-19.
 - d. Section 016000 – Product Substitutions. Substitutions: Permitted.

2. Touch-Up Primer for Galvanized Surfaces: FS TT-P-641.

2.2 FABRICATION

- A. Fabricate steel items according to approved shop drawings and to applicable portions of AISC Specifications. Conceal welds where possible; grind exposed welds smooth and flush with adjacent finished surface. Ease exposed edges to small uniform radius.
- B. Pre-assemble products in shop to greatest extent possible. Disassemble units to extent necessary for shipping and handling. Clearly mark units for re-assemble and installation.
- C. For exposed to view fabrications, use materials which are smooth and free of surface blemishes including pitting, seams marks, roller marks, roller trade names and roughness. Remove blemishes by grinding or by welding and grinding, prior to cleaning, treating and application of surface finishes including zinc coating.
- D. Fabricate items with joints tightly fitted and secured.
- E. Fit and shop assemble in largest practical sections for delivery to Project site.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.
- G. Make exposed joints butt tight, flush and hairline.
- H. Fabricate anchorage and related components of same material and finish as metal fabrication, unless indicated otherwise.

2.3 ROUGH HARDWARE

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.
- B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.4 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.
- B. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
 - a. Except as otherwise indicated, space anchors 24 inches on center and provide minimum anchor units in the form of steel straps 1-1/4 inch x 8 inches long.

2.5 MISCELLANEOUS STEEL TRIM

- A. Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.
- B. Galvanize miscellaneous framing and supports in the following locations:
 - 1. Exterior locations.

2.6 PIPE BOLLARDS

- A. Fabricate pipe bollards from Schedule 80 steel pipe. Exterior bollards to be galvanized. Fill bollards with concrete rounded off at top. Paint bollards per Section 099100.
- B. Fabricate pipe bollards from Schedule 80 steel pipe. Interior bollards to be filled with concrete flush at top. Do not paint bollards. Install pipe bollard plastic cover.
- C. Fabricate sleeves for bollard anchorage from steel pipe with 1/4 inch thick steel plate welded to bottom of sleeve. Exterior sleeves or bollards are to be galvanized.

2.7 ACCESS LADDERS

- A. General: Fabricate ladders for the locations shown, with dimensions, spacings, details and anchorages as indicated. Comply with requirements of ANSI A14.3.
- B. Siderails: Continuous steel flat bars, with eased edges.
- C. Bar Rungs: Square steel bars.
- D. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
- E. Support each ladder at top and bottom and at intermediate points spaced not more than 5 feet on center. by means of welded or bolted steel brackets.
 - 1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.
- F. Provide non-slip surface on top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a type of manufactured rung which is filled with aluminum oxide grout.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish metal fabrications after assembly.

2.9 STEEL AND IRON FINISHES

- A. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process compliance with the following requirements:
 - 1. ASTM A153 for galvanizing iron and steel hardware.

2. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.
- B. Preparation for Shop Priming: 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:
 1. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning":
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

2.10 SHOP PAINTING AND PROTECTIVE COATING

- A. Conform to Steel Structures Painting Council Specification 15-68T, Type 1, including preparation for painting.
- B. Hot-Dip galvanizing and zinc coatings applied on products fabricated from rolled, pressed, and forged steel shapes, plates, bars and strips shall comply with ASTM Specification A123. Galvanized surfaces for which a shop coat of paint is specified shall be chemically treated to provide a bond for the paint. Except for bolts and nuts, all galvanizing shall be done after fabrication.
- C. Clean surfaces of rust, scale, grease and foreign matter in accordance with SSPC SP-1 solvent cleaning, prior to finishing. Prepare surfaces for painting in accordance with SSPC-SP2 Hand Tool Cleaning, SSPC-SP3 Power Tool Cleaning or SSPC SP-7 Brush Off Blast Cleaning.
- D. Do not prime surfaces in direct contact bond with concrete or where field welding is required.
- E. Prime paint items scheduled with one coat.
- F. Protect aluminum surfaces in contact with steel with zinc chromate primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items

having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.3 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. 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 the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and 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 that no roughness shows after finishing and contour of welded surface matches those adjacent.

3.4 INSTALLATION - SECURITY GRILLES

- A. Securely fasten to structural framing around opening with tamper-proof fasteners.

3.5 INSTALLATION - BOLLARDS

- F. Anchor bollards in concrete by means of pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solid with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's directions.

3.4 ADJUSTING AND CLEANING

- A. Touch-Up Painting: 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 requirements for touch-up of field painted surfaces.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

055000 - 6

SECTION 061000
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood Framing.
 - 2. Concealed blocking behind wall mounted items.
 - 3. Sheathing material.
 - 4. Wood treatment.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 062000 – Finish carpentry.
 - 2. Section 072700 - Self Adhered Air Barriers

1.2 REFERENCES

- A. American Lumber Standards Committee (ALSC):
 - 1. Softwood Lumber Standards.
- B. American Plywood Association (APA):
 - 1. Grades and Standards.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - 2. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
- D. American Wood Preservers Association(AWPA):
 - 1. AWPA - C1 - All Timber Products - Preservative Treatment by Pressure Process.
 - 2. AWPA - C15 - Wood for Commercial-Residential Construction Preservative Treatment by Pressure Processes.
 - 3. AWPA - C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
 - 4. AWPA - C27 - Plywood - Fire-Retardant Treatment by Pressure Processes.
 - 5. AWPA - P5 - Waterborne Preservatives.
- E. Underwriters' Laboratories, Inc. (UL):
 - 1. UL FR S - Fire Rated Treated Wood with Flame Spread and Smoke Developed Ratings of 25 or less in accordance with ASTM E84.
 - 2. UL 723 - Test for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Certificates:

- 1) Pressure Treated Wood: Certification from treating plant stating chemicals and process used and net amount of preservative retained are in conformance with specified standards.
- 2) Preservative Treated Wood: Certification for water-borne preservative that moisture content was reduced to 19 percent maximum, after treatment.
- 3) Fire-Retardant Treated Wood: Certification from treating plant stating that fire-retardant treatment materials comply with governing code, ordinances and requirements of local authority having jurisdiction, and treatment will not bleed through finished surfaces.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following agencies:
 1. Lumber Grading Agency: Certified by ALSC.
 2. Plywood Grading Agency: Certified by APA.
- B. Regulatory Requirements: Conform to applicable codes for fire-retardant treatment of wood surfaces for flame/smoke ratings.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
 1. Inspect wood materials for conformance to specified grades, species, and treatment at time of delivery to Project Site.
 2. Reject and return unsatisfactory wood materials.
- B. Provide facilities for handling and storage of materials to prevent damage to edges, ends and surfaces.
- C. Keep materials dry. Stack materials off ground minimum 12 inches or, if on concrete slab-on-grade, minimum 1-1/2 inches, fully protected from weather. Provide for air circulation within and around stacks and under temporary coverings.
- D. For materials pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 1. Formaldehyde: Products containing urea-formaldehyde will not be permitted.
 2. Wood pressure treatment products: Products containing chromium will not be permitted. Products containing arsenic will not be permitted.
 3. Use exterior plywood only. Interior plywood is not permitted.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

- A. Lumber, finished 4 sides, 15 percent maximum moisture content. Each piece of lumber to be factory marked with type, grade, mill and grading agency.
 1. Light framing: Construction grade Douglas fir or southern pine, appearance grade where exposed.

2. Structural framing and timbers: No. 2 grade Douglas Fir, Southern Pine, or Spruce, appearance grade where exposed.
3. Boards: Construction grade.

2.2 NAILERS, BLOCKING, FURRING AND SLEEPERS

- A. Wood for nailers, blocking, furring and sleepers: Construction grade, finished 4 sides, 15 percent maximum moisture content. Pressure preservative treat items in contact with roofing, flashing, waterproofing, masonry, concrete or the ground.

2.3 SHEATHING MATERIALS

- A. Plywood, APA rated for use and exposure:
 1. Exterior wall sheathing: APA C-D rated 32/16 Sheathing, 1/2 inch minimal thickness, exterior type.
 2. Roof sheathing: APA rated 48/24 sheathing, 5/8 inch minimum thickness, exterior type.
 3. Backing panels: APA C-D plugged, 3/4 inch thick, exterior type.
 4. Security Ceiling: APA rated 48/24 sheathing, 5/8 inch minimum thickness, tongue and groove, exterior type.

2.4 AIR BARRIER

- A. Self adhered air barrier see section 072700.

2.5 FASTENERS

- A. Fasteners: Provide manufacturers recommended power tools for each type of fastener.
 1. Bolts, Nuts, Washers, Lag Screws, and Wood Screws: ASTM A307, Medium carbon steel; size and type to suit application; galvanized for treated wood; plain finish for other interior locations, of size and type to suit application, unless otherwise noted.
 2. Expansion Shield Fasteners: For anchorage of non-structural items to solid masonry and concrete.
 3. Powder or Pneumatically Activated Fasteners: For anchorage of non-structural items to steel.
 4. Fasteners for Wood and Plywood (over 1/2 inch) to Light Gage Metal Framing and Metal Deck (up to 1/8 inch thick):
 - a. Hilti PWH #3 with wings.
 - b. ITW TEKS/4 with wings.
 - c. Substitutions: Permitted
 5. Fasteners for Wood and Plywood (up to 2 inches thick) to Metal (from 1/8 inch to 1/4 inch thick):
 - a. Hilti PFH #4 with wings.
 - b. ITW TEKS/4 with wings.
 - c. Substitutions: Permitted
 6. Fasteners for Non-Structural Wood Members to Masonry: 1/4 inch diameter x 3-1/4 inch with phillips flat head.
 - a. Tapcon masonry anchors, by ITW Buildex.
 - b. Kwik-Con II fastener, by Hilti.
 - c. Substitutions: Permitted
 7. Fasteners for preservative treated lumber must be hot dipped galvanized, type 304 or 316 stainless steel, or zinc-polymer coated.

2.6 WOOD TREATMENT

- A. Preservative Pressure Treated Lumber, Alkaline Copper Quat (ACQ): Type B, Ammoniacal Copper Quat or Type D, Amine Copper Quat.
 - 1. Manufacturers:
 - a. Chemical Specialties, Incorporated, Charlotte, NC (800) 421-8661.
 - 2. Products:
 - a. CSI: "Preserve".
 - 3. Impregnate lumber with preservative treatment conforming to AWWA Standard C1 and P5. Apply the preservative in a closed cylinder by pressure process in accordance with AWWA Standard C15.
 - 4. Retention of preservative:
 - a. Moderate service conditions (weather exposure): 0.25 pounds per cubic foot (oxide basis).
 - b. Severe conditions (constant contact with ground or water): 0.40 pounds per cubic foot (oxide basis).
 - 5. Remove excess moisture where shrinkage is a serious fault or where treated lumber will be in contact with plaster, or stucco, and where water-borne treated lumber is to be painted or stained.
 - 6. Lumber shall be dried to 15 to 19 percent moisture content after treatment, and material to be painted or stained shall have knots and pitch streaks sealed as with untreated wood.
 - 7. Liberally brush freshly cut surfaces, bolt holes and machined areas with the same preservative in accordance with AWWA Standard M4.
 - 8. Treatment material shall provide protection against termites and fungal decay and shall be registered for use as a wood preservative by the U. S. Environmental Protection Agency.
- B. Wood Requiring Treatment:
 - 1. Lumber, Preservative Treated: Nailers, blocking, stripping, and similar items in conjunction with roofing, flashing, and other construction. Sills, blocking, furring, stripping, and similar items in contact with masonry or concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that spacing, direction and details of supports are correct to accommodate installation of blocking, backing, stripping, furring and nailing strips.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - FRAMING

- A. Set structural members level and plumb, in correct position.
- B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Place horizontal members, crown side up.

- D. Construct load bearing framing and curb members full length without splices.
- E. Double members at openings as indicated on Drawings. Space short studs over and under opening to stud spacing.
- F. Construct double joist headers at ceiling openings and under wall stud partitions that are parallel to roof trusses. Frame rigidly into roof trusses.
- G. Bridge roof trusses as specified in Section 061753. Fit solid bridging at ends of members.
- H. Place full width continuous sill flashings under framed walls on cementitious foundations. Lap flashing joint 4 inches.
- I. Place sill gasket directly on sill flashing. Puncture gasket clean and fit tight to protruding foundation anchor bolts.
- J. Coordinate installation of wood decking and prefabricated wood trusses.
- K. Install miscellaneous blocking, nailing strips and framing where required as backing for attachment of wall mounted fixtures, cabinetwork, and other items, and as detailed on Drawings. Coordinate to allow proper attachment of work of other Sections.
 - 1. Secure in place using fasteners specified. Use only recommended power tools for placement of fasteners.
 - 2. Recess heads of fasteners below surface of wood members.
- L. Secure in place with appropriate fasteners. Use fasteners of correct size that will not penetrate members where opposite side will be exposed to view or require finishing. Do not split wood with fasteners; set panel products to allow expansion at joints.
- M. Construct members of continuous pieces of longest possible lengths.

3.3 INSTALLATION - PLYWOOD

- A. Secure roof sheathing with longer edge perpendicular to framing members and with ends staggered and sheet ends over bearing.
- B. Use sheathing clips between sheets between roof framing members or provide solid edge blocking between sheets.
- C. Secure wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered.
- D. Install plywood in combination single and two span continuous.
- E. Install telephone and electrical panel back boards with plywood sheathing material where required. Size the back board by 12 inches (25 cm) beyond size of electrical panel.

3.4 SITE TREATMENT OF WOOD MATERIALS

- A. Apply preservative treatment in accordance with manufacturer's published instructions.
- B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials and roofing and related metal flashings. Treat site-sawn cuts.

- C. Allow preservative to dry prior to erecting members.

3.5 CONSTRUCTION

- A. Site Tolerances:
 - 1. Framing Members: 1/4 inch from true position, maximum.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Framing Inspection:
 - 1. Inspect wood framing installation and connections at completion of each phase of wood construction for correct installation, nailing, connections, and fasteners.
 - 2. Inspect and verify that types and spacing of fasteners are installed in locations specified or indicated on Drawings.
 - 3. Inspect types, locations, and fasteners for structural metal framing connectors.
 - 4. Inspect types, locations, and connections of hold-down anchors.
 - 5. Inspect wood to steel beam connections.

3.7 SCHEDULE - NAILING

CONNECTION	NAILING
Joist to sill or girder, toenail	3 - 8d
Bridging to joist, toenail each end	2 - 8d
Bottom Plate to joist or blocking, face nail	16d at 16 inches o.c.
Top plate to stud, end nail	2-16d
Stud to bottom plate	4-8d, toenail or 2-16d, end nail
Double studs, face nail	16d at 24 inches o.c.
Double top plates, face nail	16d at 16 inches o.c.
Top plates, laps and intersections, face nail	2 - 16d
Continuous header, two pieces	16d at 16 inches o.c. along each edge
Ceiling joists to plate, toenail	3 - 8d
Continuous header to stud, toenail	4 - 8d
Ceiling joists, laps over partitions, face nail	3 - 16d
Ceiling joists to parallel rafters, face nail	3 - 16d
Rafter to plate, toenail	3 - 16d
Built-up corner studs	16d at 24 inches o.c.
Built-up beams	20d at 32 inches o.c. at top and bottom staggered 2 - 20d at ends and at each splice

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 4/12/2011

SECTION 062000
FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior running and standing trim.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 102600 – Wall and Door Protection.

1.2 REFERENCES

- A.
- B. American Woodworking Institute (AWI):
 - 1. AWI AWQS - Architectural Woodwork Quality Standards, 6th Edition Version 1.0.
- C. United States Department of Commerce Product Standard (PS):
 - 1. PS 20 - American Softwood Lumber Standard.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Custom quality.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Formaldehyde: Products containing formaldehyde will not be permitted.

1.6 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality:
 - 1. Temporary ventilation: As specified in Section 013543 - Environmental Procedures.

PART 2 - PRODUCTS

2.1 INTERIOR FINISH CARPENTRY

- A. Trim and boards for transparent finish: Rift sawn oak.
- B. Trim for painted finish: Softwood suitable for exposure and use.
- C. Sheathing : Formaldehyde free board product sanded smooth and painted each exposed side and each exposed edge as specified in Section 099100 - Painting.
 - 1. PrimeBoard, Incorporated, Wahpeton, ND (701) 642-1152.
 - 2. Medite, Roseville, CA (800) 676-3339.
 - 3. Naturall Fibre Board, Minneapolis, KS (785) 392-9922.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 ACCESSORIES

- A. Adhesive: Type recommended by AWI to suit application. Low VOC
 - 1. Titebond by Franklin International, Columbus, OH, (800) 877-4583.
 - 2. Famowood/Famobond by Eclectic Products (800) 767-4667.
 - 3. Almighty Adhesive by American Formulating & Manufacturing (619) 239-0321.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Fasteners: Size and type to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions under provisions of Section 013100 – Project Management and Coordination.
- B. Site Verification of Conditions:
 - 1. Examine areas in which Work of this Section is to be performed.
 - 2. Verify that surfaces and site conditions are ready to receive Work.
- C. Report in writing to Construction Manager prevailing conditions that will adversely affect satisfactory execution of Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install work in accordance with AWI AWQS, Section 1700 - Installation of Woodwork.
- B. Install Work plumb, level, and straight without distortion; use concealed shims. Scribe and cut Work to fit adjoining work. Anchor Work items to nailers or blocking or directly to substrate using concealed fasteners.
- C. Install shelving units, standards, and brackets at locations as indicated on Drawings.

3.3 ADJUSTING

- A. Adjust installed work. Test installed work for rigidity and ability to support loads.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

- A. Section 017300 - Execution: Cleaning installed work.
- B. Clean shelves, hardware, fittings, and fixtures.

3.5 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality:
 - 1. Temporary ventilation: As specified in Section 013543 - Environmental Procedures.

END OF SECTION

USPS CSF Specifications issued: 10/01/2018
Last revised: 3/29/2017

SECTION 071113
BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cold applied asphalt bitumen dampproofing.
 - 2. Application on masonry or concrete surfaces behind veneer finishes material.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D 41 - Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
 - 2. ASTM D 1227 - Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Provide properties of primer, bitumen, and mastics.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

- A. Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until membrane has cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - 1. ChemRex Incorporated; Shakopee, MN. (800) 433-9517.
 - 2. Karnak Chemical Corporation, Clark, NJ. (800) 526-4236.
 - 3. W.R. Meadows Incorporated, Hampshire, IL. (800) 342-5976.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 COLD-APPLIED ASPHALT EMULSION DAMPPROOFING

- A. Primer: ASTM D 41 asphalt, compatible with substrate.
- B. Trowel Grade: Emulsified asphalt mastic, prepared with mineral-colloid emulsifying agents and containing fibers other than asbestos, complying with ASTM D 1227, Type III or IV.
 - 1. ChemRex: Hydrocide 700 Mastic.
 - 2. Karnak: 920 Fibrated (Trowel Grade) Dampproofing.
 - 3. Meadows: Sealmastic Type 3 - Trowel Grade.
- C. Spray Grade: Emulsified asphalt, prepared with mineral-colloid emulsifying agents without fibrous reinforcement, complying with ASTM 1227, Type III.
 - 1. ChemRex: Hydrocide 600.
 - 2. Karnak: 100 non-Fibrated Emulsion Coating.
 - 3. Meadows: Sealmastic Type I - Spray Grade.
- D. Semimastic Grade: Emulsified asphalt semimastic, prepared with mineral-colloid emulsifying agents and containing fibers other than asbestos, complying with ASTM D 1227, Type III or IV.
 - 1. ChemRex: Hydrocide 700B Semimastic.
 - 2. Karnak: 220 AF Fibrated Dampproofing.
 - 3. Meadows: Sealmastic Type 2 - Brush-On or Spray Grade.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing.
 - 2. Verify items which penetrate surfaces to receive dampproofing are securely installed.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's published instructions.
- C. Apply mastic to seal penetrations, small cracks or minor honeycomb in substrate.

3.3 INSTALLATION

- A. Prime surfaces in accordance with manufacturer's published instructions.
- B. Trowel Grade: Trowel apply at minimum rate of 7 gallons per 100 square feet to produce a minimum dry film thickness of 60 mils.
- C. Spray Grade: Spray apply at rate of 1.5 to 2.5 gallons per 100 square feet, depending on substrate texture, to produce a minimum dry-film thickness of 15 mils. Apply in two coats, if necessary, to obtain required thickness. Allow first coat to completely dry before application of second coat.
- D. Semimastic: Brush or spray applies at a rate of 5 gallons to produce minimum dry film thickness of 30 mils.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect dampproofing application and test for minimum dry film thickness specified.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 4/12/2011

SECTION 072100
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Batt Insulation in exterior wall and ceiling construction.
 - 2. Board Insulation.
 - 3. Vapor retardant.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - 2. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 3. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 - 4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Federal Specifications (FS):
 - 1. FS HH-I-1972/GEN - Insulation Board, Thermal, Faced, Polyurethane or Polyisocyanurate.

1.3 SUBMITTALS

- A. Section 013300 – Submittal Procedures: Procedures for submittals.
 - a. Product Data: Indicate product characteristics, performance criteria, and limitations.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to insulation flame spread and smoke developed requirements of local authority having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Protect insulation from moisture, soiling and other damaging items.
- C. Store in dry location protected from sunlight.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management:
 - 1. Recycled Content: Provide fiberglass insulation manufactured from minimum 30 percent recycled glass.
- B. Environmental Impact:
 - 1. Only Greenguard indoor air quality certified products will be permitted.
 - 2. Chlorofluorocarbons (CFCs): Products and equipment requiring or using CFCs during the manufacturing process will not be permitted.

PART 2 - PRODUCTS

2.1 BATT INSULATION

- A. Manufacturers:
 - 1. Johns Manville Corporation, Denver, Co (800) 654-3103.
 - 2. Knauf Fiberglass, Shelbyville, IN (317) 398-4434, (800) 825-4434.
 - 3. Owens-Corning Fiberglass Corporation, Toledo, OH (419) 248-8000, (800) 438-7465.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Materials: Fiberglass insulation manufactured from minimum 30 percent recycled glass.
 - 1. Unfaced Glass Fiber: ASTM C 665, Type I, unfaced. Thermal resistance R-value as indicated on Drawings.
 - 2. Faced Glass Fiber: ASTM C 665, Type III, Class A, with reflective covering one side. Thermal resistance R-value as indicated on Drawings.

2.2 BOARD INSULATION

- A. Manufacturers:
 - 1. Tenneco Building Products, Smyrna, GA (800) 241-4402.
 - 2. Owens Corning, Toledo, OH (800) 828-7155.
 - 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Materials:
 - 1. Extruded Polystyrene: ASTM C578, Type IV (density 1.6 pcf minimum); square edges. Thermal resistance R-value as indicated on Drawings.
 - a. Tenneco: Amofoam.
 - b. Owens Corning: Foamular 250.
 - 2. Thickness:
 - a. Under Floor Slab: 2 inches (5.08 cm).
 - b. Foundation Perimeter: 1 inch (2.54 cm).

2.3 VAPOR RETARDANT

- A. ASTM D 4397, 6 mils thick, maximum permeance rating of 0.13 perm.
- B. Vapor Retardant Tape: Pressure-sensitive of type recommended by vapor retardant manufacturer for sealing joints and penetrations in vapor retardant.

2.4 ACCESSORIES

- A. Tape: Polyethylene or polyester self-adhering type; 2 inches (5.08 cm) wide.
- B. Adhesive: Waterproof type, acceptable to manufacturer of insulation board.
- C. Wire Mesh: Galvanized steel, hexagonal wire mesh.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Batt Insulation:
 - a. Verify adjacent materials are dry and ready to receive installation.
 - b. Verify mechanical and electrical services within walls have been installed and tested.
 - 2. Board Insulation:
 - a. Verify substrate and adjacent materials and insulation boards are dry and ready to receive insulation and adhesive.
 - b. Verify insulation boards are unbroken, free of damage.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - BATT INSULATION

- A. Install batt insulation in accordance with manufacturer's instructions, without gaps or voids.
- B. Trim insulation neatly to fit spaces. Use batts free of damage. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
- C. Install insulation with factory applied membrane facing warm side of building spaces. Lap ends and side flanges of membrane. Attach insulation in place to framing; tape seal butt ends and lapped side flanges. Tape seal tears or cuts in membrane.

3.3 INSTALLATION - BOARD INSULATION

- A. Apply adhesive in three continuous beads to board insulation.
- B. Install boards by method to maximize contact bedding. Stagger joints. Butt edges and ends tight to adjacent board and to protrusions.

3.4 INSTALLATION - VAPOR RETARDANT

- A. Install vapor retardant over entire building in interior of studs at exterior walls and adjacent surfaces
- B. Seal vertical joints over framing by lapping minimum 2 stud spaces. Fasten to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items with manufacturer's sealing tape. Seal penetrations air-tight.

END OF SECTION

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SECTION 072700
SELF-ADHERED AIR BARRIERS (MOISTURE BARRIER)

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of the Bidding Requirements, Conditions of the Contract, Division 0 and Division 1 apply to all Sections of this Project Manual. Refer to Table of Contents for complete list of Bidding Requirements, Conditions, and Sections included in the Project Manual.
- B. Work Included in This Section: Triple layer, water-resistive, vapor permeable air & moisture barrier suitable for rainscreen assemblies both self-adhered and a mechanically attached option for rainy/wet weather.
NOTE: self-adhered air barriers is called out as moisture barrier in other sections of the specifications and in the drawings.
- C. Contractor shall account for installation in the winter and rainy portions of the year. No accommodation will be given to the contractor in time or money for substrates that are wet. The project design and specification have included alternative materials that can be installed in the rainy periods. HOWEVER – Only one manufacturer shall be used for the entire project. Coordinate backings at all cladding types. Contractor shall use one type of product (self-adhered or mechanically fastened) on single entire elevations. Mechanically attached will only be allowed in wet rainy conditions. Contractor shall bid the project based on the more expensive system.
- D. Related Work in Other Sections:
 - 06 10 00 Rough Carpentry
 - 07 45 60 Fiber Cement Rainscreen System
 - 07 60 00 Flashing and Sheet Metal
 - 07 92 00 Sealants
 - 08 11 00 Hollow Metal Doors and Frames
 - 09 24 00 Stucco

1.2 REFERENCE STANDARDS

- A. American Association of Textile Chemists and Colorists (AATCC):
 - 1. AATCC 127 - Test Method for Water Resistance: Hydrostatic Pressure Test.
- B. ASTM International (ASTM):
 - 1. ASTM D 882 - Test Method for Tensile Properties of Thin Plastic Sheeting.
 - 2. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E 96/E 96M - Test Methods for Water Vapor Transmission of Materials.
 - 4. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 - 5. ASTM E 2178 - Standard Test Method For Air Permeance of Building Materials.
- C. International Code Council Evaluation Service, Inc. (ICC-ES):
 - 1. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers.

1.3 QUALITY ASSURANCE

- A. Single Source: Provide air barrier and accessories that are products of or recommended for use by a single manufacturer.
- B. Manufacturer Qualifications: Approved manufacturer of products listed in this Section with minimum 5 years' experience in manufacture of similar products in successful use in similar applications.
 - 1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample warranty.
 - 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
- C. Fire Performance Characteristics: Provide air barrier with the following fire-test characteristics.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - a. Flame spread index: 25 or less. (Class A)
 - b. Smoke developed index: 450 or less. (Class A)
- D. Mockups: Mock is required at an exterior wall, full height from eave to sill location and must include a window. Show details of air barrier. Demonstrate methods and details of installation. Show details of joints, penetrations, openings, inside and outside corners, and top and bottom of wall. Mockup shall consist of a window and shall extend 48" on each side of the window. Installer shall install the air barrier, window opening flashings, the window and window flashings for review. It is the contractor's
 - 1. Perform water spray test of mockup to demonstrate performance.
 - 2. Approved mockup may become part of installation if approved by Architect.
- E. Continuous Installation: Air barrier (moisture barrier) shall be installed in a continuous assembly from bottom most sill gaskets to top plates of upper most framing.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct Preinstallation meeting at site attended by Installer, affected trade contractors, and inspector. Invite Owner and Architect.
 - 1. Coordinate substrate installation in relation to requirements for air barrier.
 - 2. Coordinate window, door, and other openings and penetrations of self-adhered air barrier.
 - 3. Review mockup.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products. Include data indicating compliance with requirements of this Section.
 - 1. Provide manufacturer's standard installation instructions and details for air barrier and rainscreen components and accessories.
- B. Safety Data Sheets (SDS): Provide SDS for all products to be used.

- C. Samples: Submit samples of the following:
 - 1. Water-resistive air barrier sheet, minimum 10 by 10 inches (254 by 254 mm).
 - 2. Rainscreen components, minimum 12-inch (305-mm) lengths.
 - 3. Membrane flashings and tapes.
 - 4. Fasteners.
 - 5. Sealants.
 - D. Details: Submit project specific details at all locations including but not limited to the terminations at the sills, top plates, windows, doors and field. Provide details at all penetrations and seams.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Evaluation Report: For air barrier, from ICC-ES.
 - B. Manufacturer's warranty: Submit sample warranty.
- 1.7 WARRANTIES
- A. Manufacturer - 10 year material warranty from Substantial Completion.
 - B. Installer – 3 year full replacement warranty covering materials and labor

PART 2 - PRODUCTS

- 2.1 MANUFACTURER AND PRODUCT
- A. WrapShield SA by VaproShield LLC
 - B. Delta-Vent SA by Corsella-Dorkin
 - C. Or Approved Equal
- 2.2 MANUFACTURER AND PRODUCT ALTERNATIVE (mechanically fastened)
- A. WrapShield IT by VaproShield LLC
 - B. Delta-Vent S by Corsella-Dorkin
 - C. Or Approved Equal
- 2.3 PRODUCT CHARACTERISTICS
- A. Air Permeance as tested per ASTM E2178 – PASS
 - B. Water Vapor Permeance as tested per ASTM E96/A – minimum 20 perms
 - C. Water Resistance, AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage.
- 2.4 ACCESSORIES
- A. Sill Plate Gaskets made with closed cell foam and determined to be air barriers. Install under all sills.
 - 1. Owens Corning Foam Seal-R
 - 2. Or Approved Equal
 - B. Low Rise Medium Density Foam determined to be an air barrier. Install at areas indicated on plans and details.
 - 1. CertaSpray Close Cell Foam by Certainteed
 - 2. Or Approved Equal

- C. Penetration Tape: manufacturer's recommended tape/flashings for penetrations through air barrier.
- D. Sealant: manufacturer's recommended sealant to be used for a complete system installation. Sealant shall be rated for fire and smoke stopping.
- E. Provide all seam tapes, sealants and fasteners as recommended by the manufacturer for the both the self-adhered product & mechanically fastened systems.
- F. Provide all window flashings (liquid applied or preformed corners) by the manufacturer for installation with both the self-adhered & mechanically fastened systems.
- G. Provide all primers and wall conditioning products as required for all substrates on the project to promote adequate adhesion for the self-adhered product.
- H. Manufacturer recommended primer(s) for substrates of this project.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine substrate with Installer present for compliance with requirements and other conditions that would adversely affect installation or performance of air barrier. Correct deficient conditions prior to proceeding with water-resistive barrier installation.

3.2 SUBSTRATE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean and dry substrate for breathable membrane application.
- B. Prime as required per manufacturer's recommendations for substrates of the project.

3.3 AIR BARRIER INSTALLATION

- A. General: Install air and water-resistive barrier in accordance with manufacturer's instructions over exterior sheathing. Secure water-resistive barrier to substrate to prevent damage prior to installation of cladding. See detail 20/A10.2 for typical air barrier installation at all exterior walls.
- B. Air and water resistive barrier shall be consistent over the entire project. Contractor shall NOT use different products at varying locations. It is the general contractor's responsibility to coordinate with all cladding sub-contractors to ensure continuity of air & moisture barrier.
- C. Window and Louver Openings
 1. Secure prefabricated sill pan and air barrier corners at sill of opening.
 2. Install lap strip of air barrier across sill and secure with tape or mechanical fasteners, leaving bottom of lap strip free to overlap water-resistive barrier minimum of 6 inches (150 mm).
 3. Install lap strip air barrier around jambs, extending along wall surface a minimum of 9 inches (230 mm).
 4. Secure prefabricated air barrier corners at head of opening.
 5. Install lap strip of air barrier across head of opening, extending horizontally beyond corners minimum of 6 inches (150 mm).
- D. Door Openings

1. Install air barrier lap strip around jambs, extending along wall surface a minimum of 9 inches (230 mm).
2. Secure prefabricated air barrier corners at head of opening.
3. Install lap strip of air barrier across head of opening, extending horizontally beyond corners minimum of 6 inches (150 mm).

E. Pipe and Conduit Penetrations

1. Install manufactured penetration sleeves sized for penetration and installed as recommended by sleeve manufacturer.
2. Prepare air barrier skirt with minimum 12 inches (300 mm) of fabric on all sides at counter-flashed penetrations. Make multiple cuts to form a star-shaped opening in fabric and place over penetration. Extend skirt fabric along penetrating item and seal to penetrating item with single-sided tape.

F. Air Barrier

1. Begin air barrier installation at bottom of wall, (if mechanically fastening air barrier install at bottom and top at 24 inches (600 mm) o.c.) Seal bottom edge of air barrier to substrate in continuous bead of non-skinning butyl sealant or butyl double sided tape.
2. Install air and water-resistive barrier at overlapped lap strips and penetration skirts. Overlap at vertical laps minimum of 6 inches (150 mm) with taped joints or 12 inches (300 mm) without tape. Overlap at horizontal laps minimum of 6 inches (150 mm). Insert air barrier under bottom edge of lap strips and penetration skirts; do not tape bottom edge of skirts and lap strips.
3. Extend air and water-resistive barrier 6 inches (150 mm) over corners.
4. Shingle subsequent courses of air barrier. Do not place vertical laps above openings.
5. Use additional mechanical fasteners in field of sheet and tape joints if air barrier will be left exposed prior to installation of cladding.
6. Install a bead of sealant along the top edge of the air-barrier for night seals. The sealant shall be compatible with and recommended by the air barrier manufacturer.
7. At all openings, provide flashings as detailed on the drawings. Provide the liquid flashing or preformed corners.

3.4 FIELD QUALITY CONTROL

- A. Owner will engage independent inspector to inspect substrate, observe installation, and inspect and document completed air barrier prior to concealment. Submit photo documentation and written report of inspections.

3.5 PROTECTING AND CLEANING

- A. Protect installed air barrier from damage due to construction activities, high wind conditions, and extended exposure to weather.
- B. Inspect exposed air barrier prior to installation of cladding. Remove air barrier materials that have been damaged and replace. Patch damaged areas as recommended by manufacturer.

END OF SECTION

METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of the Bidding Requirements, Conditions of the Contract and Division 1 apply to all Sections of this Project Manual. Refer to Table of Contents for complete list of Bidding Requirements, Conditions, and Sections included in the Project Manual.
- B. Work Included in this Section: Metal roof panels as shown on drawings and as specified herein including all items required for a complete and watertight installation.
- C. Related Work in Other Sections: Refer to the following sections for related work:
 - 07 27 00 Self-Adhered Air Barrier
 - 07 60 00 Flashing and Sheet Metal.
 - 07 92 00 Sealants

1.2 REFERENCE STANDARDS

- A. Listed publications form a part of this Section
 - 1. The NRCA Roofing and Waterproofing Manual, current edition, published by The National Roofing Contractor's Association.
 - 2. The Architectural Sheet Metal Manual published by Sheet Metal and Air conditioning Contractor's National Association (SMACNA), current edition.
 - 3. Sealants: The Professionals' Guide, published by The Waterproofing & Restoration Institute (SWR).
 - 4. American National Standards Institute (ANSI)
 - 5. ASTM International (ASTM)
 - 6. Factory Mutual (FM)
 - 7. Underwriter's Laboratory (UL)
 - 8. RCI, Incorporated, Manual of Practice (RCI)

1.3 DESCRIPTION OF WORK

- A. General: Extent of preformed metal roofing is indicated on the drawings and by provisions of this section. Flashing is considered an integral part of roof installation and Section 07 60 00, Flashing and Sheet Metal shall apply to installation of roofing and wall panels.
 - 1. Metal roof panels and Flashing. Formed sheet metal roof panels intended for lapped or tongue and groove side seam installation, miscellaneous shop and field bent flashings of same material and finish as panels.

1.4 QUALITY ASSURANCE

- A. Field Measurements: Where possible, prior to fabrication take field measurements of structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established prior to fabrication.
- B. Manufacturer Field Quality Control: A technical representative of the materials manufacturer shall provide field/job site inspections to verify that the roofing system is properly designed and installed.
- C. Manufacturer Qualifications: The manufacturer shall have a minimum of ten (10) years experience supplying metal roofing to the region where the work is to be done. Manufacturer shall provide proof of \$2,000,000 liability insurance for their metal roof system and comply with current independent testing and certification as specified.
- D. Installer shall provide all personnel trained in the application of the materials and systems and shall maintain supervision as specified elsewhere.
- E. Installer Qualifications: A single contractor/installer shall perform the work of this section; and shall be a firm with successful experience in the installation of metal roofing systems similar to those required for this project, and which is acceptable to or licensed by the manufacturer of the primary materials. The contractor/installer shall be a member in good standing of the NRCA and must be able to show examples of work that are in a water tight condition within a 100 mile radius of the job site.
- F. Regulatory Agency Requirements: Comply with IBC and local Building Code requirements if more restrictive than those specified herein.
- G. Testing: The Owner reserves the right to perform any testing as may be required to determine compliance with these Contract Documents. Costs for such testing will be the Owner's responsibility unless testing indicated non-compliance. Costs for such testing indicating non-complying work shall be corrected and testing will be repeated until the work complies with the Contract Documents.
- H. Pre-Application Conference: Approximately two weeks prior to scheduled commencement of installation and associated work of this section, meet at project site with Installer, installer of each component of associated work, and other work which must precede or follow metal work (including mechanical work, if any), Architect, Owner, Roof Consultant and other representatives directly concerned with performance of the work. Review foreseeable methods and procedures related to work, including but not necessarily limited to the following:
 - 1. Tour representative roof and wall areas, inspect and discuss condition of substrate, curbs, penetrations and other preparatory work performed by other trades. Coordinate locations, installation, and details of fall protection anchors with anchor installer.
 - 2. Review required submittals, both completed and yet to be completed.
 - 3. Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 4. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.

5. On-Site Application Observaton/Monitoring: The Owner reserves the right to have The Project Roofing Consultant perform observation/monitoring or special inspection of the roofing application. Such inspection will not relieve the Installer of responsibility for proper execution and completion of the work.
 6. The Project Roofing Consultant shall perform application observation/technical monitoring to assist School District, by monitoring the quality and progress of the work performed by the Contractor(s), in general to see that the work is in compliance with the project specifications and Detail Drawings.
 7. Review Roof Consultants/Monitors application observation/monitoring services, as provided by the Project Roofing Consultant.
 8. Prepare Field Reports, documenting the progress of the work and any problems encountered with the work along with suggested solutions. Field Reports shall be distributed to Owner, Architect, as well as Contractor(s).
 9. Conduct a Pre-Completion Survey for the purpose of preparing a punch list of any outstanding items that need attention or correction.
 10. Conduct a Completion Survey to verify the punch list items have been completed.
 11. Maintain chronological Field File of: All scheduled progress meeting minutes, Field Reports, Pre-Completion and Completion Reports, photographs of roofing and flashing installation, approved submittals and general correspondence distributed between the Owner, Architect, Project Roofing Consultant, the Roofing Contractor.
- I. Wind Uplift Requirements: Panel system wind uplift load capacity must be capable of resisting the negative uplift pressure as follows:
1. Provide UL rated roofing system that has been tested in accordance with ASTM E1592 wind uplift test procedure.
 2. UL class 90
 3. The roof panel manufacturer must also subscribe to Underwriter's Laboratory's "Follow Up Service" assuring continuing product compliance with UL requirements.
- J. Structural Capacity: Capable of withstanding a 200 lb (91000 g) concentrate load applied to 4 sq. in. (2581 sq. mm) at center of midspan of panel between supports with no panel deformation, rib buckling or side lap separation.
- K. Thermal Movements: Provide sheet metal roofing that allows for thermal movements resulting from 200 degrees F (93 degrees C) material surfaces range without permanent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
1. Provide slip critical details that prevent tension build-up.
- L. Installation Crew(s): Installer will employ a qualified crew foreman and alternate foreman; one foreman will be in attendance on the site at all times during roofing work. No substitutions of the foreman or the alternate foreman will be made without written request at least forty-eight (48) hours prior to the substitution to the owner.

1. If unauthorized substitution of foreman or alternate foreman, without written owner acceptance, is made, the job will be stopped. A new pre-roofing conference will be held before resuming work. Attendee's participation at new pre-roofing conference will be at the contractor's expense.
2. Foreman on site must be able to communicate effectively with the crew and the Owner or Owner's representative in English.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, installation instructions and recommendations for each type of roofing product and underlayment system required. Include data substantiating that materials comply with requirements.
- B. Samples: Provide the following for both the roof.
 1. Two 12" inch long samples of metal profile
 2. Two each samples of color selection in 2" x 5" chips
 3. Two samples of each fastener proposed for use including rivets.
 4. Roof underlayment membrane and accessory products.
 5. Wall underlayment sample and accessory products including premade window corners, tapes and fasteners for wall underlayment.
- C. Shop Drawings: Submit small-scale layouts of panels on walls and roofs and large-scale details of edge conditions, joints, corners, supports, anchorages, trim, flashings, closures, and special details. Indicate panel fastening and spacing requirement for wind uplift. The details provided in the construction documents are based on the "AEP Span - SpanSeam" by ASC Profiles Incorporated for roof and "AEP Span – "Mini-V-Beam" and "Prestige" for the wall panels. If other systems are approved, a full set of shop drawings detailing all conditions are required.
- D. Safety Data Sheets (SDS): Provide SDS for all products to be used.
- E. Manufacturers Installation Instructions: Submit to Architect. Manufacturer's published installation instructions/information form part of the specification.
- F. Manufacturer Approved Installer: Submit a letter from the manufacturer certifying that the Contractor/Installer is an approved manufacturer's roofing installer in good standing.
- G. Contractor/Installer Experience: Contractor/Installer shall submit a list of completed projects and name of Architects specifically related to the installation of standing seam metal roofs within a 100 mile radius of the jobsite for the last 5 years.
- H. Technical Representative Letter: Submit letter from the roofing manufacturers' technical manager(s) agreeing to the following:
 1. The manufacturer's technical representative will be present at the pre-construction meeting.
 2. The manufacturer's technical representative will be available on the jobsite with 24 hours notice.
 3. The manufacturer's technical representative will be present at start of roof installation, if requested. The manufacturer's technical representative

shall be present with Architect, and participate in developing Punchlist, and final inspection(s) as required by the owner.

4. Letter from the roofing manufacturer(s) stating that the proposed application will comply with the Manufacturer's requirements in order to qualify the project for the specified guarantee.

- I. Maintenance Procedures: Furnish the maintenance procedures manual of the manufacturer's printed recommendations for proper maintenance of the specified roof/cladding system including inspection frequencies, penetration addition policies, temporary repairs, and leak call procedures.

1.6 JOB CONDITIONS

- A. Prior to and during application, all dirt, debris, and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.
- B. Examine the conditions and substrates in which metal panels are to be installed. Substrate shall be installed true to avoid panel stresses and distortion.
- C. Proceed with metal panel installation only after satisfactory conditions are met.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in sealed, undamaged, original containers imprinted with manufacturer's name, product name, and pertinent identifying numbers.
- B. Deliver and store panels protected from the elements. Accessory products shall be clearly labeled and in their original containers. Follow manufacturer's recommendations for storing and handling protecting panels from damage or discoloration. Handle panels with non-marring slings. Do not bend panels.
- C. Storage: Store panels protected from the elements. Follow manufacturer's recommendations for storing and handling protecting panels from damage or discoloration. Store panels above ground, with one end elevated for drainage. Protect panels against standing water and condensation between adjacent surfaces. If panels become wet, immediately separate sheets, wipe dry with clean cloth, and allow to air dry.
- D. Protective film: Remove any strippable film coating prior to installation and do not allow it to remain on the panels in extreme cold, heat or in direct sunlight.

WARRANTIES

- E. Manufacturer's Warranty: Manufacturer's standard materials warranty for 20 years, from substantial completion, that panels will not fail structurally, perforate, rupture or leak due to corrosion, and the finish will not fade, crack, peel or show other signs of deterioration.
- F. Contractor's Workmanship Warranty:
 1. Coordinate roofing installer's warranty with Section 01 77 00 requiring joint warranty of roofing installer and installer.
 2. Warrant that the sheet metal roofing system is installed in accordance with the manufacturer's recommendations and/or contract documents, whichever is more strict, and will be free from defective workmanship and remain watertight and weatherproof with normal usage for a period of five (5) years following project Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

- A. AEP Span, A Division of ASC Profiles Inc. – A BlueScope Steel
- B. Metal Sales
- C. Or Approved Equal

2.2 METAL ROOF PANELS:

- A. “Reverse Box Rib” panel by AEP Span a division of ASC Profiles, Inc. To be installed where indicated. Net coverage 36 inches, rib depth 1-1/2 inches, 22 gauge.

2.3 ROOFING PANEL MATERIALS:

A. Roof Panel Materials

1. Roofing Panels Base Metal:

- a. Steel conforming to ASTM A792 minimum yield 50,000 psi, thickness 22 gauge.

2. Protective Coatings:

- a. Zinalume® Plus protective coating conforming to ASTM A792, AZ50

3. Exterior Finish:

- a. DuraTech™ 5000 (polyvinylidene Fluoride), full 70% Kynar® 500/Hylar 5000® consisting of a baked-on 0.2 mil corrosion resistant primer and a baked-on 0.8 mil finish coat for a total of 1.0 mil dry film thickness.
- b. Durability: Provide coating which has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack or check in finish, and without chalking in excess of 8 (ASTM D 659), and without fading in excess of 5 NBS units.

4. Interior Finish:

- a. Primer Coat Material: Corrosion-resistant primer; primer coat dry film thickness: 0.15 mils; finish coat material: polyester paint, finish coat dry film thickness: 0.35 mils.
- b. Total Interior Dry Film Thickness: 0.50 mils.
- c. Color: Off-White.

5. Color:

- a. Provide full range of colors for Owner/Architect to choose from.
- b. See Color Schedule 09 95 00

2.4 ROOF PANEL ACCESSORIES

A. Pipe Flashings:

- 1. “Dektite” by ITW Buildex
- 2. Or Approved equal.

- B. Closures:
 - 1. Manufacturer supplied neoprene closures set in sealant top and bottom.
- C. Screw Fasteners:
 - 1. Manufacturer's standard self-drilling, hex-head, non-corrosive types, with exterior heads gasketed. Exposed fasteners to be factory finished in color matching roof material. Manufacturer shall provide fasteners that are stable (does not cause galvanic corrosion)
- D. Sealant Compound:
 - 1. Polyurethane per Section 07 92 00
 - 2. Butyl per Section 07 92 00.
 - 3. Or Roof Panel Manufacturer recommended to comply with warranty.
- E. Accessories: Except as indicated as work of another specification section, provide components required for a complete system, including trim and similar items shown or recommended by panel manufacturer. Match materials/finishes of preformed panels.
- F. Bituminous Coating: Cold-applied asphalt mastic, SSPC paint 12, compounded for 15-mil dry film thickness per coat.

2.5 FABRICATION

- A. Unless otherwise shown on drawings or specified herein, fabricate panels in continuous one-piece lengths and fabricate flashings and accessories in longest practical lengths.
- B. Roofing panels shall be factory formed. Field formed panels are not acceptable.
- C. Factory Cutting of Panels: Fabricate and finish panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and dimensional requirements, and with structural requirements.

2.6 METAL FINISHES

- A. General: Apply coatings before forming and fabricating panels, as required by coating process and as required for maximum coating performance capability. Protect coating promptly after application and cure, by application of strippable film or removable adhesive cover, and retain until installation has been completed.
- B. Exposed field cuts of panel ends shall be considered unacceptable. Required field cuts of metal panels shall not be cut with abrasive wheels or saws on exposed edges, it shall be shearcut.
- C. Fabricate and finish panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and dimensional requirements, and with structural requirements.
- D. Metal Gauges: Thicknesses required for structural performances, but not less than manufacturer's recommended minimums for profiles and applications indicated, and not less than 24 gauge for steel.

PART 3 - EXECUTION

3.1 PENETRATIONS

- A. General: Extend as required all soil pipe stacks and through roof penetrations to be 12" above finished roof surface.

3.2 INSPECTION

- A. Thoroughly inspect framing and deck to receive metal roofing. Review with the Architect and Owner's Representative prior to installing. Panels shall be installed only when the substrate is within the acceptable tolerances as recommended by the panel manufacturer. Starting work will indicate acceptance of substrate.

3.3 CORROSION PROTECTION:

- A. Treat any contacting surface of dissimilar materials to prevent electrolytic corrosion.

3.4 ROOF PANEL INSTALLATION

- A. General: Comply with panel fabricator's and materials manufacturers' instructions and recommendations for installation except where drawings and specifications indicate more restrictive requirements.
 - 1. Install panels and flashings to allow for thermal movement.
 - 2. Typically, provide fixed gutter ends and allow ridges or highwalls to "float".
 - 3. Provide hemmed edge over continuous cleats at all eaves, valleys and cricket flashings.
 - 4. Turn up edge of panels at top of slope per drawings.
- B. Anchor panels at eave anchor panels and other components of the work securely in place, with provisions for thermal/structural movement in direction of ridge.
- C. Panels are to be installed in continuous sections from ridge to eave or valley with no transverse seams.
 - 1. Do not stretch or compress panel side-lap.
 - 2. Secure panels without warp or deflection.

- 3. Fully engage interlocking seams.
- D. Install system per approved submittal drawings only.
- E. Allowable Erection Tolerance: Maximum Alignment Variation: ¼ inch in 40 feet.
- F. Cutting and Fitting: Cut neat, square and true. Field cuts shall not be exposed. Debur cut edge where necessary to saw-cut panels. Openings 6 inches and larger in any direction: shop fabricate and reinforce to maintain original load capacity.
- G. Remove any strippable protective coating on the panels and flashings prior to installation and in any case do not allow the strippable coating to remain on the panels in extreme heat, cold, or in direct sunlight or other Ultra Violet source.
- H. Caulk, seal fasten so as to provide a complete weathertight installation.
- I. Install end closures at all panel terminations. Closure shall be proper type for particular installation or shall be custom fit. Seat closures in sealant bed on top and bottom or front and back prior to tightening assembly.

3.5 REPLACEMENT AND REPAIR

- A. Damaged Units: Replace panels and other components of the work which have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair procedures.
- B. Touch-up areas as required or directed with manufacturer's standard touch-up paint. Follow instructions for application carefully.

3.6 CLEANING

- A. As work progresses, remove excess scrap and keep working area free from debris on a daily basis. Wash panel surface with water if necessary or in Architect's judgment.

END OF SECTION

FIBER-CEMENT RAINSCREEN SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of the Bidding Requirements, Conditions of the Contract and Division 1 apply to all Sections of this Project Manual. Refer to Table of Contents for complete list of Bidding Requirements, Conditions, and Sections included in the Project Manual
- B. Work Included in This Section: Furnish and install factory primed fiber-cement panels, trims, flashings, accessories, moisture barrier and attachments as shown on drawings and as specified herein.
- C. Related Work in Other Sections: Refer to the following Sections for related Work:
 - 06 10 00 Rough Carpentry
 - 07 27 00 Self Adhered Air Barriers
 - 07 60 00 Flashing & Sheetmetal
 - 07 92 00 Sealants
 - 09 91 00 Painting

1.2 DESCRIPTION OF WORK

- A. Provide fiber-cement rainscreen system (noted as fiber cement siding on the plans) work is indicated on drawings and by provisions of this section, and is defined to include the installation of a new fiber-cement exterior wall cladding system over furring strips over moisture barrier, and the detailing of the system at all exterior wall penetrations, edges, drains, and mechanical equipment.

1.3 PERFORMANCE REQUIREMENTS:

- A. Prevent water migration from entering building through exterior cladding and related flashings per ASTM E 330 & E331.
- B. Fire Resistance Requirements: Panels must be defined as non-combustible in accordance with ASTM E 136 and must have a flame spread index of 0 and a smoke developed index of 5 according to ASTM E 84.
- C. Manufactured in accordance with ASTM C1186
- D. Complies with ICC – ES AC90

1.4 REFERENCE STANDARDS

- A. Listed publications form a part of this Section
 - 1. American National Standards Institute (ANSI)
 - 2. American Society for Testing and Materials, (ASTM)
 - 3. International Building Code (IBC)
 - 4. International Code Council (ICC-ES AC90)

1.5 SUBMITTALS

- A. Refer to Section 01 33 00 for general submittal requirements.
- B. Product Data: Submit manufacturers' published literature for specified products and accessories as applicable, including manufacturer's specifications, physical characteristics, and performance data. Submit as a supplement, manufacturers' instructions and directions for installation if not included in manufacturers' published literature.
- C. Safety Data Sheets (SDS): Provide SDS (or MSDS) for all products to be used.
- D. Shop Drawings: Provide detailed drawings, drawn to scale and fully noted of fiber-cement cladding showing clearly all parts, fastenings and anchorage methods. Show detailed drawings of all transitions to other cladding materials, at all termination areas and penetrations.
- E. Samples:
 - 1. Fiber-Cement Panels
 - a. Fiber-cement panels: Two samples (12 in. x 12 in.)
 - b. Fiber-cement furring strips: (12 in. x 12 in.)
 - c. Cavity Vent Strip for fiber-cement panels (12 in. long piece)
 - d. Extruded Aluminum - strip (12 in. long piece)
 - e. Moisture barrier: Two samples (12 in. x 12 in.)
 - f. Fasteners
 - (1) Moisture barrier fasteners as required.
 - (2) Furring Strip fasteners (manuf. recommended)
 - (3) Fiber-cement panel fasteners (manuf. recommended)
 - (4) Vent strip fasteners (manuf. recommended)
 - g. Verification samples: Two samples (4 in. x 6 in.) representing actual finish colors and patterns.
- F. Warranty/Guarantee:
 - 1. Manufacturer's Guarantee: Submit executed copy of fiber-cement manufacturer's standard 30 (thirty) year limited product warranty from Final Completion.
 - 2. Contractor's Workmanship Warranty:
 - a. Coordinate fiber-cement cladding installer's warranty with Section 01 77 00.
 - b. Warrant that the fiber-cement cladding system is installed in accordance with the manufacturer's recommendations and/or contract documents, whichever is stricter, and will be free from defective workmanship and remain watertight and weatherproof with normal usage for a period of five (5) years following project Final Acceptance.
- G. Maintenance Procedures: Furnish the maintenance procedures manual of the manufacturer's printed recommendations for proper maintenance of the specified system including inspection frequencies, penetration addition policies, temporary repairs, and leak call procedures.

1.6 ASBESTOS FREE CERTIFICATION

- A. All new materials and products installed as part of this work shall be certified to be free of asbestos in accordance with the requirements of section 00 51 00 and 01 77 00. Each supplier and subcontractor shall warrant Contractor that materials and products provided by them are free of asbestos.

1.7 DELIVERY & STORAGE OF MATERIALS

- A. Lay fiber-cement panels flat on a smooth, level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing in manufacturer's unopened packaging until ready for installation.

1.8 QUALITY ASSURANCE

- A. Subcontractor Qualifications: Must be approved by fiber-cement cladding materials manufacturer; must have at least five years' experience in the installation of this type of wall cladding system and be able to show installations (within a one hundred mile range of this project) in satisfactory and waterproof condition at least five years of age.
- B. Installer Certification: Submit written certification from manufacturer of fiber-cement wall cladding system that the installer is approved by the manufacturer for installation of specified system. Installer must be able to show a minimum of five installations in satisfactory and waterproof condition at least five years of age.
- C. Cladding Crew: Cladding contractor will employ a qualified crew foreman and alternate foreman; one foreman will be in attendance on the site at all times during fiber-cement panel work. No substitutions of the foreman or the alternate foreman will be made without written request at least forty-eight (48) hours prior to substitution to the owner. The foreman must be able to communicate clearly and accurately to the Contractor, Architect and Owner's representative in English.
- D. If unauthorized substitution of foreman or alternate foreman, without written owner acceptance, is made, the job will be stopped. A new pre-application conference will be held before resuming work. Attendee's participation at new pre-application conference will be at the contractor's expense.
- E. Project Envelope Consultant: the Owner reserves the right to engage an Envelope Consultant to perform application observation/technical monitoring assisting the Owner, by monitoring the quality and progress of the work performed by the Contractor(s), in general to see that the work is in compliance with the project specifications and Detail Drawings.
- F. Materials: Provide only top quality materials of manufacturer, certified as to type and weight conformance with specifications. All materials shall be manufactured or recommended by the fiber-cement panel system manufacturer.
- G. Fire Rating: Provide fiber-cement panel system and component materials which have been tested for application indicated and are tested in accordance with UL, ICBO, and/or ASTM E84 by a nationally accredited laboratory. Provide wall cladding materials bearing markings on bundle, package, or container indicating that materials have been produced under laboratory's inspection and follow-up service.
- H. Certificate of Compliance: Upon completion of the application of the wall cladding assembly, furnish letter on applicator's letterhead stating that flashings and fiber-cement wall cladding have been applied in accordance with specifications.

1.9 JOB CONDITIONS

- A. Precautions: Install fiber-cement panels only within limits of environmental conditions provided by manufacturer. Proceed with panel work only if existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations and warranty requirement.

1.10 PROTECTIONS

- A. Deliver materials to job site in sealed, undamaged, original containers imprinted with manufacturer's name, product name, and pertinent identifying numbers or markings.
- B. Protect from damage all exterior lighting, landscaped and paved areas.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. James Hardie Building Products, Inc
- B. Or Approved Equal

2.2 PANEL MATERIALS

- A. Fiber Cement Cladding Panels: Hardie Reveal 2.0 Panel as manufactured by James Hardie Building Products, Inc. 7/16 inches thick, 3 feet 11.5 inches (1206 mm) wide by 7 feet 11.5 inches (2426 mm) long. Product shall be engineered for climate conditions. Surface Texture: Smooth.
Manufacturer's Climate Zone Product: HZ10 for hot humid and wet climates with a yellow tint primer.
- B. Code Compliance / Testing / Formulation Requirement for Siding Materials:
 - 1. Fiber-cement siding, complies with ASTM C 1186 Type A Grade II.
 - 2. Fiber-cement siding, complies with ASTM E 136 as a noncombustible material.
 - 3. Fiber-cement siding, complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
 - 4. Fiber-cement siding, complies with ASTM E 119 1 hour and 2 hour fire resistive assemblies listed with Warnock Hersey.
 - 5. Fiber-cement siding, tested to ASTM E330 for Transverse Loads.
 - 6. Intertek Warnock Hersey Product Listing.
 - 7. Formulated from Portland cement, ground sand, cellulose fibers, additives, and water: formed under pressure to required profile.

2.3 WALL PANEL MOISTURE BARRIER:

- 1. See section 07 27 00 Self Adhered Air Barriers

2.4 SELF-ADHESIVE FLASHING:

- A. Around masonry openings: 40-mil, self-adhesive polymerized asphalt by Fortifiber; or as recommended and provided by the Self-Adhered Air Barrier manufacturer – see section 07 27 00.

2.5 FURRING (STRAPPING)

- A. Rainscreen Cavity: Install Hardie Reveal Panels on a drained and vented rainscreen cavity, with a minimum 3/8 inch (9.5mm) air cavity. Selection of cavity vent materials shall be incorporated into the design to prevent insect and pest entry.
- B. Furring strips shall be installed vertical to allow drainage, spaced 16" o.c. Attached furring strips over moisture barrier inline with studs. Furring strips shall be treated wood, 1" x 4" min. x 8',
- C. Use wood/material that will not react (galvanic or otherwise) with fasteners listed below to cause staining or rapid corrosion of fasteners.

2.6 ACCESSORIES

- A. Trims: Reveal™ Trims in the following profiles supplied by James Hardie. Reveal Trims confirm to a 6063 alloy in T-5 temper with a minimum thickness of 0.050 inch. All reveal trims are 12 feet in length.
 - 1. Horizontal trim.
 - 2. Vertical trim.
 - 3. Outside corner trim.
 - 4. Inside corner trim.
 - 5. J channel trim.
 - 6. Drip cap trim.
- B. Finishes of Reveal Trims
 - 1. Chem Film for field painting of Reveal Trims; Chem Film Coating shall conform to ASTM N D1730
 - 2. Clear anodized metal finish aesthetic; clear anodizing shall conform to ASTM B244 and ASTM B136.
 - 3. Color coated finish to match panel finish as supplied in accordance with manufacturers requirements

2.7 FASTENERS

- A. Fasteners: For attaching Hardie Reveal Panel to a rain screen provide the following
 - 1. Wood Framing: 10-12 1-1/2 inch long x 0.47 inch HD low profile Torx (T20W) (TW-S-D12-4.8x38).
 - 2. Fasteners shall be of high quality stainless steel to ensure resistance to corrosion. Factory heads shall be factory blasted to accept paint adhesion. Fasteners shall be approved for system by manuf.
 - 3. Provide color match fasteners.

2.8 FINISHES

- A. Finish for Panels: Factory primed and ready to receive paint. See section 09 95 00 color schedule for color selection.
- B. Finish for Trim: Pre-primed for field painting to match color.

2.9 SEALANT

- A. Install in panel joints and in double row below battens.

- B. Joint sealant complying with ASTM C920 Grade NS, Class 25 or higher or a Latex Joint Sealant complying with ASTM C 834.
- C. Or other sealant product as recommended by manufacturer as selected and project approved.

2.10 ACCESSORIES

- A. FCP-T Piece: Fry Reglet Inc. FCP-T Piece with ½ inch reveal as recommended and specified by the JamesHardie Company.
- B. Flashing Tape: Per Self-Adhered Air Barrier manufacturer per section 07 27 00
- C. Cavity Vent Strip: as recommended and provided by the fiber-cement panel manufacturer (Tamlyn).
- D. Furring strips: Artisan furring strips as recommended and supplied by the fiber-cement panel manufacturer.
- E. Accessories: Except as indicated as work of another specification section, provide components required for a complete system, including trim and end-closures, clips, seam covers, flashings, sealants, gaskets, fillers, closure strips covers, and similar items shown or recommended by panel manufacturer. Match materials/finishes of preformed panels.

PART 3 – EXECUTION

3.1 JOB CONDITIONS

- A. Nominal timber framing selected for minimal shrinkage and complying with local building codes, including the use of weather-resistive barriers and/or vapor barriers where required. Minimum 1½ inch face and straight, true, of uniform dimensions and properly aligned.
- B. Install moisture-resistive barriers and claddings to dry surfaces.
- C. Repair any punctures or tears in the weather-resistive barrier prior to the installation of the cladding per manufacturers' recommendations.
- D. Protect siding from other trades.
- E. Do not begin installation until substrates have been properly prepared.
- F. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 SURFACE CONDITIONS

Correct conditions detrimental to timely and proper completion of work.

3.3 INSTALLATION OF WALL SELF-ADHERED AIR BARRIER/ MOISTURE BARRIER

- A. Install moisture barrier at the exterior walls to be clad with fiber-cement cladding, over the exterior wall sheathing in a shingled water shedding fashion starting from bottom of wall. Fasten with galvanized fasteners to keep underlayment flat and tight to wall. Lap horizontal seams 6-inches minimum and vertical seams 6-inches minimum with taped joints or 12-inches without tape.
- B. Carefully adhere underlayment so that fasteners and tools do not tear the material. Adhere underlayment per manufacturers' recommendations.

- C. At inside and outside corners, carefully hand-conform the moisture barrier to the corners so that the product does not bridge or tear at corners. Wrap underlayment a minimum of 12-inches past each corner from both sides.
- D. Ensure each corner is wrapped in order to create a minimum of two-layer, shingled protection at corners.
- E. At all penetrations, windows, doors, and cladding transitions, moisture barrier shall be incorporated into the window/door flashing system, flexible flashing, and sheet metal flashings in shingled, water shedding fashion.
- F. Moisture barrier shall be incorporated into penetration, rough opening, and all other flashings as shown in Detail Drawings, and in a weather tight, water shedding fashion.
- G. Tears in moisture barrier shall be repaired per manufacturers' recommendations.

3.4 INSTALLATION – PANEL WALL CLADDING

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Place fasteners no closer than 3/8 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.
- C. Install cavity vent strips along the bottom edge of framing or sheathing. Install furring over sheathing attaching to framing members to form a minimum 3/8" rainscreen cavity.
- D. Apply sealant over furring. Only apply enough sealant for one panel at a time.
- E. Install first panel at the bottom corner working across and up. Ensure panels are square and level. Fasten bottom half of panel.
- F. Apply sealant to FCP Z flashing and insert over top of panel just installed.
- G. Install second panel using 1/2 inch (13 mm) spacers at vertical joints. Fasten bottom half of second panel and finish attaching first panel.
- H. Install a kickout flashing to deflect water away from the siding at the roof intersection.
- I. Install a self-adhering membrane on the wall before the subfascia and trim boards are nailed in place, and then install the kickout.
- J. Allow minimum vertical clearance between the bottom edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- K. Maintain clearance between siding and adjacent finished grade.
- L. All field cut edges shall be primed or sealed during the installation process using an exterior grade primer or sealer which is compatible with the type of finish paint to be used.
- M. Specific framing and fastener requirements refer to the applicable building code compliance reports.
- N. Place fasteners no closer than 3/4 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.
- O. Use fasteners as specified in the James Hardie Tech Data sheet and in the Hardie Reveal Panel Installation Instruction.

- P. Install panel using 1/2 inch (13 mm) spacers at horizontal joints. Leave bottom edge of panel above all horizontal trims exposed, no caulking shall be placed at this overlap of Horizontal Reveal Trim. Factory primed edge shall always be used
- Q. Install a kickout flashing to deflect water away from the siding at the roof intersection.
- R. Install a self-adhering membrane on the wall before the subfascia and trim boards are nailed in place, and then install the kickout.
- S. Allow minimum vertical clearance between the bottom edge of siding and any other material in strict accordance with the manufacturer's installation instructions and as determined by James Hardie Zone.
- T. Maintain clearance between siding and adjacent finished grade.
- U. Specific framing and fastener requirements - refer to the applicable building code compliance reports.

3.5 FINISHING

- A. Paint fiber-cement rainscreen system including factory primed siding, trim, fasteners and accessories per section 09 91 00 within 90 days of installation.

3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion

END OF SECTION 07 45 60

SECTION 075113

BUILT-UP ASPHALT ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements related to repairs of an existing built-up asphalt roofing membrane, including flashings, and related accessories.

1.2 RELATED SECTIONS

- A. Section 013300 – Submittal Procedures
- B. Section 016000 – Product Requirements
- C. Section 072100 – Thermal Insulation
- D. Section 076200 – Sheet Metal Flashings and Trim

1.4 REFERENCES

- A. Reference standards of the following sources are applicable to products and procedures specified in Part 2 - Products and Part 3 – Execution of this Section:
 - 1. American Society for Testing and Materials (ASTM)
 - a. ASTM D 312 - Standard Specification for Asphalt Used in Roofing
 - b. ASTM D 2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
 - c. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements
 - d. ASTM D 1668 - Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing
 - e. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
 - f. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free
 - g. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
 - h. ASTM D 2824 - Standard Specification for Aluminum-Pigmented Asphalt Roof Coatings, Non-fibered, Asbestos Fibered, and Fibered without Asbestos
 - i. ASTM D 1863 - Standard Specification for Mineral Aggregate Used on Built-Up Roofs
 - j. ASTM D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - 2. Factory Mutual Global (FM)
 - 3. Underwriters Laboratories (UL)
 - 4. National Roofing Contractors Association (NRCA)
 - 5. American Society of Civil Engineers (ASCE)
 - a. ASCE 7 Minimum Design Loads of Buildings and Other Structures

1.5 SUBMITTALS

- A. Prior to the start of work, submit the following to the Owner for approval:
 - 1. Product submittals required within Section 013300.
- B. Refer to Section 013300 for procedural requirements related to the submittal process.

1.6 QUALITY ASSURANCE PROCEDURES

- A. Applicator Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive a manufacturer's warranty. Company shall have a minimum of 5 years documented experience certified by roofing system manufacturer.
- B. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by roofing system manufacturer for specified roofing system and shall be in compliance with specified regulatory requirements.
- C. Examine the technical specifications and drawings. Verify all dimensions, detail conditions, roof plan notes and existing site conditions that may affect the work. Verification of existing dimensions and site conditions is the responsibility of the Contractor. No additional compensation will be considered for failure to verify existing dimensions, detail conditions, roof plan note callouts, and existing site conditions.
- D. Upon examination, if conflicts between the technical specifications and drawings, and those of federal, state or local regulatory agencies, the product manufacturer, industry roofing standards, or Owner-mandated requirements are discovered, notify the Owner immediately for resolution.
- E. During work, if conditions are discovered which do not allow for continuation of the work per the technical specifications and drawings, notify the Owner immediately for resolution.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 016000 for transport, handling, storage and product requirements.
- B. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.
- C. Store materials in weather protected environment, clear of ground and moisture. Cover insulation, roofing materials, and other moisture-sensitive products with a canvas tarp. Store roll materials standing on end.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not perform work during inclement weather. Refer to product manufacturer for outdoor temperature requirements for installation of materials. Do not install materials at times when the outdoor temperature does not fall within the minimum/maximum temperature requirements of the manufacturer.
- B. Cold weather precautions:
 - 1. When the outside temperature is forecast to fall below 32°F (°C), store unused materials in a heated location. Remove these materials only when ready for installation. Sealants, adhesives and primers should be maintained at a temperature of 50°F (10°C), minimum, at all times. Do not use sealants, adhesives or primers that develop a gelled or lumpy texture to them. Return these materials to a heated location.
 - 2. When applying hot asphalt, reduce mop lead distance to 2-feet or less.
 - 3. If a minimum asphalt temperature of 420°F (216°C) cannot be maintained at the point of application, discontinue work.
 - 4. Refer to the asphalt roofing manufacturer and NRCA requirements and recommendations

for additional cold weather application recommendations and restrictions.

- C. Material Safety Data Sheets (MSDS) of all specified products shall remain on site for the duration of this project.

1.9 MANUFACTURER WARRANTY AND CONTRACTOR GUARANTEE

- A. Provide an alternate price for a manufacturer 20-Year Total System, Non-Pro-Rated Warranty (including insulation, roofing membrane, and flashings) covering materials and labor. The warranty shall include the following additional items:
 - 1. The warranty shall include a wind rider for the design wind speed at the specific project location.
 - 2. Roofing inspection by a technical representative of the roofing membrane manufacturer 22-24 months after date of Final Acceptance.
 - 3. Roofing manufacturer will provide unlimited repairs during warranty period with no cost limitation.
 - 4. Temporary emergency repairs may be made by United States Postal Service without voiding any warranty provisions.
 - 5. Attach copy of Record Document Roof Plan Drawings, Roof Detail Drawings, and Record Built-Up Asphalt Roofing Specification Section to Warranty.
- B. The Contractor shall provide a two-year contractor guarantee. At a minimum, the contractor guarantee shall include the following:
 - 1. Contractor name, address, phone number and project contact name.
 - 2. The project completion date, and date of guarantee expiration.
 - 3. The contractor guarantee shall include, in writing, all project work, workmanship, and/or all materials installed by the contractor or subcontractors to be of a quality that will comply with all project specific requirements of the Construction Documents and other documents governing the Work and workmanship through the guarantee period.
 - 4. The contractor shall investigate roof leaks during the guarantee period within a reasonable time period, but in no instance greater than 24-hours after notification of a leak. The contractor shall repair leaks determined to be the cause of the Work at no cost to the Owner.

PART 2 – PRODUCTS

2.1 BUILT-UP ASPHALT ROOFING SYSTEM SUMMARY

- A. The complete roofing membrane system assembly shall consist of a built-up, four-ply roof system consisting of the specified asphalt saturated felts identified in paragraph 2.3A set in hot, fluid applications of asphalt. Aggregate surfacing shall be applied to the completed roof membrane.

2.2 BITUMEN

- A. Asphalt: ASTM D 312, Type III.

2.3 ROOFING FELTS, SHEETS, AND FABRICS

- A. Roofing membrane plies: Asphalt-saturated Type VI ply felt meeting ASTM D 2178; manufactured by the roofing membrane manufacturer.
- B. Base flashings:
 - 1. Inner ply: Modified bitumen flashing sheet, polyester reinforced, minimum nominal 85 mil thickness; ASTM D 6164, Type I, Grade S.

2. Outer ply: Modified bitumen granule-surfaced surfacing sheet, polyester reinforced, minimum nominal 130 mil thickness; ASTM D 6164, Type I, Grade G.
 - a. Color: White or light gray; as determined by Owner.
- C. For use at roof sump flashings and elsewhere as may be indicated: Asphalt treated woven glass fabric, ASTM D 1668, Type I.
- D. For use at temporary overnight tie-ins: Asphalt-saturated organic felt, No. 15, non-perforated, ASTM D 226, Type 1.

2.4 ADHESIVES, CEMENTS, PRIMERS AND COATINGS

- A. Roofing and flashing cement: ASTM D 4586, Type I, (summer grade or winter grade as applicable to season).
- B. Modified bitumen cement (For use at granule surfaced flashing sheets and other locations required by the roofing membrane manufacturer): Product compatible with modified bitumen roofing surfacing flashing sheet and approved by the roofing membrane manufacturer.
- C. Asphalt primer: ASTM D 41.
- D. Aluminum coating (for flashings): Fibrated aluminum coating; ASTM D 2824, Type III. Product type approved by the roofing membrane manufacturer.

2.5 AGGREGATE

- A. Gravel, ASTM D 1863, Size No. 67; clean and dry.
- B. Slag, ASTM D 1863, Size No. 67; clean and dry.

2.6 FASTENERS

- A. Roofing membrane and flashing fasteners: Unless otherwise indicated, types as required by the roofing membrane manufacturer.
 1. For pipes with a diameter up to 6-inches:
 - a. Adjustable prefabricated support such as Pipe Pier 150 manufactured by Pipe Pier Support Systems, Hamel, MN, or approved equal.
 - b. Product approved by the roofing manufacturer for this application.
 - c. Product capable of accommodating the weight of the supported pipe at intervals recommended by the pipe support manufacturer.
 2. For pipes with a diameter greater than 6-inches:
 - a. Product approved by the roofing manufacturer for this application.
 - b. Product capable of accommodating the weight of the supported pipe at intervals recommended by the pipe support manufacturer.
- E. Self-adhering membrane (for use over parapet walls beneath coping caps, and at other locations indicated on the drawings): Product approved for use beneath sheet metal by the membrane manufacturer, and meeting the following criteria:
 1. Meeting the requirements of ASTM D 1970.
 2. Approved for use as an underlayment for standing seam sheet metal roofing.
 3. A 40-mil minimum membrane thickness.

- F. Roof hatch:
 - 1. Roof hatch, such as "Type E" or "Type S", manufactured by The Bilco Company, New Haven, CT, or approved equal.
 - a. Size and configuration as necessary.
 - b. Product approved by the roofing manufacturer for this application.
- G. Extendable ladder-mounted safety post, such as "LadderUP Safety Post", manufactured by The Bilco Company, New Haven, CT, or approved equal.
 - 1. Size and configuration as necessary to accommodate and new roof hatch.
 - 2. Product approved by the roofing manufacturer for this application.
- H. Rooftop unit support curbs: Product such as "Pate Equipment Supports" manufactured by The Pate Company, Lombard, IL, or approved equal.
 - 1. Size and configuration as necessary to accommodate rooftop unit.
 - 2. Fabricated from 18 ga. galvanized steel, minimum, with welded seams; and a nominal 2-inch thick nailer affixed atop the curb support.
 - 3. Fabricated to allow for a minimum flashing height of 8-inches, minimum.
 - 4. Product approved by the roofing manufacturer for this application.

PART 3 - EXECUTION

3.1 GENERAL

- A. Refer to Section 024100 for general work and substrate preparation requirements.

3.2 BITUMEN KETTLE OPERATION

- A. Operator Preparation – Kettle operation requires an individual who is trained in the use of such equipment and use of the kettle requires a designate operator who will remain at the kettle during its use. Under no circumstance shall the kettle be unmanned. Never allow any untrained person to operate the kettle. Kettle temperature shall be recorded a minimum of twice per day.
- B. Kettle operator must be dressed accordingly; including, but not limited to, the following items:
 - 1. Long-sleeved shirt, buttoned at the cuffs.
 - 2. Long pants without cuffs.
 - 3. Gloves, snug fitting at the cuffs.
 - 4. Heavy shoes with high tops.
- C. Site Preparation – The kettle should be located close enough to the building to allow for proper setup of thin-wall tubing. Care must be taken to protect building, by use of tarpaulins. However, be aware of the possible hazards from locating too close, such as splashing of asphalt or the spread of fire.
- D. Avoid locating kettle near openings and air intakes on the building to lessen the effect of fumes on the people inside.
- E. Select a clear, level area with firm ground. Locate kettle away from all flammable materials and away from all electrical lines. Chock wheels front and back when kettle is in operation. Make sure the kettle is level and stable from rocking. Place non-flammable material underneath kettle to protect the ground from spillage. Set up a warning line system around the entire kettle working area. Keep unauthorized people away from the area. If LP fuel is being used, secure the cylinder(s) so that it cannot tip over. Locate cylinder(s) at least ten feet from the burners. Keep all fuel upwind from the kettle and away from open flames. Place asphalt to be used for the day in a location convenient for loading the kettle.

- F. Ground protection (plywood and EPDM membrane) is required at kettle site. Comply with all Local Fire Codes or requirements set forth by Local Fire Marshall.

3.3 BITUMEN FUME CONTROL

- A. The Contractor shall include the cost of providing a fume recovery system such as Fumeguard Asphalt & Pitch Fume Control System as manufactured by the Garlock Equipment Company or approved equal in all projects where asphalt is specified.
- B. Fumes from paint, adhesives, or any other sources are prohibited from entering the building interior. Contractor must provide proper ventilation and take necessary precautions to prevent fume permeation including covering intake vents, providing and installing carbon filters, arranging for HVAC equipment shut down, or any other necessary means to prevent fumes from entering the building.

3.4 ROOFING MEMBRANE INSTALLATION

- A. Except as may be modified by these specifications and drawings, install roofing membrane in accordance with the requirements and recommendations of the roofing membrane manufacturer, using the manufacturer's current printed instructions.
- B. Chalk lining: Beginning at the low points or drains, chalk line the cover board surface to serve as guides for the proper mopping and laying of the roofing membrane plies.
- C. Felt direction: Install roofing membrane felts perpendicular to the roof slope.
- D. Broom or press each ply into place, full width.
- E. Provide non-perforated asphalt organic felt envelopes at perimeter edges, and metal pitch dams at roof openings, and at other locations required by the roofing membrane manufacturer to prevent coal-tar pitch drippage.
- F. Install only as much roofing as can be completed in a work day, including flashing and detail work. All installed roofing shall be sealed to a watertight condition prior to leaving the site daily.
- G. Sequence roofing work to eliminate the use of installed roofing as a walkway, or as a storage platform for materials.
- H. Where wheeled or excessive traffic over new or existing roofing work is unavoidable, provide and use 3/4-inch plywood, set over a minimum of two-inch thick rigid board insulation to protect roofing components in place.
- I. Overnight tie-in: Care should be exercised to ensure that water does not flow beneath any completed sections of the roof by temporarily sealing the loose edge of the membrane at the end of each work day and when the weather is threatening. The roofing membrane manufacturer's requirements should be followed closely.
- J. Remove debris from the roof daily prior to leaving the site. Inspect the site at ground level. Remove any roof replacement related debris from the ground.

3.5 BASE FLASHINGS

- A. Curb height: Unless otherwise indicated provide an 8-inch minimum flashing height above the

finished roofing surface. Refer to Section 061053 for wood blocking requirements related to raising of rooftop curbs.

- B. Ensure that all flashing substrates are suitable to receive new base flashing materials.
- C. Install base flashings at vertical walls and curbs in accordance with the roofing membrane manufacturer's requirements and recommendations, with the following exceptions/clarifications:
 - 1. Flashing Securement:
 - a. If the flashing substrate is wood or wood nailers are present, secure the flashing top edge with roofing nails and 1-inch metal cap fasteners fasteners spaced 6-inches on center, maximum.
 - b. At all other substrates, secure the top edge of flashing with an aluminum anchor bar, secured 12-inches o.c., max., or as recommended by the roofing membrane manufacturer; whichever is less. Refer to Section 076202 for aluminum anchor bar requirements.
 - 2. Flashing stripping: Use woven glass fabric and roofing cement to seal vertical laps and the flashing top edge of the flashing (including anchor bars, if applicable).
 - 3. Flashing and stripping coating: Apply the specified aluminum coating over base flashings and strippings. Apply the coating in accordance with the requirements and recommendations of the roofing membrane manufacturer. Ensure that the surface coating is uniform in color and appearance. Do not apply coating during cold weather, or immediately after the application of strippings. If necessary, allow strippings time to "flash off", as recommended by the coating manufacturer.

3.6 ROOF SUMP FLASHINGS

- A. Prior to installation of the base ply, install a three-course stripping of woven glass fabric and roofing cement over the cover board/insulation substrate.
- B. Ensure that the roofing membrane plies extend into the roof sump.
- C. Install a three-course stripping of woven glass fabric and roofing cement over the roofing plies.
- D. Install a lead sheet flashing over the roofing plies in the sump; refer to Section 076202. Prime both sides of the lead sheet prior to installation.
- E. Install two plies of woven glass fabric, each ply set in roofing cement, over the lead flashing sheet.
- F. Ensure that the roofing membrane felts, lead flashing sheet, and woven glass fabric flashing plies extend under the clamping ring and into the drain bowl. Tightly secure the clamping ring.
- G. Apply the specified aluminum coating over the roof sump flashings. Apply the coating in accordance with the requirements and recommendations of the coating manufacturer. Ensure that the surface coating is uniform in color and appearance.
- H. Install a roof sump gravel stop as indicated in Section 076202.

3.7 METAL FLASHINGS AND ACCESSORIES

- A. Refer to Section 076202.

3.8 SHEET METAL FLANGE STRIPPINGS

- A. At sheet metal flanges associated with roof sump area gravel stops, tubular penetrations, pitch

pans and perimeter edge sheet metal fascia flashings:

1. Prime the top and bottom of the sheet metal flange. Allow the primer time to dry.
2. Set flange in a full bed of roofing cement.
3. Install strippings in accordance with the drawings and the requirements and recommendations of the modified bitumen roofing membrane manufacturer.

3.9 SEALANTS

- A. Refer to Section 079200.

3.11 MISCELLANEOUS INSTALLATIONS/TREATMENTS

- A. Install mechanical ventilator units in position and secure to the existing curbs with EPDM-gasketed screws. Provide a minimum of one fastener on each side of the curb and a minimum of one fastener every 12-inches o.c.
- B. Connect all electrical, plumbing, gas line and ventilation connections required for mechanical units. Retain a qualified, licensed electrical subcontractor to connect electrical equipment. Retain a qualified, licensed mechanical subcontractor to connect gas lines and ventilation connections.
- C. Rooftop conduit and pipe supports:
1. Install adjustable prefabricated pipe supports at rooftop conduit and pipes.
 2. Space pipe supports at intervals recommended by the support manufacturer, as determined by the diameter and weight of the conduit or pipe.
 3. Separate the support from the roof surface by installing the support over roof walkway pads, installed as specified.
- D. Pre-fabricated plumbing vent pipe extensions:
1. Refer to manufacturer requirements and recommendations for installation.
- E. Install self-adhering underlayment beneath coping caps, and at other locations indicated on the drawings.
1. Refer to manufacturer requirements and recommendations for installation.
- F. Roof hatch installation:
1. Provide wood nailers beneath roof hatch flanges, if necessary, to match insulation thickness.
 2. Install new roof hatch following the written instructions, recommendations, and requirements of the roof hatch manufacturer.
- G. Extendable safety post installation:
1. Install new safety post following the written instructions, recommendations, and requirements of the roof hatch manufacturer.
- H. Application of elastomeric coating to rooftop penetrations:
1. Prepare substrate in a manner that is acceptable to the coating manufacturer. Substrate preparation includes, but is not limited to: treatment of excessive gaps, repair of damaged or loose sheet metal components, repair of holes, cleaning of roof penetrations, treatment of surface rust, treatment of residual asphalt, and priming (if required by the roof coating manufacturer).
 2. Coat the indicated penetrations following the recommendations and requirements of the coating manufacturer.
- I. Installation of equipment support curbs:

1. Install support curbs where indicated on the project drawings. Flash curbs into the roof system as indicated on the project drawings.
2. Refer to manufacturer requirements and recommendations for installation.

END OF SECTION

USPS CSF Specifications, issued: 5/1/2014
Last revised: 9/22/2015 issued: 10/1/2015

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of the Bidding Requirements, Conditions of the Contract and Division 1 apply to all Sections of this Project Manual. Refer to Table of Contents for complete list of Bidding Requirements, Conditions, and Sections included in the Project Manual.
- B. Work Included in This Section: Provide all flashing, roof ventilators and sheet metal work as shown on drawings and as specified herein including all materials and accessories required for a complete and watertight installation.
- A. Related Work in Other Sections:
 - 06 10 00 Rough Carpentry
 - 07 27 00 Self-Adhered Air Barriers
 - 07 41 13 Metal Roof Panels
 - 07 42 10 Metal wall panels
 - 07 45 60 Fiber Cement Rainscreen System
 - 07 51 13 Built up roofing
 - 07 72 23 Roof Hatch
 - 07 92 00 Sealants
- B. Related Work in Other Divisions
 - Dvision 22 Mechanical

1.2 REFERENCE STANDARDS

- A. Listed publications form a part of this Section
- B. Sheet Metal and Air Conditioning Contractors National Association, Inc., (SMACNA): SMACNA ASMM: Architectural Sheet Metal Manual.
- C. International Building Code (IBC): Latest Edition, comply with all appropriate sections of Chapter 23, Exposure 'B'.
- D. Sealants: The Professionals' Guide, published by The Waterproofing & Restoration Institute (SWR)
- E. The NRCA Roofing and Waterproofing Manual, (Latest Edition) National Roofing Contractors Association (NRCA): .

1.3 SUBMITTALS

- A. Refer to Section 01 33 00 for general submittal requirements.
- B. Submit large-scale details of edge conditions, joints, corners, supports, anchorages, trim, flashings, closures, and special details where they differ from details shown on plans or are not detailed on plans.
 - 1. Indicate fastening and spacing requirements for wind uplift.
 - 2. The details provided in the construction documents are based on the Metal Sales panel specified below. If another system is used, a full set of shop drawings detailing all conditions are required.

- C. Product Data: Provide data on prefabricated components.
- D. Safety Data Sheets (SDS): Submit SDS for all products to be used in the system.
- E. Samples: Submit sample typical window sill pan fabricated of specified materials including seam, hold down clip, and edge flashing. Submit color chips of metal showing color specified.
- F. Warranty/Guarantee:
 - 1. Manufacturer's Warranty: Manufacturer's standard materials warranty for 20 years, following delivery date, that panels will not fail structurally, perforate, rupture or leak due to corrosion, and the finish will not fade, crack, peel or show other signs of deterioration.
 - 2. Contractor's Workmanship Warranty:
 - a. Coordinate sheet metal installer's warranty with Section 01 77 00 requiring joint warranty with roofing installer and window installer.
 - b. Warrant that the sheet metal is installed in accordance with the manufacturer's recommendations and/or contract documents, whichever is more strict, and will be free from defective workmanship and remain watertight and weatherproof with normal usage for a period of five (5) years following project Final Acceptance.

1.4 QUALITY ASSURANCE

- A. Asbestos Free Certification: All new materials and products installed as part of this work shall be certified to be free of asbestos in accordance with the requirements of Section 00 51 00 and 01 77 00. Each Supplier and subcontractor shall warrant to the Contractor that materials and products provided by them are free of asbestos.
- B. Subcontractor Qualifications: Minimum of five years experience with similar type installations. Provide list of completed projects located in the State of Washington.

1.5 WATERTIGHT REDUNDANCY

- A. Metal flashings are intended to provide secondary watertight protection. All substrates below copings and metal fabrications shall first have installed over them at least one ply of roof membrane or one layer of self-adhesive rubberized asphalt flashing sheet to assure a watertight assembly prior to installation of metal.

1.6 ELECTROLYTIC AND CORROSIVE ACTION

- A. Protect adjacent dissimilar metals from electrolytic action by adequate coating. Coat exterior masonry, plates and concrete surfaces against which stainless steel work is applied with suitable paint, red rosin paper or polyethylene underlayment.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS:

- A. General: All flashings not called out on the drawings shall be minimum 22ga stainless steel.

- B. Stainless Steel: AISI Type 302/304, complying with ASTM A 167, 2D annealed finish, soft, except where harder temper required for forming or performance; 22 gauge except as otherwise indicated. Stainless steel shall be passivated type.
- C. Factory Finished Galvanized Steel: 22 GA. hot dipped galvanized steel (G-90) commercial quality, extra smooth primed and finished one side with 0.8 mil Polyvinylidene Fluoride (PVF 2). Kynar-500 or Hylar 5000 70% resin finish coat applied over a 0.2 mil baked-on epoxy base primer to a total film thickness of 1.0 mil \pm 0.2 ml total dry film thickness and backside primed with baked-on epoxy primer with dry film thickness of .2 mil by the following Manufacturers: ASC Profiles, Inc, Metal Sales, or approved.
- D. Galvanized Steel: Commercial quality with 0.20 percent copper ASTM A 526 except ASTM A 527 for lock-forming, G90 hot-dip galvanized,
 - 1. Thickness: 20 gauge for cleats or as indicated.
- E. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non corrosive, size and gauge required for performance or as indicated.

2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Concealed hook strips, fasteners, etc.: Same metal as material being fastened, 2 gauges heavier than material being fastened.
- B. Screw and Nail Type Fasteners - General: Same metal as flashing/sheet metal or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
 - 1. For fastening aluminum, galvanized, or stainless steel: Stainless steel self-drilling fasteners, pan head, flat head, or hex head as indicated. Provide with separate stainless steel washer bonded to EPDM rubber at exposed installations.
 - 2. For fastening galvanized sheet: Galvanized self drilling screws, pan head, flat head, or hex head as indicated with separate EPDM bonded metal washers with color matched heads.
 - 3. Fasteners for Concrete & Masonry: "Zamac Nailin" or "Spikes" by Rawl with stainless steel nail and separate neoprene gasketed stainless steel washer or Rawl Hex Head Rawl stainless steel "Tapper" with separate neoprene gasketed stainless steel washer.
- C. Rivets: Solid core stainless steel Pop-rivets with stainless steel mandrel. Type SSD44SSH and SSD64SSH as applicable.
- D. Sealant and Sealant Tape: Per Section 07 92 00.
- E. Metal Furring: ASTM C645 for furring, blocking, etc.
- F. Self-Adhesive Flashing:
 - 1. At Roof: Same product used at roofing, "Grace Ice & Water Shield Strips", width as required, 40-mil, self-adhesive, polymerized asphalt by W.R. Grace or approved equal.
 - 2. At Walls: Same product used for wall underlayment and flashings, - See section 07 27 00
 - 3. At Windows: Compatible product with wall underlayment – See section 07 27 00

- G. Bituminous Coating: FS TT-C-494 or SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
- H. Roofing Cement: ASTM D-4586, Type II, asphaltic, asbestos free for stripping plies.
- I. Provide all miscellaneous items as required for a complete and proper installation.
- J. Separation Tape: 1/16" x 1/2" neoprene tape.
- K. Solder: For use with stainless steel, galvanized steel, and pre-finished steel where indicated. Provide 60-40 tin/lead solder (ASTM B 32), with acid- chloride type flux, except use rosin flux over tinned surfaces.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. Execute by skilled craftsmen according to best methods of the trade. Lines, moldings, edges sharp and true, reinforce as required for stiffness; allow for expansion and contraction, and for shrinkage of wood construction. Joints and seams neatly formed and finished; surfaces free of waves and buckles. Exterior work permanently watertight.

3.2 FABRICATED UNITS

- A. General Metal Fabrication: Shop-fabricated work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Formwork to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work in 10' lengths without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
- B. Copings: Provide with 1-inch tall standing seam joints lapped against the weather and with the vertex of the bend filled with polyurethane sealant. Utilize bayonet joints on vertical coping faces per details.
- C. Expansion Provisions: Provide for thermal expansion of exposed sheet metal work. Space movement joints at maximum 10 feet intervals with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion joints as detailed cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic (concealed within joints).
- D. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1 1/2 inches, except where pre-tinned surfaces would show in finished work.
 - 1. Soldering Pre-finished Metal: Grind off finish on metal surfaces only to extent required for tinning joint.
- E. Sealant Joints: Where moveable non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of urethane sealant in compliance with SMACNA standards.

- F. Flashings: Provide where flashings are indicated on drawings or are required for a weathertight job. Exposed corners shop formed and soldered where stainless steel or galvanized steel. Use concealed fastenings wherever possible. Where necessary to expose fasteners, use high dome hex-head gasketed screw fasteners with finish color to match sheet metal. All materials exposed to view to receive exterior finish.
- G. Counterflashings: Form to detail in standard sheet lengths of specified sheet metal, width to overlap base flashings at least 4 inches. Lap with bayonet joints and provide continuous hemmed drip edge at bottom. Provide counterflashing wherever roofs intersect vertical surfaces or where indicated on details
- H. Gutters and Downspouts: Roll form continuous gutter to detailed profile in gauges indicated. Sectional gutters are not approved. Conform to SMACNA guidelines. Support gutters on continuous hook strip of galvanized metal as detailed. Where ends of gutter abut walls, allow 1/2 in. expansion space. Install expansion joints where shown on drawings.
 - 1. PVC Downspouts: Provide Schedule 40 PVC downspouts and fittings. Install support straps at 6'-0" O.C. per details. Paint per Section 09 91 00.

3.3 INSTALLATION REQUIREMENTS

- A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units, conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams, laid away from southerly prevailing weather, which will be permanently watertight and weatherproof.
- B. Gutters, Downspouts and Drip Edge: Coordinate with roofing installation per Sections 07 54 00. Install items fabricated from sheet metal with straps, adhesives and anchors per details and as recommended by SMACNA Manual and roofing manufacturer's recommendations.
- C. Roof Penetration Flashing: Bed primed flanges of work in a uniform coat of bituminous roofing cement where required for embedment in membrane and waterproof performance. Coordinate with roofing installation per Section 07 55 50.
- D. Roof coping terminations, fabrications, curb flashings, and other sheet metal work where indicated: Fabricate sheet metal work as detailed. All joints and connections shall be soldered where indicated for stainless steel fabrication for strong and watertight joints. Pre-finished steel fabrications shall be bent and riveted with solid core stainless steel pop-rivets and continuous sealant in the lap joints. Spacing of rivets shall be adequate to assure strong, permanent, watertight joints. Coordinate with roofing contractor when setting metal. All flashings shall be installed over construction previously made weathertight with extension of roofing plies or installation of self-adhesive flashing. Set exposed flashings in mastic.
- E. Counterflashings: Coordinate installation of counterflashing with installation of assemblies to be protected by counterflashings. Install counterflashings in reglets or receivers. Secure in a watertight manner by means of snap-in installation and sealant, blind rivets and sealant, raggles with sealant and face pins.
- F. Pre-manufactured Reglets: Install per manufacturer's recommendations. Close ends with manufacturer's foam end closures and sealant.

- G. Wall counter flashings, fascia flashings and other straight run sheet metal work where indicated: Fabricate as detailed. Set exposed flashings in mastic where flashing meets roofing.
- H. Fabricated Regets and Counter flashings and Wall flashings: Form to details as indicated. Flat locked or drive cleat seams; lap ends 4-inch minimum with bayonet joints per details, seal with urethane sealant, hem and crimp bottom edge. Install upper edges of flashing in reglet as indicated by details or as surface-applied installation per details. Set exposed flashings in mastic where flashing meets roofing.
- I. Curb Flashings: Shop fabricate to shapes and profiles indicated.
- J. Splash Blocks: Set splash blocks in mastic and orient to discharge in the direction of the roof drain and over flow drain.

3.4 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Provide final protections and maintain conditions that ensure sheet metal flashing and trim work during constructions is without damage or deterioration other than natural weathering at the time of substantial completion.

END OF SECTION 07 60 00

SECTION 077233

ROOF HATCH

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Prefabricated aluminum roof hatch, with integral support curbs, operable hardware, and counterflashings.
 - 2. Ladder Safety Post.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 075113 – Built up roofing
 - 2. Section 076000 – Flashing and sheet metal.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data on unit construction, sizes, configuration, jointing methods, and attachment method.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver to Project site in manufacturer's unopened container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering specified items which may be incorporated in the Work include the following:
 - 1. Babcock-Davis Hatchways, Incorporated, Arlington, MA. (781) 643-5344.
 - 2. The Bilco Company, West Haven, CT. (203) 934-6363.
 - 3. Milcor, Holland, OH. (800) 861-6452.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MANUFACTURED UNITS

- A. Model Numbers:

1. Babcock-Davis: IRR.
2. Bilco: NB-50T.
3. Milcor: EE Series.

B. Description:

1. Size: 2 feet 6 inches x 4 feet 6 inches.
2. Curb: 11 gauge, fully welded corners; 2 inch rigid insulation; integral cap flashing to receive roof flashing system; extended flange for mounting.
3. Cover: 11 gauge aluminum with two inch insulation retained by 22 gage aluminum inner liner. Continuous gasket to provide weatherproof seal. Color to have high solar reflective index.
4. Hardware:
 - a. Compression spring operator and shock absorber.
 - b. Steel manual pull handle for interior and exterior operation.
 - c. Steel hold-open arm with vinyl covered grip handle for easy release. Cadmium plated finish.
 - d. Heavy duty pintle type hinges.
 - e. The hatch should have a key type deadbolt locking device, slide bolt locking device or have the capability to install a padlock to secure the hatch cover to the hatchway.
5. Fasteners: Corrosive-resistant fasteners recommended by roof hatch manufacturer, which are to be interior mounted.

2.3 FABRICATION

- A. Fabricate free of visual distortions and defects. Weld corners and joints.
- B. Fabricate units weathertight with integral capflashing, providing for removal of condensation.
- C. Final finish to high solar reflective index.
- D. Weld hasp, latch and hinges to prevent removal from exterior.

2.4 ROOF HATCH LADDER

- A. Metal Ladder: Specified in Section 055000.
- B. Ladder Safety Post: LadderUP, Model LU-1, by The Bilco Company.
 1. Telescoping high strength steel tubular section; locks automatically when fully extended.
 2. Stainless steel spring balancing mechanism; controls upward and downward movement.
 3. Black enamel finish.
 4. Provide fasteners for securing posts to ladder rungs.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Roof Hatch:
 1. Install in accordance with manufacturer's published instructions.
 2. Provide weathertight installation.
 3. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.
 4. Field paint exterior exposed areas of hatch with 2 coats as specified in Section 099100.

- B. Ladder Safety Post: Secure safety post to top two ladder rungs, on climbing side, in accordance with manufacturer's published instructions.

3.2 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate location and required clear dimensions of roof deck opening.
 - 2. Coordinate with installation roof insulation, roof membrane, and related flashings.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field Inspection.
- B. Independent Roofing Inspector and Roofing manufacturer Roofing Quality Control Inspector will inspect interface of roofing installation and roof hatch installation as a part of the roofing quality control inspections.

3.4 ADJUSTING

- A. Adjust hatch hinge and hold-open arm for smooth operation.
- B. Adjust ladder safety post for smooth non-binding operation.

END OF SECTION

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SECTION 078400

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Firestopping in fire-rated wall assemblies.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM E 119 - Test Methods for Fire Tests of Building Construction and Materials.
 - 2. ASTM E 814 - Test Methods for Fire Tests of Through Penetration Fire Stops.
- B. Underwriters' Laboratories, Inc. (UL):
 - 1. UL 1479 - Fire Tests of Through-Penetration Firestops.

1.3 DEFINITIONS

- A. Firestopping: Sealing material or assembly placed in spaces between building materials to stop movement of smoke, heat, gasses, or fire through wall openings.

1.4 SYSTEM DESCRIPTION

- A. Firestopping Materials: ASTM E 119, ASTM E 814, UL 1479 to achieve a fire rating as indicated on Drawings.

1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures of submittals.
 - 1. Product Data: Product characteristics, performance, and limitation criteria.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Firestopping installer documentation of experience indicating compliance with specified qualification requirements.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of this Section with minimum 5 years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver Products in manufacturer's original unopened containers or packages with labels intact, identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions, where applicable.
- B. Store and handle materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.8 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Do not install materials when temperature of substrate material and ambient air is below 60 degrees F.
 - 2. Maintain minimum temperature before, during, and for 3 days after installation of materials.
 - 3. Keep away from heat, open flame, sparks, or other sources of ignition until curing is complete. Use only with adequate ventilation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering firestopping materials which may be incorporated in the work include the following:
 - 1. Nelson Firestop Products, Tulsa, OK (800) 331-7325.
 - 2. Hilti Firestop Systems, Tulsa, OK (800) 879-8000.
 - 3. The Rectorseal Corporation, Houston, TX (800) 231-3345.
 - 4. Specified Technologies, Incorporated (STI), Somerville, NJ (800) 992-1180.
 - 5. 3M Fire Protection Products, St. Paul, MN (800) 328-1687.
 - 6. Tremco Firestop System, Beechwood, OH (800) 321-7906.
- B. Other products such as USG Firestop System by U.S. Gypsum Co. are acceptable if complying with requirements.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Intumescent Latex Sealant: Single-component, intumescent, latex formulation.
 - 1. LBS, by Nelson Firestop Products.
 - 2. Metacaulk 950 or 1000, by RectorSeal.
 - 3. SpecSeal SSS100, by STI.
 - 4. CP 25WB+, by 3M.
 - 5. TREMstop WBM, by Tremco.
- B. Intumescent Solvent-Release-Curing Sealant: Single component, intumescent, synthetic-polymer based, non-sag grade.
 - 1. CP 25N/S, by 3M.
 - 2. TREMstop WBM, by Tremco.
- C. Intumescent Wrap/Strip: Single-component, elastomeric sheet with aluminum foil on one face.
 - 1. WRS, by Nelson Firestop Products.

2. Metacaulk Wrap Strip, by RectorSeal.
 3. SpecSeal SSWRED Wrapstrip, by STI.
 4. FS-195+ Wrap/Strip, by 3M.
 5. TREMstop WS, by Tremco.
- D. Intumescent Putty: Single-component, non-hardening, dielectric, intumescent putty.
1. FSP, by Nelson Firestop Products.
 2. Metacaulk Fire Rated Putty, by RectorSeal.
 3. SpecSeal Putty, by STI.
 4. Moldable Putty+, by 3M.
- E. Silicone Sealant: Single-component, moisture-curing, silicone-based elastomeric, non-sag grade.
1. CLK N/S, by Nelson Firestop Products.
 2. FS 601, by Hilti.
 3. Metacaulk 835+, by RectorSeal.
 4. SpecSeal PEN 300, by STI.
 5. 2000+ Silicone, by 3M.
 6. FYRE SIL, by Tremco.
- F. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, nonshrinking foam.
1. FS Fireblocks, by Hilti.
 2. SpecSeal PEN 200, by STI.
 3. 2001 Silicone RTV Foam, by 3M.
- G. Intumescent Collar: Factory-fabricated, intumescent collar.
1. PCS, by Nelson Firestop Products.
 2. CP 642, by Hilti.
 3. Metacaulk Pipe Collar, by RectorSeal.
 4. SpecSeal SSC Collars, by STI.
 5. Plastic Pipe Device, by 3M.
 6. TREMstop D, by Tremco.
- H. Intumescent Composite Sheet or Pillows and Mortar: Intumescent sheet used to firestop large openings.
1. CPS, by Nelson Firestop Products.
 2. SpecSeal SSB Pillows and SpecSeal SSM Firestop Compound, by STI.
 3. CS-195+ Composite Sheet, by 3M.
 4. TREMstop PS, by Tremco.
- I. Packing Material: Manufacturer's standard mastic, putty, ceramic fiber blanket, or mineral wool to be used as fill or backing material for firestopping.
1. FSB or Mineral Wool, by Nelson Firestop Products.
 2. Mineral Wool, by Hilti.
 3. Fire Safing or Backer Rod, by RectorSeal.
 4. Mineral Wool Safing, by STI.
 5. FireMaster Mastic, FireMaster Putty, or FireMaster Bulk, by 3M.
 6. Cerablanket, by Tremco.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.

- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to United States Postal Service.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.
- B. Remove incompatible materials which may affect bond.
- C. Place hangers or damming materials in penetration to hold firestopping materials where required.

3.3 INSTALLATION

- A. Follow manufacturer charts for appropriate material to achieve required fire rating in various locations.
- B. Install firestopping at penetrations of fire rated wall materials by sleeves, piping, ductwork, conduit, and other items in accordance with manufacturer's published instructions.

3.4 CLEANING AND PROTECTION

- A. Clean excessive fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturer's of firestopping Products and of products in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations.
- C. If damage occurs, cut out and remove damaged or deteriorated firestopping and install new materials.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Inspection procedures.
- B. Contracting Officer will inspect each firestopping installation. Do not cover firestopping installations that will be concealed by other construction until Contracting Officer inspection.

3.6 SCHEDULES

A. Provide firestopping complying with UL assemblies specified below.

Penetration	Assembly	Nelson	Hilti	RectorSeal	STI	3M	Tremco
Metal Pipe	CMU Wall 8" Thick or Less	CAJ1224 or CAJ1203	CAJ1150 or CAJ1158	CAJ1114 or CAJ1115	CAJ1079 or CAJ1217	CAJ1001 or CAJ1009	CAJ1179 or CAJ1187
	Gypsum Board Partition	WL1083 or WL1030	WL1052 or WL1054	WL1026 or WL1034	WL1049 or WL1079	WL1003 or WL1009	WL1020 or WL1051
Non-Metallic Pipe	CMU Wall 8" Thick or Less	CAJ2086	CAJ2095 or CAJ2109	CAJ2021 or WJ2025	CAJ2064 or CAJ2045	CAJ2005	CAJ2082 or FA2024
	Gypsum Board Partition	WL2071	WL2078	WL2015 or WL2104	WL2093 or WL2029	WL2002 or WL2005	WL2083 or WL2082
Cable Tray	CMU Wall 8" Thick or Less	CAJ8049 or CAJ4033	CAJ4017	CAJ8043	CAJ4020 or CAJ4029	CAJ4003 or CBJ4020	CAJ4007 or WJA4005
	Gypsum Board Partition	WL4003	WL4006	N/A	WL4005 or WL4008	WL4004	WL3043 or WL3044
Insulated Metal Pipe	CMU Wall 8" thick or Less	CAJ5008 or CAJ5059	CAJ5045	WJ5016 or CAJ5070	CAJ5021 or CAJ5029	CAJ5001 or CAJ5002	CAJ5052 or CBT5005
	Gypsum Board Partition	WL5036	WL5022 or WL5029	WL5057	WL5014 or WL5051	WL5001	WL5034
Construction Gaps	CMU Wall to Metal Deck	N/A	HW-D-0008	TRC/PV120-14	U900Z020	U900Z028	U900Z013 or U900Z014
	Gypsum Board Partition to Metal Deck	N/A	HW-D-0003 or HW-D-0004	HWD0014 or TRC/PV120-14	HWD1001	U400V	WHPV60.01 or U900Z014

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 4/12/2011

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparing sealant substrate surfaces.
 - 2. Sealant and backing.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 321313 - Concrete Paving: Sealants used in conjunction with paving.
 - 2. Section 033000 - Cast-In-Place Concrete: Sealants used in conjunction with concrete.
 - 3. Section 074113 - Metal roof panels.
 - 4. Section 074560 - Fiber cement rainscreen siding.
 - 5. Section 078400 - Firestopping: Firestopping sealant at fire-rated assemblies.
 - 6. Section 076000 - Sheet Metal Flashing and Trim: Sealants used in conjunction with metal flashings.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C717 - Standard Terminology of Building Seals and Sealants.
 - 2. ASTM C834 - Specification for Latex Sealants.
 - 3. ASTM C920 - Specification for Elastomeric Joint Sealants.
 - 4. ASTM D1056 - Flexible Cellular Material- Sponge or Expanded Rubber.
- B. Federal Specifications (FS):
 - 1. FS SS-S-200 - Sealing Compounds, Two Component, Elastomeric, Polymer Type, Jet-Fuel Resistant, Cold Applied.
 - 2. FS TT-S-1657 - Sealing Compound, Single Component Butyl Rubber Based Solvent Release Type (for Buildings and other Types of Construction).

1.3 SUBMITTALS

- A. Section 013300 – Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Product chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Warranty: Submit manufacturer warranty with forms completed in United States Postal Service name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver Products in manufacturer's original unopened containers or packages with labels intact, identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions, where applicable.
- C. Store and handle materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Install sealant during manufacturer's recommended temperature ranges and weather conditions for application and cure. Consult manufacturer when sealant cannot be applied during recommended conditions.

1.7 WARRANTY

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Warranty:
 - 1. Submit written warranty signed by sealant manufacturer agreeing to replace sealants and accessories which fail because of loss of cohesion or adhesion or which do not cure.
 - 2. Warranty Period: 5 years or longer per the manufacturers' standard warranties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated into the work include the following:
 - 1. Bostik, Inc, Huntingdon Valley, PA, (800) 523-2678, (125) 674-5600.
 - 2. Dow Corning, Midland, MI (517) 496-4000.
 - 3. GE Silicones, Waterford, NY (518) 233-3330.
 - 4. Mameco International, Cleveland, OH, (800) 321-6412, (216) 752-4400.
 - 5. W.R. Meadows, Inc, Elgin, IL (800) 342-5976, (847) 683-4500.
 - 6. Nomaco, Inc., Zebulon, NC, (919) 269-6500.
 - 7. Pecora Corporation, Harleysville, PA, (800) 523-6688, (215) 723-6051.
 - 8. Sika Corporation, Lyndhurst, NJ, (800) 933-7452, (201) 933-8800.
 - 9. Sonneborn Building Products Div. ChemRex, Inc., Shakopee, MN (800) 243-6739, (612) 496-6000.
 - 10. Tremco, Beachwood, OH, (800) 852-3821, (216) 292-5000.
 - 11. USG Corp., Chicago, IL (800) 874-4968, (312) 606-4000.
 - 12. Sherwin-Williams Co. (The), Cleveland, OH (800) 321-8194

2.2 BUILDING SEALANTS (See Sealant Schedule at the end of this Section for specific use of sealants.)

A. Urethanes:

1. Type 1: Two-Part Urethane: Self-Leveling, ASTM C920, Type M, Grade P, Class 25.
 - a. Chem-Calk CC-550, by Bostik.
 - b. Vulkem 245, by Mameco.
 - c. Vulkem 255, Wide-Joint, by Mameco.
 - d. NR-200 Urexpan, by Pecora Corporation.
 - e. Loxon 2K SL Multi-Component Polyurethane Sealant, by Sherwin-Williams.
2. Type 2: Two-Part Urethane: Non-Sag, ASTM C920, Type M, Grade NS, Class 25.
 - a. Chem-Calk 500, by Bostik.
 - b. Vulkem 227, by Mameco.
 - c. Sonolastic NP 2, by Sonneborn Building Products, ChemRex Inc.
 - d. Loxon 2K NS Multi-Component Polyurethane Sealant, by Sherwin-Williams.
3. Type 3: One-Part Urethane: Self-Leveling, ASTM C920, Type S, Grade P, Class 25.
 - a. Vulkem 45, by Mameco.
 - b. Urexpan NR-201, by Pecora Corporation.
 - c. Sonolastic SL1, by Sonneborn Building Products, ChemRex Inc.
 - d. Sikaflex 1C-SL by Sika.
 - e. Loxon 1K SL Polyurethane Sealant, by Sherwin-Williams.
4. Type 4: One-Part Urethane: Non-Sag, ASTM C920, Type S, Grade NS, Class 25.
 - a. Chem-Calk 900, by Bostik.
 - b. Vulkem 116, by Mameco.
 - c. Sonolastic NP I, by Sonneborn Building Products, ChemRex Inc.
 - d. Loxon 1K Smooth Polyurethane Sealant, by Sherwin-Williams.

B. Silicones:

1. Type 1: One-Part Silicones: ASTM C920, Type S, Grade NS, Class 50.
 - a. 795 Silicone Building Sealant, by Dow Corning.
 - b. 864 Architectural Silicone Sealant, by Pecora Corporation.
 - c. White Lightning Silicone Ultra Sealant, by Sherwin-Williams.
2. Type 2: One-Part Silicones: ASTM C920, Type S, Grade NS, Class 25.
 - a. 999-A Silicone Building & Glazing Sealant, Dow Corning.
 - b. Construction 1200 Sealant, General Electric Company.
3. Type 3: One-Part Silicones: ASTM C920, Type S, Grade NS, Class 25. Vertical Surfaces Only.
 - a. Construction 1200 Sealant, General Electric Company.
 - b. 999-A, Dow Corning.
 - c. 860 Glaziers and Contractors Silicone Sealant, by Pecora Corporation. (colors only)
4. Type 4: One-Part Silicones: ASTM C920, Type S, Grade NS, Class 25 or 50.
 - a. 786 Mildew Resistant Silicone Sealant, Dow Corning.
 - b. SCS 1700 Sanitary Sealant, General Electric.
 - c. 898 Silicone Sanitary Sealant, Pecora Corporation.

C. Acrylics, Latex:

1. Type 1: One-Part Acrylic Latex, Non-Sag, ASTM-C-834-76.
 - a. Chem-Calk 600, by Bostik.
 - b. LC-130, by MACCO Adhesives, The Glidden Company.
 - c. Easa-ply ALS, by W. R. Meadows, Inc.
 - d. AC-20+Silicone Acrylic Latex, by Pecora Corporation.
 - e. Sonolac, Sonneborn Building Products, ChemRex Inc
 - f. 950A Siliconized Acrylic Latex Caulk, by Sherwin-Williams.

D. Acoustical Sealants:

1. Type 1: AC-20 FTR Acoustical and Insulation Sealant, by Pecora Corporation.
2. Type 2: 60+ Unicrylic, by Pecora Corporation.
3. Type 3: Sheetrock Acoustical Sealant, by United States Gypsum.
4. Power House Siliconized Latex Caulk, by Sherwin-Williams

- E. Butyls:
1. Type 1: One-Part Butyl, Non-Sag, FS TT-S-1657.
 - a. Chem-Calk 300, by Bostik.
 - b. BC-158 Butyl Rubber, by Pecora Corporation. (ASTM C1085)
 - c. White Lightning Butyl Rubber Caulk, by Sherwin-Williams. (ASTM C1311)
- F. Preformed Compressible & Non-Compressible Fillers:
1. Type 1: Backer Rod - Closed cell polyethylene foam:
 - a. HBR Backer Rod, by Nomaco.
 - b. #92 Greenrod, by Nomaco.
 - c. Sonofoam Closed-Cell Backer Rod, Sonneborn Building Products, ChemRex Inc.
 2. Type 2: Backer Rod - Open cell polyurethane foam:
 - a. Denver Foam, by Backer Rod Mfg Inc.
 - b. Foam Pack II, by Nomaco.
 3. Type 3: Neoprene compression seals:
 - a. WE, WF, and WG Series, by Watson Bowman & Acme Corp.
 - b. Will-Seal 150 Precompressed Expanding Foam Sealants, by Will-Seal, a Division of Illbruck.
 4. Type 4: Butyl Rod: Kirkhill Rubber Co. (714)529-4901.
- G. Bond Breaker Tape: Polyethylene tape of plastic as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate of joint filler must be avoided for proper performance of sealant

2.3 PAVING SEALANTS

- A. Type 1: Two-Part Urethane: Self-Leveling, ASTM C920, Type M, Grade P, Class 25.
1. Vulkem 202, by Mameco. (Jet Fuel Resistant) (FS SS-S-200D, Type H only)
 2. NR-300 Urethane, by Pecora Corporation. (FS SS-S-200E)
 3. Loxon 2K SL Polyurethane Sealant, by Sherwin-Williams.
- B. Type 2: One-Part Urethane: Self-Leveling, ASTM C920, Type S, Grade P, Class 25.
1. Sonomeric 1 Sealant, by Sonneborn Building Products, ChemRex Inc. (FS SS-S-200E)
 2. Vulkem 45, by Mameco.
 3. Loxon 1K SL Polyurethane Sealant, by Sherwin-Williams

2.4 COLORS

- A. Generally, use sealant colors matching color of material joint is located in.
- B. Where a joint occurs between two materials of differing colors and Contractor cannot determine which material to match, contact Contracting Officer for selection.

2.5 ACCESSORIES

- A. Joint Cleaner: Provide type of joint cleaning compound recommended by sealant manufacturer for joint surfaces to be cleaned.
- B. Primer: As recommended by sealant manufacturer.
- C. Masking tape and similar accessories to protect surfaces from damage.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that joint widths are in conformance with sealant manufacturer allowable limits.
 - 2. Verify that contaminants capable of interfering with adhesion have been cleaned from joint and joint properly prepared.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Prepare and size joints in accordance with manufacturer's instructions. Clean substrates of dirt, laitance, dust, or mortar using solvent, abrasion, or sandblasting as recommended by manufacturer. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Verify that joint backing and release tapes are compatible with sealant. Verify sealant is suitable for substrate. Verify that sealant is paintable if painted finish is indicated.
- C. Protect materials surrounding work of this Section from damage or disfiguration.

3.3 INSTALLATION

- A. Install sealant in accordance with manufacturer's published instructions.
- B. Prime or seal joint surfaces where recommended by sealant manufacturer. Do not allow primer or sealer to spill or migrate onto adjoining surfaces.
- C. Install backer rod and bond breaker tape where required by manufacturer.
- D. Install preformed compressible and non-compressible fillers in accordance with manufacturer's published instructions.
- E. Install sealants to depths recommended by sealant manufacturer in uniform, continuous ribbons free of air pockets, foreign embedded matter, ridges, and sags, "wetting" joint bond surfaces equally on both sides.
- F. Tool joints concave unless shown otherwise. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form slight cove so that joint will not trap moisture and foreign matter. Dry tool joints. Do not use soap, water, or solvent to tool joints.
- G. Epoxy Floor Joint Sealant: Install sealant at floor construction and control joints in accordance with manufacturer's published instructions and initially under manufacturer's supervision.

3.4 CURING

- A. Cure sealants in compliance with manufacturer's published instructions.

3.5 CLEANING

- A. Remove excess and spillage of sealants promptly as the work progresses, using materials and methods as recommended by sealant and substrate manufacturers. Clean adjoining surfaces to eliminate evidence of spillage without damage to adjoining surfaces or finishes.

3.6 SEALANT SCHEDULE

- A. Exterior Joints:
 - 1. Perimeters of exterior openings where frames and other penetrations meet exterior facade of building: precast concrete, brick, CMU, polymer reinforced concrete.
 - a. Sealant Urethane Type 2
 - b. Sealant Silicone Type 1 (for prefinished materials only)
 - 2. Expansion and control joints in exterior surfaces of cast-in-place concrete walls, precast architectural wall panels.
 - a. Sealant Urethane Type 2
 - b. Sealant Urethane Type 4
 - c. Preformed Compressible & Non-Compressible Filler Type 1
 - 3. Expansion and control joints in exterior surfaces of unit masonry walls and polymer reinforced concrete, including at metal panels.
 - a. Sealant Urethane Type 2
 - 4. Coping joints, coping-to-facade joints, cornice and wash, or horizontal surface joints not subject to foot or vehicular traffic.
 - a. Sealant Urethane Type 2
 - b. Sealant Urethane Type 4
 - c. Sealant Silicone Type 1 (for prefinished materials only)
 - 5. Exterior joints in horizontal wearing and non-wearing surfaces.
 - a. Sealant No. Urethane Type 1
 - b. Sealant No. Urethane Type 3
 - c. Preformed Compressible & Non-Compressible Filler Type 1
 - 6. Paving joints and curbs.
 - a. Sealant Urethane Type 4
 - b. Paving Sealant Type 2
 - 7. Setting bed for threshold and saddles.
 - a. Sealant Acoustical Type 1
 - 8. Painted metal lap or flashing joints.
 - a. Sealant Silicone Type 1
- B. Interior Joints:
 - 1. Seal interior perimeters of exterior openings.
 - 2. Expansion and control joints on interior of exterior cast-in-place concrete walls.
 - 3. Expansion and control joints on interior of exterior precast, architectural wall panels.
 - 4. Expansion and control joints on interior of exterior masonry walls.
 - 5. Perimeters of interior hollow metal and aluminum frames.
 - 6. Interior masonry vertical control joints and intersecting masonry walls; CMU-to-CMU, CMU-to-concrete.
 - 7. Joints at intersection of exterior masonry walls and interior gypsum board partitions.
 - 8. For all of the above interior joints:
 - a. Sealant Urethane Type 2
 - b. Sealant Urethane Type 4
 - c. Sealant Silicone Type 1 (for prefinished materials only)

9. Exposed interior control joints in drywall and concealed joints.
 - a. Sealant Acrylic, Latex, Type 1
 - b. Sealant Acoustical Type 1
 - c. Sealant Acoustical Type 3
 - d. Sealant Butyl Type 1
 10. Joints of underside of precast beams or planks.
 - a. Sealant Urethane Type 2
 - b. Sealant Urethane Type 4
 11. Joints at tops of non-load bearing masonry walls at underside of cast-in-place concrete.
 - a. Sealant Urethane Type 2
 - b. Sealant Urethane Type 4
 12. Perimeter of bath fixtures: sinks, tubs, urinals, waterclosets, basins, vanities, etc.
 - a. Sealant Silicone Type 4
 13. Interior expansion and control joints in floor surfaces exposed to foot traffic.
 - a. Sealant Urethane Type 2
 - b. Sealant Urethane Type 4
 - c. Preformed Compressible & Non-Compressible Filler Type 1
 14. Interior saw-cut contraction joints in exposed concrete floors exposed to forklift traffic.
 - a. Paving Sealant Type 1
 15. Interior non-moving joints, including control, contraction, or construction joints, in interior floor slabs exposed to heavy duty traffic.
 - a. Paving Sealant Type 1
 16. Painted metal lap joints.
 - a. Sealant Silicone Type 1
- C. Glazing:
1. Structural Glazing.
 - a. Sealant Silicone Type 2
 - b. Sealant Silicone Type 3
 2. General Purpose Glazing.
 - a. Sealant Silicone Type 3
 3. End Damming.
 - a. Sealant Butyl Type 1

END OF SECTION

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Last revised: 8/31/18

SECTION 081100
METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel doors and frames.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 087100 - Door Hardware: Hardware coordination.
 - 2. Section 099100 - Painting: Field painting and finishing of doors and frames.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 152 - Methods for Fire Tests of Door Assemblies.
 - 2. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1996.
 - 3. ASTM E 152 - Methods of Fire Tests of Door Assemblies.
- B. Door Hardware Institute (DHI):
 - 1. DHI - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
 - 2. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware.
- C. Steel Door Institute (SDI):
 - 1. SDI-100 - Recommended Specifications Standard Steel Doors and Frames.
 - 2. SDI-105 - Recommended Erection Instructions for Steel Frames.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 80 - Fire Doors and Windows.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Indicate door materials, gauges, configurations, and location of cut-outs hardware reinforcement, and finish.
 - a. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for louvers.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements:
 - 1. Fire Rated Door Construction:
 - a. Conform to ASTM E 152, labeled and listed by Underwriters Laboratories (UL).
 - b. Rate of rise of 450 degrees F across door thickness maximum in 30 minutes of fire exposure.
- C. Installed Door Assembly: Conform to NFPA 80 for fire rated minute label as indicated on Drawings.

1.5 DELIVERY, STORAGE AND PROTECTION

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Protect doors and frames with resilient packaging.
- C. Break seal on-site to permit ventilation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering items which may be incorporated in the Work include the following:
 - 1. Amweld Building Products, Incorporated, Garrettsville, OH (330) 527-4385, (800) 248-6116.
 - 2. Ceco Door Products, Brentwood, TN (615) 661-5030.
 - 3. Curries Company, Mason City, IA (515) 423-1334.
 - 4. Republic Builders Products, McKenzie, TN (800) 733-3667.
 - 5. Steelcraft, Cincinnati, OH (513) 745-6400.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Exterior Doors: SDI-100, Level II - Heavy-Duty - 1-3/4 inch, Model 1 - Full Flush Design, 16 gage cold-rolled steel; galvanized in accordance with ASTM A 653.
- B. Interior Doors: SDI-100, Level II - Heavy-Duty - 1-3/4 inch, Model 1 - Full Flush Design, 18 gage cold-rolled steel.
- C. Exterior Frames: 14 gage, cold-rolled steel, mitered and welded; galvanized in accordance with ASTM A 653.
- D. Interior Frames: 16 gage, cold-rolled steel, mitered and welded, 2 inch profile, for installation in a metal or wood stud and gypsum board partition.

2.3 CORE CONSTRUCTION

- A. Provide one of the following core construction;
 - 1. Interior Doors: Kraft Honeycomb, Phenolic treated.
 - 2. Exterior Doors:
 - a. Polyurethane: Core foamed-in-place or laminated. 20 psi strength, 1.8 pcf density; 1/2 inch maximum voids in any direction. Strength of bond between core and steel face sheet shall exceed strength of core so delamination will not occur during operating conditions.
 - b. Polystyrene: Rigid core of polystyrene foam board, 1500 psf compressive strength, 18 psi shear strength. Strength of bond between core and steel face sheet shall exceed strength of core so that delamination will not occur under operating conditions.
 - c. Vertical Steel Stiffeners: 22 gage vertical steel stiffeners, spaced 6 inches apart and spot welded to face sheets at 6 inches on center. Insulate spaces between stiffeners with loose fill insulation full height of door.

2.4 ACCESSORIES

- A. Rubber Silencers: Resilient rubber.
- B. Top Filler Cap on exterior doors: Install cap, weld, grind, fill and finish smooth.

2.5 PROTECTIVE COATINGS

- A. Bituminous Coating: Fibered asphalt emulsion.
- B. Primer: Exposed surfaces shall be cleaned, treated with Bonderite chemical and given one baked-on shop coat of grey rust inhibiting primer.

2.6 FABRICATION

- A. Fabricate units rigid, neat, and free from warp or buckle. Fabricate KD or welded as specified. Weld exposed joints continuously; grind, dress, and make smooth, flush and invisible.
- B. Reinforce units to receive surface applied finish hardware.
- C. Prepare frame for silencers. Provide three single rubber silencers for single doors and two single silencers on frame head at double doors without mullions.
- D. Primer: Air dried.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Install frames in accordance with SDI-105.
- B. Install doors in accordance with DHI.
- C. Install doors in accordance with manufacturer's published instructions, of size, and at locations indicated.
- D. Coordinate with adjacent wall construction for anchor placement.
- E. Field paint doors and frames as specified in Section 099100.
- F. The frame is to be mounted to the studding in such a manner to prevent a spreading of the frame from the studs of less than 1/2 inch.

3.3 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate frame installation with size, location, and installation.
 - 2. Coordinate with door opening construction, door frame, and door hardware installation.
- B. Site Tolerances:
 - 1. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspect metal door and frame installation, alignment, attachment to structure, and operation.

3.5 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth and balanced door movement.
- B. Section 017300 - Execution: Cleaning installed Work.

END OF SECTION

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Last revised: 9/22/2015

SECTION 083613
OVERHEAD SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Doors with insulated steel-framed steel panels.
2. Tracks configured for the following lift types:
 - a. Low overhead.

B. Related Documents: The Contract Documents, as defined in Section 011000, Summary of Work apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

C. Related Sections:

1. Section 087100, Door Hardware: for lock cylinders and keying.
2. Section 099100, Painting: for field-applied paint finish.
3. Section 111304, Dock Lift (Scissors Type), for interlock switch connection.
4. Section 260519, Low-Voltage Electrical Power Conductors and Cables: for electrical service and connections for powered operators, and accessories.

1.2 REFERENCES

- A. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) By the Hot-Dip Process.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 DEFINITIONS

- A. 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.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: 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 Load: Uniform pressure (velocity pressure) of 20 lb./sq. ft. acting inward and outward.
- B. Operation-Cycle Requirements: Design sectional overhead door components and operator to operate for not less than 100,000 cycles.

1.5 SUBMITTALS

- A. Product Data: For each type and size of sectional overhead 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.
 - 3. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
- B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
 - 1. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied finishes.
- D. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 - 1. Frame: 6-inch length.
 - 2. Panel: 6 inches square.
- E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- F. Manufacturers' Certificates: Signed by manufacturers certifying that they comply with requirements specified in "Quality Assurance" Article. On request, submit evidence of manufacturing experience.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the sectional overhead door manufacturer for both installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing sectional overhead doors similar to those indicated for this Project and with a record of successful in-service performance.
- C. Source Limitations: Obtain sectional overhead doors through one source from a single manufacturer.
 - 1. Obtain operators and controls from the sectional overhead door manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of sectional overhead doors and accessories and are based on the specific system indicated. Other manufacturers' systems with equal performance and dimensional characteristics may be considered. Refer to Division 1 Section "Substitutions."
- E. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Clopay Building Products Co., Cincinnati, OH (800) 526-4301.
 2. Haas Door Co., Wauseon, OH (800) 877-0795.
 3. McKee Door, Inc.; Aurora, IL (800) 222-7426.
 4. Overhead Door Corporation, Farmer's Branch, TX (800) 972-1730.
 5. Raynor Garage Doors, Dixon, IL (800) 472-9667.
 6. Wayne-Dalton Corp, Mt. Hope, OH, (800) 764-1457.
 7. Windsor Door; Little Rock, AR (800) 946-3767.

2.2 STEEL SECTIONS

- A. Construct door sections from galvanized, structural-quality carbon-steel sheets complying with ASTM A 653 (ASTM A 653M), commercial quality, with a minimum yield strength of 33,000 psi (225 MPa) and a minimum G60 (Z180) zinc coating.
1. Steel Sheet Thickness: 20 gauge for exterior and 26 gauge for interior sheets.
 2. Exterior Section Face: Flat.
- B. 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.
- C. Reinforce bottom section with a continuous channel or angle complying with bottom section profile and allowing installation of astragal.
- D. 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.
- E. Provide reinforcement for hardware attachment.
- F. Insulation: Manufacturer's standard rigid cellular polystyrene or polyurethane-foam-type thermal insulation, foamed in place to completely fill inner core of section, pressure bonded to face sheets to prevent delamination under wind load and with maximum flame-spread and smoke-developed indices of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely, with no exposed insulation material evident.
1. Steel Sheet Inside Face: Manufacturer's standard thickness.
- G. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints, and free of warp, twist, and deformation.
- H. Finish galvanized steel door sections as follows:
1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Surface Preparation: Clean galvanized surfaces with nonpetroleum solvent so surfaces are free of oil and surface contaminants.
 3. Pretreat zinc-coated steel, after cleaning, with a conversion coating of type suited to organic coating applied over it.

4. Apply manufacturer's standard primer and finish coats to interior and exterior door faces after forming, according to coating manufacturer's written instructions for application, thermosetting, and minimum dry film thickness.
 - a. Color: White

2.3 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Provide manufacturer's standard, galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, and complying with ASTM A 653 (ASTM A 653M), for minimum G60 (Z180) zinc coating. 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 at 2 inches (50 mm) o.c. for door-drop safety device. Slope tracks at proper angle from vertical or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.
- B. Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and at top of overhead door.
 1. Provide motor-operated doors with combination bottom weatherseal and sensor edge.
 2. In addition, provide continuous flexible seals at door jambs for a weathertight installation.
- C. Windows: Provide windows of 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.
 1. Size: Manufacturer's standard panel for type of glazing indicated.
 2. Clear Polycarbonate Plastic: 6-mm clear, transparent, fire-retardant polycarbonate sheet manufactured by extrusion process, UV resistant.

2.4 HARDWARE

- A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Provide heavy-duty galvanized steel hinges, of not less than 0.0747-inch-thick uncoated steel, at each end stile and at each intermediate stile, per 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.
- C. Rollers: Provide 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 track, 2-inch-diameter roller tires for 2-inch track, and as follows:
 1. Case-hardened steel tires.
- D. Push/Pull Handles: For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.
- E. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
 1. Locking Bars: Both jamb sides, operable from inside only.
- F. Chain Lock Keeper: Suitable for padlock.

2.5 COUNTERBALANCING MECHANISM

- A. Torsion Spring: Operation by torsion-spring counterbalance mechanism consisting of adjustable-tension torsion springs, fabricated from oil-tempered-steel wire 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 100,000 cycles minimum.
- B. Cable Drums: Provide 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 1 additional midpoint bracket for shafts up to 16 feet long and 2 additional brackets at one-third points to support shafts more than 16 feet long, unless closer spacing is recommended by door manufacturer.
- C. Cable Safety Device: Include a spring-loaded, steel or bronze cam mounted to bottom door roller assembly on each side, designed to automatically stop door if either cable breaks.
- D. Bracket: Provide anchor support bracket, as required to connect stationary end of spring to the wall, to level shaft and prevent sag.
- E. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.6 MANUAL DOOR OPERATORS

- A. Push-up Operation: Provide lift handles and pull rope for raising and lowering doors, operating with not more than 25-lbf lift or pull.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine wall and overhead areas, including opening framing and blocking, with Installer present, for compliance with requirements for installation tolerances, clearances, and other conditions affecting performance of Work of this Section.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install door, track, 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. Fasten vertical track assembly to framing at not less than 24 inches o.c. Hang horizontal track from structural overhead framing with angle or channel hangers welded and bolt fastened in place. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

3.3 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.4 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
 3. Review data in the maintenance manuals. Refer to Division 1 Section "Contract Closeout."
 4. Schedule training with Owner with at least 7 days' advance notice.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 4/12/2011

SECTION 083800

TRAFFIC DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Double action impact resistant traffic doors, security type.
 - 2. Door hardware.
 - 3. Security features.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Provide products complete with accessories, trim, finish, safety guards, and other pertinent devices and details needed for a complete installation and intended use.
- D. Related Sections:
 - 1. Section 055000 - Metal Fabrications: Steel door frames for traffic doors.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.
 - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Indicate door materials, thickness, configuration, and hardware.
 - 2. Shop Drawings:
 - a. Indicate dimensions, details of construction, and installation.
 - b. Indicate relationship to adjoining related Work where cutting, fitting, reinforcement, and anchorage is required for complete installation.
- B. Section 017704 – Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operating and Maintenance Data: Operating and maintenance instruction and parts lists.
 - 2. Submit written special warranty with forms completed in United States Postal Service name and registered with manufacturer as specified in this section.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver product in manufacturer's original unopened packages with labels legible and intact.
- C. Labels shall identify manufacturer, brand name, model size, finish, and location of installation.
- D. Store double action doors and accessories in unopened packages in protected dry area to prevent damage from environmental and construction operations.
- E. Handle double action doors with care to prevent damage.

1.6 WARRANTY

- A. Comply with Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Manufacturer warranty to cover all material and labor required to repair or replace doors and door components for a period of two years from time of acceptance by USPS, within a guaranteed maximum repair response time of ten (10) calendar days.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. This Product must be manufactured by a USPS Direct Vendor and is subject to a USPS price and requirements purchasing agreement. The following vendor contact must be used:
 - 1. Chase Industries/Senneca Holdings, 10021 Commerce Park Dr., Cincinnati, OH 45246.
Ordering POC: Sky Mathews, (800) 543-4455, ext. 3477, quotes-orders@senneca.com
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not Permitted.

2.2 TRAFFIC DOORS

- A. Model:
 - 1. Chase Industries: Durulite Series 200 Security Doors, (or Series ME-200, when a custom size is required).
- B. Color: Selected by Contracting Officer from manufacturer's standard colors.
- C. Door Body:
 - 1. Per manufacturer's USPS approved construction.
 - 2. Panel skin rate of burning, ASTM D635: "HB" (horizontal burning), no combustion.
 - 3. Panel skin flame spread index, ASTM E84: 275 maximum.
- D. Hardware: The upper pivot shall consist of a V-cam capable of carrying a door weighing 200 pounds. Lift shall be 1-3/8 inches with gravity self-closing action. Door shall be adjustable back and forth and/or up and down.
- E. Gaskets: All gasket materials shall be factory applied and shall include wings to prevent accumulation of dirt. Gaskets shall be on leading edge, back and bottom of each door panel.

- F. Top and Hinge Seal Covers: Top seal shall be made of block reinforced nylon, with black anodized aluminum metal. Stainless steel screws shall be used for fastening to frame. Top and bottom hinge seal covers shall be field installed.
- G. Viewing Area:
 - 1. Per manufacturer's USPS approved construction.
- H. Fasteners: All fasteners and washers, including jamb fasteners shall be made of stainless steel.
- I. Black Spring Polyethylene Bumper/Kick Plate.
 - 1. At Carrier Vestibule: 38-inch-high bumpers on both sides of doors with no kickplate.
 - 2. At Mail Vestibule: 38-inch-high bumpers on both sides of doors with no kickplate.
- J. Steel Door Frames: Specified in Section 055000.
- K. Directional Signs. USPS standard design:
 - 1. Pictograph for enter. Apply to entry side of panels.
 - 2. Pictograph and "NO EXIT". Apply opposite to entry side of panels for doors providing entry to building.
 - 3. Pictograph and "NO ENTRY". Apply opposite to entry side of panels for doors providing exit from building.

2.3 SECURITY FEATURES

- A. In addition to the items specified above, the following features shall be included in the door units:
 - 1. Lower hinge guard.
 - 2. Cane bolts, minimum 5/8-inch round steel, 12 inches long from tip to elbow (upper) and 36 inches long from tip to elbow (lower).
 - 3. 2-inch chain hole with grommet.
 - 4. Dirt free retainer sleeves for each lower cane bolt, with a depth of at least 3 inches.
 - 5. Double glazed polycarbonate security windows with three (3) 1" x 1/4" vertical steel bars. The vertical bars extend from the top of the door to within 33" of the bottom of the door panel, with a maximum horizontal spacing of 7".

2.4 DOOR STOPS

- A. Overhead door stops, header mount with tabs and contact pads.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that openings are prepared with headers level, jambs plumb, floor level, without projections, and are correctly dimensioned to receive double action doors.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Install door unit assembly to manufacturer's published instructions and final shop drawings.
- B. Fit and align door assembly level and plumb.
- C. Use anchorage devices to securely fasten door assembly to door frame construction without distortion or imposed stresses.

3.3 ADJUSTING

- A. Adjust door assembly to provide smooth operation from closed to full open position.

3.4 CLEANING

- A. Section 017300 - Execution: Cleaning installed Work.
- B. Remove protective material from pre-finished surfaces.
- C. Remove labels and visible markings.
- D. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Wipe surfaces clean.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 8/29/18

SECTION 084113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum entrance doors.
 - 2. Door hardware for entrance doors.
 - 3. Perimeter sealant.
- B. Related Documents: The Contract Documents, as defined in Section 011000- Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 087100 - Door Hardware: Hardware for same, and coordination.
 - 2. Section 088000 - Glazing: Requirements for glazing.

1.2 REFERENCES

- A. Aluminum Association (AA):
 - 1. AA-M12 C22 A41.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 605.2.
 - 2. AAMA 701.2.
 - 3. AAMA - Curtain Wall Manual #10
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM B209.
 - 2. ASTM B221.
 - 3. ASTM A36/A36M.
 - 4. ASTM A386.

1.3 SYSTEM DESCRIPTION

- A. Aluminum entrances and storefront system includes tubular aluminum sections, shop fabricated, factory finished, glass and infill, related flashings, anchorage and attachment devices. System is to be glazed from the interior or exterior.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
 - 2. Shop Drawings:
 - a. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Special Warranty: Submit written special warranty with forms completed in United States Postal Service name and registered with manufacturer as specified in this Section.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Handle Products of this section in accordance with AAMA - Curtain Wall Manual #10.
- C. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 - 1. Install sealants and glazing only when temperature is 40 degrees F. or greater.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Energy Efficiency:
 - 1. Exterior framing system: Provide frame with thermal break for exterior framing systems; provide weather-stripping for doors in exterior frame.

1.9 WARRANTY

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Special Warranty:
 - 1. The manufacturer/installer shall warrant the product and installation to be free from defective material and workmanship for a period of two years after date of substantial completion, and shall replace or repair any defective component or system, in whole or part, as necessary to restore the product to its original intended state and integrity.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Kawneer Company, Incorporated, Atlanta, GA (770) 449-5555.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a. Amarlite Architectural Aluminum and Glass Co., Tamarac, FL (800) 691-5750.
 - b. EFCO Corporation; Monett, MO. (800) 221-4169.
 - c. Tubelite, Inc., Reed City, MI. (800) 846-2227.
 - d. U.S. Aluminum Corporation, Waxahachie, TX. (800) 627-6440.
 - e. Vistawall Architectural Products, Terrell, TX. (800) 869-4567.
 - 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Extruded Aluminum: ASTM B221.
- B. Sheet Aluminum: ASTM B209.
- C. Steel Sections: ASTM A36/A36M; shaped to suit mullion sections.
- D. Fasteners: Stainless steel.

2.3 ENTRANCE DOORS IN EXISTING STOREFRONT

- A. Doors: Series 350 swing door, medium stile, by Kawneer Company, Inc. Door sizes indicated on Drawings.
 - 1. Vertical Stile: 3-1/2 inch (88mm), single piece.
 - 2. Top Rail: 3-1/2 inch (88mm), single piece.
 - 3. Bottom Rail: 10 inch (250mm), single piece.
 - 4. Glazing: 1/4 inch (6mm) thick units per Section 088000, with standard bevel glass stops.
 - 5. Color: black and clear anodized, verify locations.

2.4 GLASS AND GLAZING MATERIALS

- A. Glazing Materials: As specified in Section 088000.

2.5 SEALANT MATERIALS

- A. Sealant and Backing Materials:
 - 1. Perimeter Sealant: Type as specified in Section 079200.
 - 2. Sealant Used Within System (Not Used for Glazing): Type as specified in Section 079200.

2.6 HARDWARE

- A. Verify hardware components specified in Section 087100.
- B. Closers: See Section 087100.
- C. Hinges: Door manufacturer's standard three pairs of butt hinges with non-removable pins. Finish: #14 Clear Anodized.
- D. Locking Devices: See Section 087100.

- E. Pulls: Type CO-9 pull, by Kawneer Company, Inc. Finish: #14 Clear Anodized.
- F. Exit Devices: See Section 087100.
- G. Weatherstripping, for Exterior Doors only:
 - 1. Head and Jamb: Replaceable wool, polypropylene, or nylon wool pile with aluminum strip backing, recessed in frame; AAMA 701.2.
 - 2. Sill: Semi-rigid polymeric material on aluminum anodized to match door; EPDM sweep strip; 38-560 by Kawneer or similar by other named manufacturers.
- H. Threshold: See Section 087100.

2.7 FINISHES

- A. Exposed Aluminum Surfaces: Architectural Class I anodic coating, AA-M12 C22 A41, #14 Clear, unless otherwise indicated on Drawings.
- B. Maintain same color range on doors, frames and other components. Do not mix light and dark shades.
- C. Concealed Steel Items: Galvanized in accordance with ASTM A386 to 2.0 oz/sq. ft.
- D. Apply two coats of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Install entrances in accordance with manufacturer's instructions.
- B. Set thresholds in bed of mastic and secure.
- C. Install hardware using templates provided. Refer to Section 087100 for installation requirements.
- D. Install glass in accordance with Section 088000.

3.3 ADJUSTING

- A. Section 017300 - Execution: Adjusting installed work.
- B. Adjust operating hardware [and sash] for smooth operation.

3.4 CLEANING

- A. Section 017300 - Execution: Cleaning installed work.
- B. Remove protective material from pre-finished aluminum surfaces.
- C. Wash down exposed surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- D. Remove excess sealant by method acceptable to sealant manufacturer.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 09/22/2015

SECTION 087100
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Finish Hardware items which are required for swing, sliding and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.
 - 2. Hinges.
 - 3. Locks and latches.
 - 4. Operating trim.
 - 5. Accessories for pairs of doors and exit devices.
 - 6. Closing devices.
 - 7. Door controls.
 - 8. Stops and holders.
 - 9. Miscellaneous hardware.
- B. Related Sections:
 - 1. Section 0811000 – Metal Doors and Frames
 - 2. Section 016000, Product Requirements.

1.2 REFERENCES

- A. American National Standards Institute (ANSI);
 - 1. ANSI A156.3 - National Standard for Exit devices.
 - 2. ANSI A156.4 - National Standard for Door Controls - Closers.
 - 3. ANSI A156.6 - National Standard for Architectural Door Trim.
 - 4. ANSI A156.13 - National Standard for Mortise Locks & Latches.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 80 - Fire Doors and Windows.
 - 2. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
 - 3. NFPA 252 - Fire Tests of Door Assemblies.
- C. Underwriters Laboratories (UL):
 - 1. UL 10B - Fire Tests of Door Assemblies.
 - 2. UL 305 - Panic Hardware.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
- B. Product Data: Submit manufacturers' technical product data for each item of hardware. Include whatever information may be necessary to show compliance with requirements and include instructions for installation and for maintenance of operating parts and finishes.
- C. Hardware Schedule: Submit final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.

1. Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - a. Type, style, function, size and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - h. Keying information.
 2. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- D. Samples: Prior to submittal of the final hardware schedule and prior to final ordering of finish hardware, submit one sample of each type of exposed hardware unit, as selected by the Contracting Officer, finished as required, and tagged with full description for coordination with schedule.
1. Samples will be returned to the supplier. Units which are acceptable and remain undamaged through submittal, review and field comparison procedures may, after final check of operation, be used in the work, within limitations of keying coordination requirements.
- E. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.
- F. Written Report: Before final inspection, a detailed written report shall be made to the Contracting Officer covering application and condition of the Finish Hardware.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with the following requirements:
1. ANSI A117.1
 2. NFPA 101.
 3. NFPA 80.
 4. NFPA 252.
 5. UL 10B.
 6. UL 305.
- B. Regulatory Requirements:
1. Conform to applicable code for requirements applicable to fire rated doors and frames.
 2. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., and acceptable to the public authority as suitable for the purpose specified and indicated.
 3. Conform to United States Postal Service "Standards for Facility Accessibility by the Physically Handicapped" Handbook RE-4 for mounting heights and locations of accessories.
- C. Manufacturer: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
- D. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware to similar projects for a period of not less than 2 years, and who employs an experienced architectural hardware consultant (AHC) who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements.

- E. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Within each Article in Part 2 hardware products from a few manufacturers are specified to establish a standard of quality and minimum functional requirements.
- B. All items of a particular hardware category i.e. locksets, closers, hinges shall be of the same manufacturer.

C. Hardware Manufacturers:

1.	Adams Rite / ASSA ABLOY, Phoenix, AZ	(800) 872-3267
2.	Alarm Lock Systems, Amityville, NY	(800) 252-5625
3.	Baldwin Hardware Corp., Reading, PA	(888) 592-2216
4.	Bommer, Landrum, SC	(800) 334-1654
5.	Best Access Systems, Indianapolis, IN	(800) 311-1705
6.	Corbin Russwin, Berlin, CT	(800) 543-3658
7.	Detex Corporation, New Brannfels, TX	(800) 729-3839
8.	Falcon/Dor-O-Matic, Harwood Heights, IL	(800) 815-1517
9.	Door Controls International, Dexter, MI	(800) 742-3634
10.	Folger Adam Company, Lemont, IL	(800) 260-9001
11.	Glynn-Johnson, Indianapolis, IN	(877) 613-8766
12.	Hager Companies, St. Louis, MO	(800) 255-3590
13.	Hiawatha, Inc., Bloomington, MN	(800) 777-1686
14.	H. B. Ives, Wallingford, CT	(888) 371-7331
15.	Knappe & Vogt Manufacturing Co., Grand Rapids, MI	(800) 253-1561
16.	LCN Closers, Princeton, IL	(800) 526-2400
17.	McKinney Hinge, Scranton, PA	(800) 346-7707
18.	National Guard Products, Incorporated, Memphis, TN	(800) 647-7874
19.	Norton, Charlotte, NC	(800) 393-1097
20.	NT Falcon, Brea, CA	(914) 632-9774
21.	NT Monarch, Shepherdsville, KY	(800) 826-5792
22.	PDQ Manufacturing, Leola, PA	(800) 441-9692
23.	Pemko, Ventura, CA	(800) 824-3018
24.	Precision Hardware, Romulus, MI	(317) 849-2250
25.	Reese Enterprises, Incorporated, Rosemount, MN	(800) 328-0953
26.	Rixson-Firemark, Franklin Park, IL	(866) 474-9766
27.	Rockwood Manufacturing, Rockwood, PA	(800) 458-2424
28.	Sargent, New Haven, CT	(800) 727-5477
29.	Sargent & Greenleaf, Nicholasville, KY	(800) 826-7652
30.	Schlage, Colorado Springs, CO	(800) 847-1864
31.	Securitech Group Incorporated, Maspeth, NY	(800) 622-5625
32.	Simplex Access Controls	(800) 746-7539
33.	Soss, Pioneer, OH	(800) 922-6957
34.	Stanley, New Britain, CT	(877) 334-6791
35.	Trimco, Los Angeles, CA	(323) 262-4191
36.	Von Duprin, Indianapolis, IN	(317) 613-8302
37.	Wooster Products Incorporated, Wooster, OH	(800) 321-4936
38.	Yale, Charlotte, NC	(800) 438-1951
39.	Zero International (Allegion), Indianapolis, IN	(877) 671-7011

- D. Section 016000 - Product Requirements: Unless noted otherwise, substitution of specified products with equivalent products from the above approved manufacturers is permitted in accordance with Product Options and Substitutions in Section 016000.

2.2 HINGES

- A. Subject to compliance with requirements, provide hinges of one of the following manufacturers and as specified below:
1. Hager.
 2. McKinney.
 3. Stanley.
 4. Soss.
- B. Material:
1. For interior doors, provide full mortise-type steel hinges with steel pins; non-rising for non-security exposure, flat button with matching plugs.
 2. For exterior doors, provide full mortise-type stainless steel hinges with stainless steel pins; non-removable, flat button with matching plugs.
 3. Ball-bearing Type: Swaged, inner leaf beveled, square corners.
- C. Hinges/pivots by types:
1. Type H-1: Medium weight door, average frequency, steel.

a.	Hinge	FBB179	4-1/2 x 4-1/2	652	Stanley
b.	Hinge	BB1279	4-1/2 x 4-1/2	652	Hager
c.	Hinge	TB2714	4-1/2 x 4-1/2	652	McKinney
 2. Type H-2: Medium weight door, average frequency, steel, non-removable pins. Hinges on interior doors shall be satin chrome plated finish 652. Hinges on exterior doors shall be completely stainless-steel finish 630.

a.	Hinge	FBB179	4-1/2 x 4-1/2 NRP	652	Stanley
b.	Hinge	BB1279	4-1/2 x 4-1/2 NRP	652	Hager
c.	Hinge	TB2714	4-1/2 x 4-1/2 NRP	652	McKinney
 3. Type H-3: Concealed, medium weight door, average frequency, steel.

a.	Hinge	216		626	Soss
----	-------	-----	--	-----	------
 4. Type H-4: Medium weight door, average frequency, steel. (Continuous Piano hinge)

a.	Hinge	STS314 1/4		626	Stanley
----	-------	------------	--	-----	---------
 5. Type H-5: Medium weight door, average frequency, steel, 5-inch high, non-removable pins. Hinges on interior doors shall be satin chrome plated finish 652. Hinges on exterior doors shall be completely stainless-steel finish 630.

a.	Hinge	FBB179	4-1/2 x 5 NRP	652	Stanley
b.	Hinge	BB1279	4-1/2 x 5 NRP	652	Hager
c.	Hinge	TB2714	4-1/2 x 5 NRP	652	McKinney

2.3 LOCKS, LATCHES, AND BOLTS

- A. Subject to compliance with requirements, provide locks, latches and bolts of one of the following manufacturers and as specified below:
1. Best.
 2. Corbin Russwin.
 3. Sargent.
 4. Schlage.
 5. Yale.
- B. Materials:

1. Mortise Locks: ANSI A156.13, Grade 1, equipped with 6-pin tumbler. Provide 2-3/4-inch backset. Provide three keys per cylinder.
2. Latch Sets: Provide release by turning lever, closing door, or turning emergency release key through hole in outside knob.
3. Strikes: ANSI Strikes, 1-1/4 x 4-7/8 inches, with curved lip. Wrought box strikes, with extended lip for latch bolts, except open strike plates may be used in wood frames. Provide dustproof strikes for foot bolts.
4. Tactile Warning: Provide lever handles with manufacturer's standard tactile warning per handicapped codes when required by local authority.

C. Keying

1. General:
 - a. Incorporate a security system to ensure that keys used during construction do not open doors after United States Postal Service occupancy.
 - b. Key side of locks shall be on the public side.
 - c. Master and submaster key system shall conform to United States Postal Service criteria. Doors at exterior of facility, from public area to workroom, and Stamped Envelope Storage areas shall not be on the master/submaster keying schedule. Other areas, based on need or local preference, may be excluded from master/submaster keying schedule.
2. Construction Keying:
 - a. Furnish exterior door lock sets with keyed alike removable construction core cylinders for use during construction.
 - b. Restrict distribution of construction keys. Maintain record of persons who have received keys and deliver copies of record to Contracting Officer upon request.
 - c. Provide permanent cores to Postmaster prior to substantial completion. Postmaster shall store them securely until needed. At substantial completion and at Contracting Officer direction, remove construction cores and replace with permanent cores in presence of Postmaster. Provide keys to Postmaster and return construction cores to manufacturer.
3. Permanent Keying:
 - a. Master locks and cylinders are to match the United States Postal Service existing keying system if a system exists.
 - b. Master to open all doors, except entrance doors to facility, doors from public area to workroom, and Stamped Envelope Storage shall not be on any master key system.

D. Cylinders and Thumbturns by types:

- | | | | | |
|----|-----------------------------|-------------------------|-----|----------------|
| 1. | Type B-1: Rim Cylinder. | | | |
| a. | Cylinder | 1109 | 626 | Yale |
| b. | Cylinder | 20-022 | 626 | Schlage |
| c. | Cylinder | 3000-200 | 626 | Corbin Russwin |
| 2. | Type B-2: Mortise Cylinder. | | | |
| a. | Cylinder | 2153 w/ 1161 series cam | 626 | Yale |
| b. | Cylinder | 20-013 | 626 | Schlage |
| c. | Cylinder | 1000-A03 | 626 | Corbin Russwin |
| 3. | Type B-3: Cylinder Guard | | | |
| a. | Cylinder Guard | MS4043 | 630 | Adams Rite |

E. Locks and Latches by types:

- | | | | | |
|----|------------------------------|----------------------------------|-----|----------------|
| 1. | Type L-1 | Hotel Lock (similar to ANSI F15) | | |
| a. | AUR 8832FL w/security collar | | 626 | Yale |
| b. | ML2029 NSA w/security collar | | 626 | Corbin Russwin |
| c. | L9485P-06 w/security collar | | 626 | Schlage |
| 2. | Type L-2 | Classroom Lock (ANSI F84) | | |
| a. | AU 5408LN | | 626 | Yale |

	b.	CL 3555	626	Corbin Russwin
	c.	ND70PD	626	Schlage
3.		Type L-3 Entrance Lock (ANSI F20)		
	a.	AUR 8847FL w/security collar	626	Yale
	b.	ML2067 w/ security collar	626	Corbin Russwin
	c.	L9453P-06A w/ security collar	626	Schlage
4.		Type L-4 Storeroom Lock (ANSI F86)		
	a.	AU 5405LN	626	Yale
	b.	CL3557	626	Corbin Russwin
	c.	ND80PD	626	Schlage
5.		Type L-5 Privacy Lock (ANSI F76)		
	a.	AU 5402LN	626	Yale
	b.	CL3520	626	Corbin Russwin
	c.	ND40S	626	Schlage
6.		Type L-6 Closet Deadbolt (ANSI E2151)		
	a.	3611B	626	Yale
	b.	470	626	Sargent
7.		Type L-7 Passage		
	a.	AU 5401LN (F75)	626	Yale
	b.	CL3510	626	Corbin Russwin
	c.	ND10S	626	Schlage
8.		Type L-8 Entrance cypher lockset		
	a.	Simplex 8148 mortise with deadbolt	626	

2.4 PUSH/PULL UNITS

A. Pulls and Pushes Manufacturers: Subject to compliance with requirements, provide from one of the following manufacturers as specified below.

1. H. B. Ives.
2. Trimco.
3. Rockwood.
4. Baldwin.
5. Adams Rite

B. Materials: ANSI A156.6 for 0.050-inch thickness.

C. Push and Pulls by types:

- | | | | |
|----|---------------------------------------|-----------------|----------------|
| 1. | Type P-1: Push 4-inch x 16 inch. | | |
| | a. | 1001-3 | 630 Trimco |
| | b. | 70C | 630 Rockwood |
| 2. | Type P-2 Pull: 4-inch x 16 inch. | | |
| | a. | 1010-3 | 630 Trimco |
| | b. | 132 x 70C | 630 Rockwood |
| 3. | Type P-3 Pull: 2.75-inch x 11.5 inch. | | |
| | a. | 3001 fixed pull | 629 Adams Rite |

2.5 EXIT DEVICES

A. Exit Devices: Subject to compliance with requirements, provide exit devices of one of the following manufacturers and as specified below.

1. Corbin Russwin.
2. Yale.

3. Von Duprin.
4. Adams Rite.
5. Jackson Exit Device.
6. Monarch.
7. Sargent.
8. Securitex Group Inc.

B. Exit Only Door Alarms:

1. SDA103

SECURITECH

C. Materials:

1. Provide exposed metal to match hardware.
2. Size and mount units indicated or, if not indicated, to comply with manufacturer's recommendations for exposure condition. Reinforce substrate as recommended.

D. Exit Devices by types:

- | | | | |
|----|---|-----|------------|
| 1. | Type E-1: Exit Device (F01) (for wood and metal doors) | | |
| a. | 8700 w/ security interlock nose guard/strike | 628 | Adams Rite |
| 2. | Type E-2: Exit Device (F04) (for narrow stile rim for aluminum doors) | | |
| a. | 8800 x cyl. dog w/ security interlock nose guard/strike | 630 | Adams Rite |
| 3. | Type E-3: Exit Device (F03) (for wood and metal doors) | | |
| a. | 8700 x cyl. dog w/ security interlock nose guard/strike | 628 | Adams Rite |

2.6 CLOSERS

A. Closers: Subject to compliance with requirements, provide closers of one of the following manufacturers and as specified below.

1. LCN.
2. Norton.
3. Yale.

B. Materials & Features:

1. ANSI A156.4, Grade 1.
2. ADA/ANSI A117.1
3. U.L. listed. Provide closers for fire rated openings in compliance with NFPA 80, NFPA 101, and local building codes.
4. Non-Sized; adjustable 1 to 5 pounds.
5. 180-degree door opening.
6. Heavy Duty parallel arm.
7. Standard Cover.
8. Provide exposed metal to match hardware.
9. Mounting: Mount closers as follows unless indicated otherwise:
 - a. Interior side of exterior doors.
 - b. Opposite side of public side.
 - c. Workroom side of doors leading to or from the Workroom.
 - d. Room side of corridor doors.
10. Size and mount units indicated or, if not indicated, to comply with manufacturer's recommendations for exposure condition. Reinforce substrate as recommended.
11. Closers to be installed to allow door swing as shown on drawings.

C. Closers by types:

- | | | | |
|----|-----------|-----|--------|
| 1. | Type C-1: | | |
| a. | 4011 | 689 | LCN |
| b. | P7500 | 689 | Norton |
| c. | 4400 | 689 | Yale |

- | | | | |
|----|-------------------------|-----|--------|
| 2. | Type C-2: Parallel arm. | | |
| a. | 4111 | 689 | LCN |
| b. | P7500 | 689 | Norton |
| c. | 4400 | 689 | Yale |

2.7 STOPS, HOLDERS AND BUMPERS

- A. Stop and Holder, Floor and Wall Stop, and Bumper Manufacturers: Subject to compliance with requirements, provide from one of the following manufacturers as specified below.
1. H. B. Ives.
 2. Quality Hardware Manufacturing Co., Inc.
 3. Trimco.
 4. Dor-O-Matic.
 5. Glenn-Johnson.
- B. Materials:
1. Door stop mounting: Methods to suit substrates encountered (plastic anchor, drywall anchor, expansion shield).
 2. Provide grey rubber exposed resilient parts.
 3. Do not furnish aluminum floor stops.
 4. Where a door stop is specified in the Hardware Schedule, provide a wall stop type (S-1). However, if circumstances prevent a wall stop installation (door too far from perpendicular wall, door swing into adjacent glass, etc.) then substitute a type (S-2) or (S-3) floor stop as indicated for use intended.
 5. Adjust height of floor stops to suit undercut of adjacent door.
- C. D. Stops, Holders and Bumpers by types:
1. Type S-1: Wall Stop - Install with appropriate anchors for substrate encountered.

a.	1270W	630	Trimco
b.	407 1/2C	630	Ives
 2. Type S-2: Floor Stop - Install with appropriate anchors for substrate encountered.

a.	1201	626	Trimco
b.	FS444	626	Ives
 3. Type S-3: Floor Stop - Install with appropriate anchors for substrate encountered.

a.	W1211	630	Trimco
b.	FS436	630	Ives
c.	331ES	630	Quality

2.8 THRESHOLDS

- A. Threshold Manufacturers: Subject to compliance with requirements, provide from one of the following manufacturers as specified below.
1. Pemko.
 2. National Guard.
 3. Reese.
 4. Zero.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Thresholds by types:
1. Type T-2:
Saddle threshold for floor finish at doors (either VCT to VCT or VCT to tile or sealed concrete.)
 - a. VCT to VCT

	154	628	Pemko
	HD5A	628	Reese
	425E	628	National
b.	VCT to Tile/Concrete		
	158	628	Pemko
	S514A	628	Reese
	653	628	National
2.	Type T-3 (with weather seal):		
a.	S483AV	628	Reese
b.	2005AT	628	Pemko
c.	896V	628	National

2.9 WEATHERSTRIPPING

- A. Weatherstripping Manufacturers: Subject to compliance with requirements, provide from one of the following manufacturers as specified below.
1. Pemko.
 2. Reese.
 3. Zero.
 4. National Guard.
- B. Weatherstripping by types:
1. Type W-1: Door Gaskets.
 - a. 807A Reese

2.10 MISCELLANEOUS HARDWARE

- A. Miscellaneous Hardware Manufacturers: Subject to compliance with requirements, provide from the manufacturers specified below.
- B. Provide door silencers for all doors unless indicated otherwise.
- C. Miscellaneous Hardware by types:
1. Type M-1: Acoustical Perimeter Door Seal
 - a. 105NA 628 National
 2. Type M-2: Dead Lock, (ANSI E0191) - w/ No exposed trim on lobby side.
 - a. 3300 Series 630 Yale
 3. Type M-3: Security Viewer. Mounted/installed, centered at 5'-0" AFF.
 - a. 1756 630 Hager
 4. Type M-4: Astragal
 - a. 184A 628 Reese
 5. Type M-5: Silencers
 - a. 1229A Gray Trimco
 - b. SR64 Ives
 6. Type M-6: Flushbolts
 - a. 3917 626 Trimco
 - b. 555 626 Rockwood
 7. Type M-7: Astragal
 - a. 276C 628 Reese
 8. Type M-8: Kick Plates
 - a. K0050 8 x 34 630 Trimco
 - b. KP18 8 x 34 630 Rockwood
 9. Type M-9: Armor Plate; 40" H x 46" W (both sides of door) 630
 10. Type M-10: Emergency Exit Alarm w/ Contacts: 630

- a. SDA103 SGI
 - 1) Provide concealed door contacts and a separate alarm unit. Alarm will have local 120 db (min) audible alarm and a visual alarm (strobe light) operated on 24VDC fed from a local card reader interface module (where ePACS is provided) or 24VDC from independent power supply and must have a backup battery which will power the alarm for one hour in the event of a loss of power, and to continually charge the battery. Battery operated door or panic bar mounted alarms are not allowed.
 - 2) Alarm to be located directly above the door 10 ft. above the finished floor. Provide door sign indicating alarm will sound when opened and labeled, "EMERGENCY EXIT ONLY - RE-ENTRY PROHIBITED".
- 11. Type M-11: Reinforcing Pivot Hinges
 - a. 253 652 Hager
- 12. Type M-12: Bumper (Install on push side of door at same height as lockset, in line with lever handle of lockset and approximately 2 inches away from the handle.)
 - a. 170-19 630 Bommer
- 13. Type M-13: Door Bottom Shoe
 - a. DES-3C, 1 1/4" x 1 3/4" width 630 Hiawatha

2.11 FABRICATION

- A. Finish and Base Material Designations: Number indicate BHMA Code or nearest traditional U.S. commercial finish.
- B. Where base material and quality of finish are not otherwise indicated, provide at least commercially recognized quality specified in applicable Federal Specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that doors and frames are ready to receive Work and dimensions are as instructed by the manufacturer.
 - 2. Verify that electric power is available to power operated devices and of the correct characteristics.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Where not specified under other sections to be performed by manufacturer or suppliers, machine, fit and drill wood and metal doors.
- B. Prepare doors of various types to receive hardware, using templates and instructions provided with the hardware items for jobsite work.

- C. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Contracting Officer.
 - 1. Conform to requirements United States Postal Service "Standards for Facility Accessibility by the Physically Handicapped" Handbook RE-4.
- D. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.
- E. Installer of security hardware is to be trained and familiar with product.
- F. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- G. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- H. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.

3.3 ADJUSTING

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work 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.
- D. Instruct United States Postal Service Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area, the Installer, accompanied by the representative of the latch and lock manufacturer, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware. Consult with and instruct United States Postal Service personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.4 HARDWARE SCHEDULE

- A. General requirements, see respective paragraphs above for details:
 - 1. Ensure that keys used during construction cannot open doors after United States Postal Service occupancy.
 - 2. Provide door silencers for all doors unless indicated otherwise.

SET 1

CSF Small 15-30: Exterior storefront
CSF Small 25-100A Box Lobby exit
Each set to have:

1 ea. (B-3) Cylinder Guard
1 ea. Removable Mullion
1 ea. (T-3) Threshold
2 ea. Closer

Existing aluminum storefront entry door.

SET 1 A

CSF Small 15-30: Time Lock Lobby Exterior Entry
Each set to have:

1 ea. (E-5) Time Lock Exit Device System
1 ea. (B-1) Rim Cylinder
1 ea. (B-3) Cylinder Guard
1 ea. (T-3) Threshold
1 ea. Closer

All other hardware is furnished by Storefront supplier as specified in Section 084113.

SET 2

Not Used

SET 3 not used

Automatic Storefront Doors
Provide final cylinder cores. Coordinate with Section 084229.

All other hardware is furnished by Automatic Entrance Door supplier as specified in Section 084229.

SET 4

Workroom to Box Lobby
Each set to have:

3 ea. (H-2) Hinges
1 ea. (L-1) Hotel Lock (Similar to F15)
1 ea. (T-2) Threshold
1 ea. (M-3) Security Viewer
1 ea. (M-13) Door Bottom Shoe
1 ea. Door Stop
1 ea. Closer

SET 5

Toilet - single occupancy

Each set to have:

3 ea.	(H-1)	Hinges
1 ea.	(L-5)	Privacy Lock (F76)
1 ea.	(T-1)	Threshold
1 ea.		Door Stop
1 ea.		Closer

SET 6

Toilet - multiple occupancy

Each set to have:

3 ea.	(H-1)	Hinges
1 ea.	(P-1)	Push
1 ea.	(P-2)	Pull
1 ea.	(M-8)	Kick Plate
1 ea.		Door Stop
1 ea.		Closer

SET 7

CSF Small 15-30: Mail and Carrier Vestibules to Exterior and to Workroom

Each set to have:

3 ea.	(H-5)	Hinges (5-inch)
1 ea.	(L-8)	Mechanical Pushbutton Lock with deadbolt
1 ea.	(T-2)	Threshold
1 set	(W-1)	Door Gaskets
2 ea.	(M-9)	Armor Plate
1 ea.	(M-11)	Reinforcing Pivot Hinge
1 ea.	(M-12)	Bumper
1 ea.	(M-13)	Door Bottom Shoe
1 ea.		Door Stop (interior door only)
1 ea.		Closer

Peep hole at door type G

SET 8

Mail Vestibule Personnel to Workroom and to Exterior (if <20 employees)

Carrier Vestibule Personnel to Exterior

Enclosed Platform: Carrier Vestibule Personnel to Exterior

Building and Grounds Room (single door)

Each set to have:

3 ea.	(H-2)	Hinges
1 ea.	(L-3)	Entrance Lock (ANSI F20)
1 ea.		Door Stop (interior doors only)
1 ea.		Closer

SET 9

Mail Vestibule Personnel to Workroom and to Exterior (if >=20 employees)

Each set to have:

3 ea.	(H-2)	Hinges
1 ea.	(E-4M)	Access Control Device (buildings 6,500 SF or less, only)
	(E-4EM)	Access Control Device (includes 1 electric hinge)
1 ea.	(T-2)	Threshold
1 ea.	(M-13)	Door Bottom Shoe
1 ea.		Door Stop
1 ea.		Closer

SET 10

Mail and Carrier Vestibule Impact Doors

All hardware furnished by Impact Door supplier as specified in Section 083800.

SET 11

SSDB 15-20: Mechanical Room to Mail Vestibule

Office Door to Retail Lobby (public)

Telephone Equipment Room to Workroom

Stamped Envelopes to Workroom

Each set to have:

3 ea.	(H-2)	Hinges
1 ea.	(L-1)	Hotel Lock (Similar to F15)
1 ea.	(T-2)	Threshold
1 ea.	(M-13)	Door Bottom Shoe
1 ea.		Door Stop
1 ea.		Closer

SET 12

Storage/Janitor's Closet to Workroom

Storage Room to Workroom

Mechanical Room to Workroom

Each set to have:

3 ea.	(H-1)	Hinges
1 ea.	(L-4)	Storeroom Lock (F86)
1 ea.		Door Stop
1 ea.		Closer

SET 13

Office to Workroom

Work Area to Office

Janitor's Closet to Workroom

Each set to have:

3 ea.	(H-1)	Hinges
1 ea.	(L-2)	Classroom Lock (F84)
1 ea.		Door Stop
1 ea.		Closer

SET 14

Folding Closure Pocket

CSF Small Plans

Each set to have:

- 4 ea. (H-3) Hinges
- 1 ea. (L-6) Closet Deadbolt

SET 15

Folding Closure

CSF Small Plans

Each set to have:

- 2 ea. (B-2) Rim Cylinder

All other hardware furnished by Door Supplier.

SET 16

CSF Small "A" Plans: Wicket door

Each set to have:

Door:

- 3 ea. (H-1) Hinges
- 1 ea. (L-4) Storeroom Lock (F86)
- 1 ea. (T-2) Threshold
- 1 ea. Door Stop
- 1 ea. Closer

Wicket Panel:

- 1 ea. (H-4) Continuous Piano Hinge
- 1 ea. (M-2) Deadlock (ANSI E0191)
- 1 ea. (M-3) Security Viewer
- 1 ea. (M-4) Astragal

SET 17

Wicket Door

Each set to have:

Door:

- 3 ea. (H-2) Hinges
- 1 ea. (L-1) Hotel Lock (Similar to F15)
- 1 ea. (T-2) Threshold
- 1 ea. (M-13) Door Bottom Shoe
- 1 ea. Door Stop
- 1 ea. Closer

Wicket Panel:

- 1 ea. (H-4) Continuous Piano Hinge
- 1 ea. (M-2) Deadlock (ANSI E0191)
- 1 ea. (M-3) Security Viewer
- 1 ea. (M-4) Astragal

SET 18

Mail Platform Sectional Overhead Door: All hardware furnished by Sectional Overhead Door supplier as specified in Section 083613.

SET 19

CIO to Workroom

Each set to have:

- 3 ea. (H-2) Hinges
- 1 ea. (L-1) Hotel Lock (Similar to F15), Note: the lock must be the specified model from Yale, substitutions are not permitted.
- 1 ea. Cylinder, USPS Furnished (PSIN# 0931A0), Contractor Installed
- 1 ea. (T-3) Threshold
- 1 ea. (M-13) Door Bottom Shoe
- 1 ea. (M-1) Acoustical perimeter seal
- 1 ea. Door Stop
- 1 ea. Closer

SET 20

CIO Covert Entry to Exterior

Each set to have:

- 3 ea. (H-2) Hinges w/ NRP
- 1 ea. (L-1) Hotel Lock (Similar to F15), Note: the lock must be the specified model from Yale, substitutions are not permitted.
- 1 ea. Cylinder, USPS Furnished (PSIN#091SP), Contractor Installed
- 1 ea. (T-3) Threshold
- 1 set (W-1) Door Gaskets
- 1 ea. (M-3) Security Viewer
- 1 ea. (M-13) Door Bottom Shoe
- 1 ea. Door Stop
- 1 ea. Closer

SET 21

Electrical to Exterior
Recycling to Exterior
Each set to have:

3 ea.	(H-2)	Hinges
1 ea.	(L-1)	Hotel Lock (Similar to F15)
1 ea.	(T-3)	Threshold
1 set	(W-1)	Door Gaskets
1 ea.		Closer

SET 22

Admin to Exterior Exit
Each set to have:

3 ea.	(H-2)	Hinges
1 ea.	(E-1)	Exit Device
1 ea.	(T-3)	Threshold
1 ea.		Closer

SET 23

Workroom to Exterior Exit
Each set to have:

1 ea.	(M-10)	Alarm System
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SET 24

Enclosed Platform to Exterior (double-doors)
Building and Grounds Room (double-doors)
Each set to have:

6 ea.	(H-2)	Hinges
1 ea.	(L-1)	Hotel Lock (Similar to F15)
1 ea.	(T-3)	Threshold
1 set	(W-1)	Door Gaskets
1 ea.	(M-6)	Flushbolts
1 ea.	(M-7)	Astragal
2 ea.	(S-1)	Door Stop
1 ea.		Closer

SET 29

Lunch room to Workroom

3 ea.	(H-1)	Hinges
1 ea.	(L-7)	Passage Set
1 ea.		Door Stop
1 ea.		Closer

END OF SECTION

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SECTION 088000

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Clear tempered glass.
 - 2. Insulated glass units with security film, low E.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 084113 - Aluminum-Framed Entrances: Glazed doors.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
 - 2. ASTM C1036 - Standard Specification for Flat Glass.
 - 3. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
 - 4. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.
 - 5. ASTM F1233 - Standard Test Method for Security Glazing Materials and Systems.
- C. Consumer Product Safety Standards for Architectural Glazing. CPSC 16 CFR, Part 1201.
- D. Flat Glass Marketing Association (FGMA):
 - 1. FGMA - Glazing Manual and Glazing Sealing Systems Manual.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Glass: Structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
 - b. Glazing compound: Provide chemical, functional, and environmental characteristics, limitations, special application requirements.
 - 2. Samples:
 - a. Glazing: Submit one sample 12 x 12 inches (300 x 300 mm) in size of each type of glazing, illustrating tinting, and finish of glazing materials. Label each sample indicating kind, quality and manufacturer.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.

- b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 – Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Submit written special warranty with forms completed in United States Postal Service name and registered with manufacturer as specified in this section.

1.4 QUALITY ASSURANCE

- A. Identification: Each unit of tempered glass and burglar resistant glazing shall be permanently identified by the manufacturer. The identification shall be etched or ceramic fired on the glass and be visible when the unit is glazed.
- B. Provide Energy Star Label on glazing indicating compliance with DOE Energy Star requirements.
- C. Perform Work in accordance with FGMA Glazing Manual.
- D. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Do not install glazing when ambient temperature is less than 40 degrees F.
 - 2. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Special Warranty:
 - 1. Include coverage for cracking, breakage, and replacement of same.
 - a. Warranty Period: 1 year.
 - 2. Include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.
 - a. Warranty Period: 10 years.
 - 3. Include coverage for delamination of laminated glass and replacement of same.
 - a. Warranty Period: 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Pilkington, Toledo, OH (800)221-0444.
 - 2. PPG Industries, Pittsburgh, PA (412) 434-2858 (800) 377-5267.
 - 3. Viracon, Owatonna, MN (800) 533-2080.
- B. Subject to compliance with project requirements, manufacturers offering polycarbonate products which may be incorporated in the Work include the following:
 - 1. Sheffield Plastics, Incorporated Sheffield, MA (413) 229-8711 (800) 628-5084.
 - 2. GE Plastics, Pittsfield, MA (800) 451-3147.
- C. Subject to compliance with project requirements, manufacturers offering security film products which may be incorporated in the Work include the following:
 - 1. 3M, St. Paul, MN (800) 480-1704.
- D. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 GLASS MATERIALS

- A. Glass Type 2 - Insulated Tempered Glass Units, Low E: Double pane units with inner pane of clear tempered glass with security film and outer pane of tinted tempered glass.
 - 1. Glass Thickness, Inner: 1/4 inch (6 mm).
 - 2. Glass Thickness, Outer: 1/4 inch (6 mm).
 - 3. Unit Thickness: 1 inch (25 mm) thick units. 1/4 inch (6 mm) thick, clear inner pane. 1/4 inch (6 mm) thick, tinted outer pane. 1/2 inch (12 mm) air space between panes.
- B. Security film on existing glazing - Conform to ANSI Z97.1 and CPSC 16CFR Part 1201. Security film of a minimum 0.007 inch (0.1778 mm) on the inner side of panel.
 - 1. Thickness: 1/4 inch (6 mm), unless indicated otherwise.

2.3 GLAZING COMPOUNDS

- A. Polysulphide Sealant: Two component, chemical curing, non-sagging type; cured Shore A hardness of 15-25.
- B. Silicone Sealant: Single component, chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining; cured Shore A hardness of 15-25.
 - 1. Color: Clear.
- C. Acrylic terpolymer compounded especially for glazing; non-hardening, non-staining, and non-bleeding.

2.4 GLAZING ACCESSORIES

- A. Setting Blocks: Resilient blocks of 70 to 90 Shore A durometer hardness; compatible with glazing sealant.
- B. Spacers: Resilient blocks of 40 to 50 Shore A durometer hardness; self adhesive on one side; compatible with glazing sealant.
- C. Filler Rods: Closed cell or jacketed foam rods of polyethylene, butyl, neoprene, polyurethane, or vinyl; compatible with glazing sealant.
- D. Joint Cleaners, Primers, and Sealers: As recommended by glazing sealant manufacturer.

- E. Gaskets: ASTM D2000, SBC 415 to 3BC 620; extruded or molded neoprene or EPDM, black.
- F. Mastic: Non-solvent type adhesive as recommended by mirrored glass manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that openings for glazing are correctly sized and within tolerance.
 - 2. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.

3.3 GLAZING

- A. Locate setting blocks at quarter points of sill; set in sealant if heel or toe bead is required.
- B. Install spacers inside and out except where preshimmed tape or glazing gaskets are to be used.
- C. Set each piece in a series to other pieces in pattern draw, bow, or other visually perceptible characteristics.
- D. Provide glazing sealants and gaskets as required for particular glazing application. Coordinate with other Sections for material compatibility.
- E. Gaskets:
 - 1. Provide adequate anchorage, particularly for driven-in wedge gaskets.
 - 2. Miter and weld ends of channel gaskets at corners to provide continuous gaskets.
 - 3. Seal face gaskets at corners with sealant to close opening and prevent withdrawal of gaskets from corners.

- F. Do not leave voids in glazing channels except as specifically indicated or recommended by glass manufacturer. Force sealant into channel to eliminate voids. Tool exposed surfaces to slight wash away from joint. Trim and clean promptly.
- G. Do not allow sealant to close weeps of aluminum framing.
- H. Provide filler rod where sealants are used in the following locations:
 - 1. Head and jamb channels.
 - 2. Colored glass over 75 united inches in size.
 - 3. Clear glass over 125 united inches in size.

3.4 CONSTRUCTION

- A. Interface with Other Work: Coordinate glazing with installation of entrances and storefronts specified in Section 084113.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect preparation and installation of glass.

3.6 CLEANING

- A. Section 017300 - Execution: Cleaning installed work.
- B. Remove glazing materials from finish surfaces.
- C. Remove labels after Work is complete.
- D. Clean glass and adjacent surfaces.

3.7 PROTECTION

- A. Section 017300 - Executions: Protecting installed work.
- B. After installation, mark pane with an 'X' by using removable plastic tape or paste. Do not mark reflective glass units.

END OF SECTION

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SECTION 092400

STUCCO

PART 1 GENERAL

1.1 SUMMARY

- A. Provisions of the Bidding Requirements, Conditions of the Contract and Division 1 apply to all Sections of this Project Manual. Refer to Table of Contents for complete list of Bidding Requirements, Conditions, and Sections included in the Project Manual.
- B. Work Included in this Section: Work included under this section of the specification for lathing, plastering, and finishing. The contractor shall provide all labor, materials and equipment necessary to complete patching as shown on the drawings and/or described herein.
- C. Related Work in Other Sections:
 - 02 41 19 Demolition
 - 06 10 00 Rough Carpentry
 - 07 60 00 Flashing and Sheet Metal
 - 07 92 00 Sealants
 - 09 91 00 Paint Finish

1.2 GENERAL REQUIREMENTS/REFERENCE STANDARDS:

- A. Compliance with standards and industry specifications whichever is more stringent:
- B. Northwest Wall & Ceiling Bureau (NWCB) standards (206) 524-4243
- C. The Northwest Wall and Ceiling Bureau "*Stucco Resource Guide*" ASTM: C1063 - Installation of Lathing and Furring for Portland Cement Plaster
- D. ASTM C926 - Application of Portland Cement Plaster
- E. Where products are specified they shall be installed in accordance with local building codes and/or manufacturers recommendations.

1.3 CONTRACTOR QUALIFICATIONS:

- A. Single Source Responsibility: Except where specified otherwise, obtain plaster materials from a single manufacturer or from manufacturers recommended by prime manufacturer of portland cement plaster.
- B. Installer Qualifications: Company specializing in portland cement plaster work having minimum of 5 years successful documented experience with work comparable to that indicated and specified.
- C. Applicator/contractor must be qualified in the workmanship of lathing and plastering and a member of the NWCB. Applicator must be approved by Architect.

1.4 SUBMITTALS:

- A. Applicator/contractor shall be prepared and may be required to supply samples.
- B. Product Data: Submit in accordance with requirements of Section 01 33 00. Provide manufacturer's published literature showing conformance to specification for all materials, and test data showing conformance of rated assemblies.

- C. Shop Drawings: Submit in accordance with requirements of Section 01 33 00. Show details of ceiling suspension, location of control joints, and coordination with other work including location and installation of hangers for acoustical treatment.
 - D. Mock Up: Provide 3 samples of textured mock up for approval by Owner and Architect prior to beginning finish work. Modify samples until acceptable to Owner and Architect.
 - E. Safety Data Sheets (SDS): Provide SDS (or MSDS) for all products to be used.
- 1.5 QUALITY CONTROL:
- A. Attend a pre-construction meeting.
 - B. Applicator/contractor shall be prepared for third party inspections by qualified persons or agency.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Comply with requirements of Section 01 60 00.
 - B. Deliver materials in manufacturer's unopened containers, fully identified with name, brand, type and grade.
 - C. Protect plaster materials from contamination and dampness until used. Store in dry, ventilated space, off ground.
- 1.7 ENVIRONMENTAL CONDITIONS:
- A. Protect all material from freezing. Do not apply materials to frozen surfaces. Moist cure cement if required to insure a proper cure. Do not attempt work in unsatisfactory environmental conditions.
 - B. Comply with requirements of NWCB *Stucco Resource Guide* and recommendations of plaster manufacturer for environmental conditions before, during, and after application of plaster.
 - C. Cold Weather Requirements:
 - 1. Do not use frozen materials in plaster mixes.
 - 2. Do not apply plaster to base which is wet, frozen or which contains frost.
 - 3. When ambient temperature is 40 degrees F and falling, heat materials and furnish heated enclosure for at least 24 hours after plastering in accordance with PCA recommendations.
 - D. Hot Weather Requirements:
 - 1. Comply with PCA recommendations.
 - 2. Protect plaster from uneven and excessive evaporation during hot, dry weather.

PART 2 - PRODUCTS

2.1 WEATHER-RESISTIVE MEMBRANE

- A. See section 07 27 00 for Self Adhered Air Barriers.

2.2 LATH: GALVANIZED (SELF FURRING)

- A. Expanded metal lath (2.5 lb/yd or 3.4 lb/yd)
- B. Accessories: casing beads, channel reveals, control joints, expansion joints to match existing in style, material and ground thickness.
- C. Window head flashings: As detailed per Section 07 60 00.

2.3 SELF-ADHESIVE FLASHING

- A. 40-mil thick self-adhesive modified asphalt flashing sheet with an HPDE backing:
- B. Manufacturer:
 - 1. SAF from the same manufacture as section 07 27 00 Self Adhered Air Barriers
 - 2. WR Grace, "Vycor V40 Weather Barrier Strips" (if deemed compatible with section 07 27 00)
 - 3. Or Approved Equal

2.4 PLASTER:

- A. Portland cement: ASTM C150 Type I/II
- B. Portland cement ASTM C618 Type IP
- C. Masonry cement ASTM C 91
- D. Lime ASTM C206 Type S
- E. Sand: ASTM C144 or C897 "washed" plaster or masonry sand
- F. Fibers ASTM C 1116: glass, nylon or polypropylene -1/2 inch long
- G. Bonding agent: ASTM C932

2.5 MIX PROPORTIONS:

- A. Per the NWCB *Stucco Resource Guide* or approved by Architect

2.6 FIBERGLASS MESH:

- A. 4-6 oz per square yard in finish coat as well as base coat.

PART 3 - EXECUTION

3.1 EXAMINATION:

Prior to starting lath and plasterwork, carefully inspect installed work of other trades. Notify architect or proper authorities in writing of any detrimental conditions before proceeding with work, including all flashings, framing, sheathing or unsatisfactory conditions in existing stucco finish. Owners shall be notified of any plants, trees, furniture, landscaping or other items that may need to be moved or protected.

- 3.2 FLASHINGS:
Installed metal flashings as detailed, stripping in with self-adhesive flashing.
- 3.3 WEATHER-RESISTIVE BARRIER:
Apply weather resistive barrier from bottom to top. Lap weather resistive barrier in shingle fashion with all flashings. Lap weather resistive barrier with existing weather resistive barrier. Seal any holes or damage to weather resistive barrier with a brushed on asphalt solution or self-adhesive flashing.
- 3.4 TRIM ACCESSORIES, GENERAL:
- A. Properly install, miter and align trim accessories with existing trim accessories. Fasten all trim accessories to framing members 8 to 12 inches on center.
 - B. All intersections, miters, splices and terminations of control joints and channel reveals shall be set in a bed of sealant or back-sealed in a manner approved by architect.
 - C. Casing beads shall be set around windows to provide the specified joint design width.
- 3.5 METAL PLASTER BASE (LATH)
Cut and fit lath neatly into patch area. An overlap with the existing lath is optimal if possible. The lath shall overlap the nailing flange of all casing beads, channel reveals or expansion joints. Control joints may be placed over the lath. Fasteners should be placed six inches on center along framing members. Fasteners should only be through the sheathing over solid framing members and not into sheathing between studs.
- 3.6 PLASTERING:
- A. Protect all areas not to be plastered from damage.
 - B. Apply a bonder to edge of existing cement plaster to insure a good bond for new patchwork. Allow to get "tacky" before plastering.
 - C. All plaster work to be applied with hand tools.
 - D. Apply a scratch coat of Portland cement plaster approximately 3/8 inch thick. Scarify or score to provide keys for the brown coat. Brown coat may be applied as soon as the scratch coat has attained sufficient rigidity to receive brown coat. The brown coat shall be rodged off to produce a flat even surface with existing plaster. After the surface moisture has left the brown coat, the brown coat shall be "hard" floated to densify the plaster membrane. A hard neoprene, cork or shingle float shall be used.
 - E. Moist cure brown coat for 3 days if relative humidity is below 70% and temperature is above 75°F or windy conditions exist.
- 3.7 FINISHING:
- A. Comply with NW Wall and Ceiling Bureau.
 - B. Allow skim coat to dry before applying finish coat.
 - C. Apply finish coat and maintain a wet edge to architectural breaks. Match approved texture sample.
 - D. Allow finish coat to "fully" set before removing protective cover from the elements.
- 3.8 MOIST CURING:

- A. Follow procedures for each coat as recommended by ASTM C926 and PCA and as required based on environmental conditions.
 - B. Prevent premature dry-out.
- 3.9 CLEAN UP:
- A. Protect plaster from weather, freezing, premature drying, marking, dirt, dust, marring or other damage throughout construction period so that it will be without any indication of damage at time of acceptance.
 - B. All excess materials shall be removed from job site.
 - C. Surrounding areas shall be clean and free of debris.

END OF SECTION 09 24 00

SECTION 092900
GYPSUM WALL BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Gypsum board and joint treatment.
 - 2. Gypsum sheathing.
 - 3. Sound attenuation blankets.
 - 4. Drywall grid system
 - 5. Finishing.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 061000 - Rough Carpentry: Wood framing for attachment of gypsum board.
 - 2. Section 099100 - Painting: Field paint finish on gypsum board.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C36 - Specification for Gypsum Wallboard.
 - 2. ASTM C79 - Test Method for Gypsum Sheathing Board.
 - 3. ASTM C557 - Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
 - 4. ASTM C630 - Specification for Water-Resistant Gypsum Backing Board
 - 5. ASTM C954 - Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs From 0.033 inches to 0.112 inches in Thickness.
 - 6. ASTM C1002 - Specification Steel Drill Screws for the Application of Gypsum Panel Products.
 - 7. ASTM C1177 - Specification for Glass Mat Gypsum Substrate for Use As Sheathing.
 - 8. ASTM C1178 - Specifications for Glass Mat Water Resistant Gypsum Backing Panel.
 - 9. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 10. ASTM E119 - Test Methods for Fire Tests of Building Construction and Materials.
- B. Gypsum Association (GA):
 - 1. GA-214 - Recommended Levels of Gypsum Board Finish.
 - 2. GA-216 - Application and Finishing of Gypsum Board.
 - 3. GA-253 - Application of Gypsum Sheathing.
 - 4. GA-600 - Fire Resistance Design Manual.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - a. Product Data: Data on gypsum board, joint materials, and finish materials.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- C. Stack gypsum board flat to prevent sagging.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 - 1. Establish and maintain environmental conditions for applying and finishing gypsum board in conformance with GA-216.
 - 2. Maintain minimum 50 degrees F for 48 hours before application and finishing of gypsum board. Maintain temperature continuously until dry. Do not exceed 95 degrees F when using temporary heat sources.
 - 3. Ventilate building spaces as required to dry joint treatment materials. Prevent drafts during hot, dry weather to avoid finishing materials from drying too rapidly.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management:
 - 1. Recycled Content: Provide gypsum board products with paper backing manufactured from 100 percent post-consumer recycled paper and gypsum core containing minimum 10 percent recycled gypsum.
 - a. Soil amendment from recycled scrap gypsum: Coordinate with Section 329200 - Turf and Grasses to identify requirements for gypsum soil amendment and to prepare scrap gypsum board for use as soil amendment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Georgia-Pacific Gypsum Products, Atlanta, GA (800) 225-6119.
 - 2. National Gypsum Company, Gold Bond Building Products, Charlotte, NC (800) 628-4662.
 - 3. United States Gypsum Company, Chicago, IL (800) 874-4968.
 - 4. Allied Stud Co., Phoenix, AZ, (800) 877-8823.
 - 5. Consolidated Fabricators Corp., Paramount, CA, (800) 635-8335
 - 6. Steeler, Inc., Seattle, WA (800) 275-2279
 - 7. Western Metal Lath, Inc., Riverside, CA (909) 360-3500
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Standard Gypsum Board: ASTM C 36; 1/2 inch and 5/8 inch thick 48 inch width, maximum permissible length; ends square cut, tapered edges.
- B. Type X Gypsum Wallboard (Fire Resistant): ASTM C36; 1/2 inch and 5/8 inch thick, 48 inch width, maximum permissible length; ends square cut, edges tapered, providing at least 1-hour fire-retardant rating for boards 5/8 inch thick or 3/4-hour fire-resistance classification for boards 1/2 inch thick, when tested in accordance with ASTM E119.
- C. Water-Resistant Gypsum Backing Board: ASTM C630; 1/2 and 5/8 inch thick, 48 inch width, maximum permissible length; ends and edges straight and solid, edges tapered. Board consisting of a noncombustible water-resistant gypsum core, surfaced on face and back with water-repellent paper bonded to the core.
- D. Water-Resistant Glass Mat Embedded Gypsum Backing Board: ASTM C1178; 1/4 and 1/2 inch thick, 32 inch or 48 inch width, maximum permissible length; ends and edges straight and solid, edges square. Board consisting of a noncombustible water-resistant gypsum core, with glass mat embedded on front and back with the face surface with a heat cured copolymer water and vapor retardant coating. For janitor and toilet rooms where tile is the finish material.
- E. Type X Water-Resistant Gypsum Backing Board (fire-resistant): ASTM C630; 1/2 and 5/8 inch thick, 48 inch width, maximum permissible length; ends and edges straight and solid, edges tapered. Board consisting of a noncombustible water-resistant gypsum core, surfaced on face and back with water-repellent paper bonded to the core. Providing at least 1-hour fire-retardant rating for boards 5/8 inch thick, or 3/4-hour fire-retardant rating for boards 1/2 inch thick, when tested in accordance with ASTM E119.
- F. Type X Water-Resistant Glass Mat Embedded Gypsum Backing Board (fire-resistant): ASTM C1178; 5/8 inch thick, 48 inch width and 8 foot length; ends and edges straight and solid, edges squared. Board consisting of a noncombustible water-resistant gypsum core, embedded on face and back with water resistant fiberglass mat bonded into the core. Providing at least 1-hour fire-retardant rating for boards 5/8 inch thick, or 3/4-hour fire-retardant rating for boards 1/2 inch thick, when tested in accordance with ASTM E119.
- G. Gypsum Sheathing Board: ASTM C79; moisture resistant type; 1/2 inch (13 mm) thick, maximum available size in place; ends square cut, tongue and grooved edges; water repellent paper faces. Exterior wall sheathing where noted.
- H. Gypsum Sheathing Glass Mat Embedded Board: ASTM C1177; moisture resistant type; 1/2 inch (13 mm) and 5/8 inch thick type X, maximum available size in place; ends and edges straight and solid, edges squared. Water resistant glass mat embossed both sides and edges, treated water resistant gypsum core with alkali resistant coating/primer. Flame spread: 0, smoke developed: 0 when tested in accordance with ASTM E84. Exterior wall sheathing where noted.
- I. Cementitious Backing Board: High density, glass fiber reinforced, 1/2 inch (13 mm) thick x 26 inches or 48 inches x length as required; 2 inch (50 mm) wide, coated glass fiber tape for joints and corners; For janitor and toilet rooms where tile is the finish material.
- J. Sound Attenuation Blankets: Semi-rigid, paperless spun mineral fiber blankets or uniform dimension controlled density of 3 lb./cu. ft. Minimum thickness shall be 1-1/2 inch.
- K. Gypsum Board Fasteners:
 - 1. Metal Framing: ASTM C 954 and C 1002, Type S-12 bugle head, corrosion-resistant self-drilling self-tapping steel screws.
 - a. One Layer 1/2 Inch: 1 inch.
 - b. One Layer 5/8 Inch: 1-1/8 inch.

- L. Gypsum Board Accessories:
 - 1. Corner Beads: 1 1/4 inch by 1 1/4 inch galvanized steel corner bead.
 - 2. Edge Trim: Galvanized steel casing.
 - a. L bead for tight abutment at edges.
 - b. J bead at other locations.
 - 3. Control Joint: No. 093 roll-formed zinc.
 - 4. Joint Materials:
 - a. Reinforcing Tape: Sheetrock Joint Tape. Paper; fiberglass joint tape not permitted.
 - b. Joint Compound: Ready-Mixed All-Purpose Joint Compound.
 - c. Adhesive: Commercial Adhesive complying with ASTM C 557.
- M. Drywall Grid System: Quickspan Locking Drywall Grid System as manufactured by Certainteed or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
- E. Design non-axial load-bearing framing to accommodate 1/2 inch (13 mm) vertical deflection.

3.2 INSTALLATION

- A. Install gypsum board in accordance with manufacturer's published instructions, GA-201 and GA-216.
- B. Where applicable, install ceiling panels before the installation of wall panels.
- C. Erect single layer gypsum board in most economical direction, with attachment to firm bearing surfaces over framing members. Do not align panel joints with edges of openings.
- D. Treat cut edges, holes, fastener heads and joints, including those at angle intersections, in water resistant gypsum board and exterior gypsum soffit board with specified joint compound. Treat cut edges, holes, fastener heads and joints in water resistant glass mat embedded backing board with mastic or mortar. Treat prior to tile installation.
- E. Place gypsum panels over supporting framing members with panel ends aligning and parallel with framing members.
- F. Install fasteners from center of field of panel toward ends and edges. Install fasteners 3/8 inch from ends and edges of panels, and as follows:
 - 1. Ceiling: 12 inches on center, perimeter and field.
 - 2. Walls: 16 inches on center, perimeter and field.

3.3 GYPSUM SHEATHING INSTALLATION

- A. Install gypsum board sheathing in accordance with manufacturer's published instructions, GA-216, GA-253 and GA-600, all latest editions.
 - 1. Erect single layer gypsum board horizontally, with edges butted tight, tongue up with attachment to firm bearing. Glass mat embedded board may be installed horizontally or vertically.
- B. Provide construction control joints at maximum 30 feet on center, at inside corners, and at intersections.
 - 1. Locate panel, allowing 1/4 inch space between edge of panel and adjacent walls, beams, columns, and fascia construction.
- C. Place edge trim where gypsum board abuts dissimilar materials. Use longest practical length.
- D. Using screws, secure panels in place at maximum 12 inches on center to supporting substrate.
- E. Protect all exposed gypsum core at perimeter edges, and penetrations by covering core with metal trim.

3.4 JOINT TREATMENT

- A. Reinforce interior and exterior corners at ceiling and wall surfaces. Apply 3 inch wide initial coating of joint compound, pressing tape firmly into joint compound. Wipe off excess joint compound. Apply second coat of joint compound with tools of sufficient width to extend beyond joint center, approximately 4 inches. Draw joint compound down to a smooth even plane.
- B. After drying or setting, sand or sponge joints, edges, and corners, eliminating high spots and excessive joint compound to produce smooth finish surface. Prepare surfaces to receive subsequent finishes to height of 6 inches above finish ceiling. Feather coats onto adjoining surfaces resulting in maximum camber of 1/32-inch in 12.
- C. Sand after second and third applications of joint compound. Do not to raise nap of paper when sanding.
- D. Install control joints full height of partition, consistent with lines of building spaces, with 1/2 inch between boards. Apply sealant at base of joint and control joint accessory piece at face.
- E. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

3.5 FINISH

- A. Apply gypsum board finish in accordance with manufacturer's published instructions and GA-214 Finish Levels.
 - 1. Level 1: All joints and interior angles shall have tape embedded in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
 - a. Application: In plenum areas above ceilings, in attics, in mechanical rooms, in areas where the assembly is generally concealed, and other areas not normally open to view. Accessories not required, unless shown or required by rating. Where a fire resistance rating is required for the gypsum board assembly, details of construction shall be in accordance with reports of fire tests of assemblies that have met the fire rating requirement.
 - 2. Level 4: All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Prepared surface shall be coated with a drywall primer/sealer prior to the application of finish paint. Refer to specification section 099100.

- a. Application: For use where gloss semi-gloss, enamel, or nontextured flat paints are specified or where severe lighting conditions occur. Generally in all areas except where noted otherwise.

3.6 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate installation of firestopping Specified in Section 078400 at penetrations through fire-restive rated gypsum board partitions.
 - 2. Coordinate installation of joint sealers specified in Section 079200 at penetrations of non fire-restive rated partitions.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 09/22/2015

SECTION 095113

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Suspended metal grid ceiling system.
 - 2. Acoustical panels.
 - 3. Perimeter trim.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 233713 - Diffusers Registers and Grilles: Air diffusion devices in ceiling system.
 - 2. Section 265100 - Interior Lighting: Light fixtures attached to ceiling system.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 635 - Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 - 2. ASTM C 636 - Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
 - 3. ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials.
 - 4. ASTM E 580 - Specification for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Rigidly secure acoustical ceiling system including integral mechanical and electrical components with maximum deflection of 1/360.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for Submittals.
 - 1. Product Data: Metal grid suspension system components and acoustical panel units.
 - 2. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of this Section with minimum 5 years documented experience.

- B. Regulatory Requirements: Surface Burning Characteristics in Accordance with ASTM E 84 for Class III or C finish:
 - 1. Flame Spread: Less than 200.
 - 2. Smoke Density: Less than 450.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements Transport, handle, store, and protect products.
- B. Deliver acoustical units in manufacturer's original unopened containers with brand name and type clearly marked.
- C. Store under cover in dry, watertight conditions.
- D. Prior to installation, store acoustical units for 24 hours minimum at same temperature and relative humidity as space where Work will be installed.

1.7 PROJECT CONDITIONS

- A. Jobsite Requirements: Maintain uniform temperature range of 60-85 degrees F, and humidity of no more than 70 percent relative humidity prior to, during, and after installation.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management:
 - 1. Recycled Content:
 - a. Acoustical panels type ACT-1: Manufactured from minimum 20 percent recycled newsprint.
 - b. Acoustical panels type ACT-2: Manufactured from minimum 65 percent recovered slag.
 - c. Suspension system: Manufactured from minimum 20 percent recycled steel.

1.9 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Materials: Provide 1 box of extra acoustical panels for each panel type, pattern, and color to Contracting Officer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Suspension System: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Armstrong World Industries, Incorporated, Lancaster, PA (800) 448-1405.
 - 2. Chicago Metallic Corporation, Chicago, IL (800) 323-7164.
 - 3. USG Interiors, Chicago, IL (800) 950-3839.
 - 4. Certainteed Ceilings (800) 346-7978

- B. Acoustical Panels: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Armstrong World Industries Incorporated, Lancaster, PA (800) 448-1405.
 - 2. USG Interiors, Chicago, IL (800) 950-3839.
 - 3. Certainteed Ceilings (800) 346-7978
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 SUSPENSION SYSTEM

- A. Model:
 - 1. Armstrong: Prelude 15/16 inch Exposed Tee System.
 - 2. Chicago Metallic: 1200 System.
 - 3. USG: Donn DX System.
 - 4. Certainteed: Classic Stab CS12-12-15
- B. Description:
 - 1. Grid: ASTM C 635, intermediate duty, steel exposed T; nominal 1 inch width; stab-in connections.
 - 2. Accessories: Stabilizer bars, clips, and splices.
 - 3. Grid Finish: White.
 - 4. Support System: Hot or cold rolled steel channels; galvanized hanger wire, minimum 12 gage.
 - 5. Edge Moldings: Metal channel with exposed flange to match suspension system.
 - 6. Compression Struts: Indicated on Drawings.

2.3 ACOUSTICAL PANELS

- A. Type ACP-1:
 - 1. Model:
 - a. Armstrong: Fine Fissured #1729.
 - b. Certainteed : HHF – 157
 - c. USG: Auratone, Radar #2310.
 - 2. Description:
 - a. Size: 24 x 48 x 5/8 inches.
 - b. Edge: Square lay-in.
 - c. Weight: minimum 0.60 pounds per square foot.
 - d. Surface Finish: Factory-applied vinyl latex paint, perforated, and scored.
 - e. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that layout of hangers will not interfere with other Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - SUSPENSION SYSTEM

- A. Install system in accordance with ASTM C 636, ASTM E 580 and manufacturer's published instructions.
- B. Provide metal hanger tabs and clips attached to metal deck where required for attachment of suspension wires.
- C. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
- D. Locate system on room axis according to Reflected Ceiling Plan, where indicated on Drawings, or locate system to a balanced grid design with edge units no less than 50 percent of acoustical panel size where Reflected Ceiling Plan not shown on Drawings
- E. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Do not eccentrically load system, or produce rotation of runners.
- F. Install edge molding at intersection of ceiling and vertical surfaces using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions. Secure at 16 inches (41 cm) on center.
- G. Install hold-down clips within five feet of doors.
- H. Rivet cross tee's at 4 feet on center to edge mould.
- I. Install compression struts and secure system with tie wires as indicated on Drawings.
 - 1. Provide hanger wires, splayed 45 degrees, within 3 inches of intersection between main runner and cross runner.
 - 2. Provide compression strut and splayed hanger wires as follows:
 - a. One assembly for each light fixture.
 - b. Located within 6 feet of wall.
 - c. Located at maximum 12 feet on center or as indicated on Drawings.

3.3 INSTALLATION - ACOUSTICAL PANELS

- A. Fit acoustic units in place free from damaged edges or other defects. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.

3.4 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Do not install acoustical ceilings until building is enclosed, heating is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
 - 2. Schedule installation of acoustic units after interior wet work is completed.
 - 3. Install after major above ceiling work is complete.
 - 4. Coordinate location of hangers with other Work.
- B. Site Tolerances:
 - 1. Variation from Flat and Level Surface: 1/8 inch in 12 feet.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspect acoustical panel placement, ceiling grid suspension system installation and connection to structure.

3.6 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality:
 - 1. Temporary ventilation: As specified in Section 013543 - Environmental Procedures.
 - a. Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by USPS Contracting Officer.

3.7 CLEANING

- A. Section 017300 - Execution: Cleaning installed Work.
- B. Clean exposed surfaces of acoustical ceilings including trim, edge mouldings, and suspension system members.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 09/22/2015

SECTION 096500
RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections: Related work specified elsewhere includes but may not be limited to
 - 1. Section 017704 - Closeout Procedures and Training.
 - 2. Section 033000 - Cast-In-Place Concrete.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM F710
 - 2. ASTM F1066
 - 3. ASTM 1869-98 ASTM F2170-02
 - 4. ASTM F2170-02
 - 5. ASTM F2195
- B. Manufacturer's Guides:
 - 1. Armstrong Installation Systems Guide F-5061
 - 2. Forbo MCT Installation Fast Facts v1.0 04/08
 - 3. Armstrong Maintenance Guide F-8663
 - 4. Forbo MCT Maintenance Manual 02/08/MDW

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - a. Product Data: Data describing physical and performance characteristics; including sizes, patterns and colors including manufacturer's product sheet.
 - 1) Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors, patterns and textures.
 - 2) Samples: Submit selection and verification samples for finishes, colors, and textures.
 - 3) Quality Assurance Submittals: Submit the following:
 - i. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - ii. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.
 - iii. Manufacturer's Instructions: Manufacturer's installation instructions.
 - 4) Closeout Submittals: Submit the following:
 - i. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for

- maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
- ii. Warranty: Warranty documents specified herein.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of this Section with minimum 5 years documented experience.
 - 1. Engage installer certified, as a “manufacturer’s approved mechanic.”
 - 2. Certificate: When requested, submit certificate indicating qualification.
- B. Regulatory Requirements:
 - 1. Critical Radiant Flux in Accordance with ASTM E 684: More than 0.45 Watts per square centimeter.
 - 2. Specific Optical Smoke Density in Accordance with ASTM E 662: Less than 450.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, Handle, Store, and Protect Products.
- B. Ordering: Comply with manufacturer’s ordering instructions and lead time requirements to avoid construction delays.
- C. Deliver tiles and installation accessories to site in original manufacturer’s unopened cartons and containers each bearing names of product and manufacturer, project identification, and shipping and handling instructions.
- D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - 1. Material should be stored in areas that are fully enclosed, weathertight with the permanent HVAC system set at a uniform temperature of at least 68 degrees F (20 degrees C) for 72 hrs. prior to, and during installation.
 - 2. Store tiles on flat surfaces.

1.6 SEQUENCING AND SCHEDULING

- A. Finishing Operations: Install tile flooring after finishing operations, including painting and ceiling operations, have been completed.
- B. Concrete Curing: Do not install tile flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by resilient flooring manufacturer’s recommended bond, moisture test, and pH test.

1.7 WARRANTY

- A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
 - 1. Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

1.8 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Wall Base: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Allstate Rubber Corporation, Ozone Park, NY (718) 526-7890.
 - 2. Armstrong World Industries, Lancaster, PA (800) 448-1405. Representative Contact: Lien Chu (800) 356-9301, ext. 8274.
 - 3. Forbo Flooring Systems, Hazelton, PA Representative Contact: Tim J. Brown (302) 419-8492.
 - 4. Johnsonite, Donna Heffernan Sission (703) 250-0714
 - 5. Vinyl Plastics, Inc., Sheboygan, WI (800) 874-4240.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Wall Base:
 - 1. Height: 4 inches
 - 2. Thickness: 1/8 inch.
 - 3. Coved.
 - 4. Length: Roll.
 - 5. Material Color: Color to be coordinate with adjacent resilient floor tile and as approved by the Contracting Officer.

2.3 ACCESSORIES

- A. Subfloor Filler: Latex underlayment, mixed with undiluted latex liquid furnished by the selected manufacturer.
 - 1. Underlayment and Patching Compound: Refer to Section 033000 Cast-In-Place Concrete for portland cement based underlayments and patching compounds.
- B. Primers and Adhesives: Waterproof; clear; of types as approved by resilient flooring manufacturer for specific material and substrates encountered. Zero VOC.
- C. Base Accessories: Premolded end stops and internal, and external corners of same material, size, and color as base.
- D. Expansion Joint Covers: Refer to other specification section for expansion joint covers to be used with resilient flooring.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work and are acceptable for product installation in accordance with manufacturer's instructions.

- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
- E. Material Inspection: In accordance with manufacturer's installation requirements, visually inspect materials prior to installation. Material with visual defects shall not be installed and shall not be considered as a legitimate claim.

3.2 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

3.3 INSTALLATION – WALL BASE

- A. Install wall base in accordance with manufacturer's published instructions.
- B. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- C. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- D. Install wall base on solid backing. Bond tight to wall and floor surfaces.
- E. Apply the base to the cabinet toe kicks. If necessary, use a hot air gun to make the base pliable enough to turn the corners of the toe kick. Minimize or eliminate base seams on the toe kick. If the cabinet butts into a wall, start the base where the wall and cabinet meet and continue around the exposed area of the toe kick.

3.4 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality:
 - 1. Temporary ventilation: As specified in Section 013543 - Environmental Procedures.
 - a. Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of minimum 60 degrees F to maximum 90 degree F continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by USPS Contracting Officer.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
 - 1. Manufacturer's Field Services: Upon Owner's request and with at least 2-3 week notice, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.
- B. Inspect resilient flooring and base installation, pattern, layout, and attachment to substrate.

3.6 CLEANING

- A. Section 017300 - Execution: Cleaning installed Work.
- B. Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
 - 1. Remove visible adhesive and other surface blemishes using cleaning methods recommended by tile floor manufacturer.
 - 2. Sweep and vacuum floor after installation.
 - 3. Do not wash floor until after time period recommended by tile flooring manufacturer.
 - 4. Damp mop tile flooring to remove black marks and soil.

3.7 PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

END OF SECTION

USPS CSF Specifications issued: 5/1/2014
Last revised: 4/12/2011

SECTION 099100

PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Surface preparation and field application of paints and finishes for interior and exterior surfaces.
 - 2. Schedule of Items to be painted.
 - 3. Exterior painting and finishing schedule.
 - 4. Interior painting and finishing schedule.
 - 5. Sealing of interior concrete floor and exterior sidewalk.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 055000 - Metal fabrications:
 - 2. Section 081100 - Metal Doors and Frames: Shop priming.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for each type of paint specified.
 - a. Technical data sheets indicating manufacturer's catalog number, paint type description, and VOC content.
 - b. Painting Schedule listing surfaces to be painted with cross reference to the specific painting and finishing system and application. Identify each paint material by manufacturer's catalog number and general classification.
 - 2. Samples: Submit color brush-out sample for each paint color and sheen specified.
 - a. Three samples on 8 1/2 inch x 11 inch card stock for color and sheen verification.
 - b. Identify each sample by paint manufacturer, paint type, color, and sheen.
 - 3. Assurance/Control Submittals:
 - a. Test Reports: Submit manufacturer's Material Safety Data Sheets (MSDS) for each paint type proposed.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing Work of this Section with minimum five years documented experience.
- B. Regulatory Requirements:
 - 1. Surface Burning Characteristics in Accordance with ASTM E-84 for Class I or A finish:
 - a. Flame Spread (Non-Combustible Surfaces): Less than 25.

- b. Smoke Density (Non-Combustible Surfaces): Less than 450.
- 2. Provide paint and coating materials that conform to Federal, State, and Local restrictions for Volatile Organic Compounds (VOC) content.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time , cleanup requirements, color designation, and instructions for mixing and/or reducing.
- C. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's published instructions.
- D. Prevent fire hazards and spontaneous combustion.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Apply paint finishes only when moisture content of surfaces is within manufacturer's acceptable ranges for type of finish being applied.
 - 2. Surface temperatures or surrounding air temperature to be above 40 degrees F before applying alkyd finishes; above 45 degrees F for interior latex, and 50 degrees F for exterior latex work. Minimum for varnish and transparent finishes is 65 degrees F.
 - 3. Provide continuous ventilation and heating facilities to maintain temperatures above 45 degrees F for 24 hours prior to, during and 48 hours after application of finishes.
 - 4. Do not apply paint in areas where dust is being generated.
 - 5. Provide lighting level in areas being painted of 80 foot candles measured mid-height at substrate surface.

1.7 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Materials:
 - 1. Provide one gallon of each color, type and sheen to Contracting Officer.
 - 2. Label each container with color, type, texture, room locations, in addition to the manufacturer's label.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the work include the following:
 - 1. Benjamin Moore and Company, Montvale, NJ (201) 573-9600.
 - 2. Comex Group (Color Wheel/Frazee/Kwal/Parker), 5575 Dtc Pkwy, Greenwood Village, CO 80111, (303)307-2100
 - 3. Duron Paints and Wallcoverings, Beltsville, MD (800) 723-8766.
 - 4. Devoe (ICI), Cleveland, OH (888) 681-6353.
 - 5. Glidden (ICI), Cleveland, OH (888) 681-6353.

6. Pittsburgh Paints, Pittsburgh, PA (800) 441-9695.
7. Sherwin-Williams Company, Cleveland, OH (800) 321-8194.

B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

A. Paints:

1. Manufacturer's "Best Grade" for each type specified.
2. Ready-mixed; pigments fully ground maintaining a soft paste consistency, capable of readily and uniformly dispersing to a complete homogeneous mixture.
3. Providing good flowing and brushing properties and be capable of drying or curing free of streaks or sags.
4. VOC limits (g/L) for exterior and interior paint applications:
 - a. Exterior- Steel-Shop Primed
 - 1) Top Coat – Non-Flat: 150
 - 2) Top Coat - Gloss: 250
 - b. Exterior- Steel - Galvanized
 - 1) Primer Coat: 200
 - 2) Top Coat - Non-Flat: 150
 - 3) Top Coat - Gloss: 250
 - c. Interior Wood – Transparent
 - 1) Stain: 250
 - 2) Varnish: 350
 - d. Interior Concrete, Concrete Block
 - 1) Block filler: 300
 - 2) Top Coat – Flat: 100
 - 3) Top Coat – Non-Flat: 150
 - 4) Top Coat – Gloss: 250
 - e. Interior Steel – Unprimed
 - 1) Rust Prime Coat: 400
 - 2) Top Coat – Non-Flat: 150
 - 3) Top Coat – Gloss: 250
 - f. Interior Steel – Primed
 - 1) Top Coat – Flat: 100
 - 2) Top Coat – Non-Flat: 150
 - 3) Top Coat – Gloss: 250
 - g. Interior Steel – Galvanized
 - 1) Top Coat – Non-Flat: 150
 - 2) Top Coat – Gloss: 250
 - h. Interior Plaster, Gypsum Board
 - 1) Undercoater: 200
 - 2) Top Coat - Flat: 100
 - 3) Top Coat – Non-Flat: 150
 - 4) Top Coat – Gloss: 250
 - i. Interior Exposed Structural Steel and Metal Deck
 - 1) Industrial Maintenance - Primer: 340
 - 2) Industrial Maintenance – Top Coat: 340

B. Primers and Undercoaters: Manufactured by same manufacturer as finish coat materials.

C. Paint Accessory Materials: Linseed oil, shellac, turpentine and other materials not specifically indicated herein but required to achieve the finishes specified of high quality and approved manufacturer.

2.3 EXTERIOR PAINT SYSTEMS

- A. Benjamin Moore:
1. Ferrous Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: M04 Acrylic Metal Primer; MDF 2.0 mils.
 - b. Each Finish Coat: M29 DTM Acrylic Semi-Gloss; MDF 2.0 mils.
 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: M04 Acrylic Metal Primer; MDF 2.0 mils.
 - b. Each Finish Coat: M29 DTM Acrylic Semi-Gloss; MDF 2.0 mils.
- B. Comex Group (Color Wheel/Frazee/Kwal/Parker)
1. Ferrous Metal: Semi-Gloss, Water Base, Alky Primer/Acrylic Latex.
 - a. Primer: Ultra-Tech C309 Universal water-Based Metal Primer, MDF 1.96 mils.
 - b. Each Finish Coat: Ultra-Tech C218 (Southeast)/C229 (Southwest)/C206 (Midwest) Exterior 100% Acrylic Semi-Gloss Enamel, MDF 1.44 mils.
 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: Ultra-Tech C309 Universal water-Based Metal Primer, MDF 1.96 mils.
 - b. Each Finish Coat: Ultra-Tech C218 (Southeast)/C229 (Southwest)/C206 (Midwest) Exterior 100% Acrylic Semi-Gloss Enamel, MDF 1.44 mils.
- C. Duron:
1. Ferrous Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: Dura Clad Universal Acrylic Metal Primer, 33-105; MDF 2.4 mils. (MPI xx, Approved)
 - b. Each Finish Coat: Dura Clad DTM Acrylic Coating Gloss 95-30X, MDF 3.0 mils. (MPI 110-G6)
 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: Dura Clad Acrylic Galvanized Metal Primer, 33-100; MDF 1.4 mils. (MPI 134, Approved)
 - b. Each Finish Coat: Dura Clad DTM Acrylic Coating Gloss 95-30X, MDF 3.0 mils. (MPI 110-G6)
- D. Devoe (ICI):
1. Ferrous Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: Mirrolac W/B DTM Primer DP85XX.
 - b. Each Finish Coat: Mirrolac W/B Semi-Gloss Enamel DP83XX.
 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: Mirrolac W/B DTM Primer, DP85XX.
 - b. Each Finish Coat: Mirrolac W/B Semi-Gloss Enamel DP83XX.
- E. Frazee:
1. Ferrous Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: 661F774Metal Prime; MDF 1.7 mils.
 - b. Each Finish Coat: 128 Satin Glide Semi Gloss Acrylic, 03-Series; MDF 1.4 mils.
 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: 661F774 Metal Prime, 33-100; MDF 1.4 mils.
 - b. Each Finish Coat: 128 Satin Glide Semi Gloss Acrylic , 03-Series; MDF 1.4 mils.
- F. Pittsburgh:
1. Ferrous Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: 90-709 DTM Interior/Exterior Primer; MDF 3.0 mils.
 - b. Each Finish Coat: 90-474 Acrylic Enamel Satin; MDF 3.0 mils.
 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.

- a. Primer: 90-709 DTM Interior/Exterior Primer; MDF 3.0 mils.
- b. Each Finish Coat: 90-474 Acrylic Enamel Satin; MDF 3.0 mils.

G. Sherwin-Williams:

- 1. Ferrous Metal: Semi-Gloss, Low VOC, Alkyd Primer/Acrylic Latex.
 - a. Primer: Pro-Cryl Universal Water-Based Primer, B66-310, MDF 3.0 mils.
 - b. Each Finish Coat: DTM Acrylic B66 Series; MDF 3.0 mils.
- 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: Pro-Cryl Universal Water Based Primer, B66-310, MDF 3.0 mils.
 - b. Each Finish Coat: DTM Acrylic B66 Series; MDF 3.0 mils.

2.4 INTERIOR PAINT SYSTEMS

A. Benjamin Moore:

- 1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: 284 Moorecraft Superhide Interior Latex Primer/Undercoater; MDF 1.5 mils.
 - b. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
- 2. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Moorecraft Super Hide Interior/Exterior Latex Blockfiller 285; MDF 11.0 mils.
 - b. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
- 3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
- 4. Wood and Wood Doors : Satin, Water Base, Acrylic Latex.
 - a. Primer: 253 Moorecraft Latex Enamel Undercoater and Primer Sealer; 2.0 mils.
 - b. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
- 5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Moorecraft Super Hide Interior/Exterior Latex Blockfiller 285; MDF 11.0 mils.
 - b. Each Finish Coat: 276 Moorecraft Acrylic Latex; MDF 1.5 mils.
- 6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: M04 Acrylic Metal Primer; MDF 2.0 mils.
 - b. Each Finish Coat: 276 Moorecraft Acrylic Latex; MDF 1.5 mils.
- 7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Enamel Undercoater: Moorecraft Acrylic Latex Underbody 269.
 - b. Each Finish Coat: 276 Moorecraft Acrylic Latex; MDF 1.5 mils.
- 8. Wood Bumpers:
 - a. Stain: 234 Benwood Penetrating Stain.
 - b. Benwood Stays Clear Acrylic Polyurethane: 423 Benwood Low Lustre Polyurethane.

B. Comex Group (Color Wheel/Frazee/Kwal/Parker):

- 1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Ultra-Tech C152 Interior Latex Primer-Sealer; MDF 1.12 mils.
 - b. Each Finish Coat: Ultra-Tech C106 Interior Latex Eggshell Enamel; MDF 1.36 mils.
- 2. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Ultra-Tech C302 Interior-Exterior Acrylic Block Filler; MDF 6.29 mils.
 - b. Each Finish Coat: Ultra-Tech C106 Interior Latex Eggshell Enamel; MDF 1.36 mils.
- 3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Ultra-Tech C141 Interior 100% Acrylic Low-Sheen Enamel; MDF 1.44 mils.
- 4. Wood and Wood Doors: Satin, Water Base, Acrylic Latex.
 - a. Primer: Ultra-Tech C312 Interior-Exterior 100% Acrylic Wood Primer; MDF 1.8 mils.
 - b. Each Finish Coat: Ultra-Tech C141 Interior 100% Acrylic Low-Sheen Enamel; MDF 1.44 mils.
- 5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Ultra-Tech C302 Interior-Exterior Acrylic Block Filler; MDF 6.29 mils.

- b. Each Finish Coat: Ultra-Tech C119 Interior Latex Semi-Gloss Enamel; MDF 1.6 mils.
 - 6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Ultra-Tech C309 Universal Water-Based Metal Primer; MDF 1.96 mils.
 - b. Each Finish Coat: Ultra-Tech C119 Interior Latex Semi-Gloss Enamel; MDF 1.6 mils.
 - 7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Ultra-Tech C312 Interior-Exterior 100% Acrylic Wood Primer; MDF 1.8 mils.
 - b. Each Finish Coat: Ultra-Tech C119 Interior Latex Semi-Gloss Enamel; MDF 1.6 mils.
 - 8. Wood Bumpers:
 - a. Stain: ZAR Interior Penetrating Oil Wood Stain; MDF N/A.
 - b. Clear Polyurethane: 2002 Flecto Varathane Interior Clear Polyurethane Sealer/Finish; MDF 0.9 mils.
- C. Duron:
 - 1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Interior Latex Drywall Primer 04-124: Applied at a dry film thickness of not less than 1.6 mils (0.041 mm). (MPI 50, Approved)
 - b. Each Finish Coat: Acrylic Latex Eggshell (Low Sheen) Enamel 36 Series; MDF 1.4 mils.(MPI 44, Approved)
 - 2. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Block Kote Interior/Exterior Latex Block Filler 08-128; MDF 10.2 mils.
 - b. Each Finish Coat: Acrylic Latex Eggshell (Low Sheen) Enamel 36Series; MDF 1.4 mils. (MPI 44, Approved)
 - 3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Ultra Deluxe Interior Acrylic Latex Eggshell (Low Sheen) Enamel 36 Series; MDF 1.4 mils.
 - 4. Wood and Wood Doors : Satin, Water Base, Acrylic Latex.
 - a. Primer: Interior Acrylic Enamel Undercoater 04-123; MDF 1.6mils. (MPI 50, Approved)
 - b. Each Finish Coat: Ultra Deluxe Interior Acrylic Latex Eggshell (Low Sheen) Enamel 36 Series; MDF 1.4 mils.
 - 5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Block Kote Interior/Exterior Latex Block Filler 08-128; MDF 10.2 mils.
 - b. Each Finish Coat: Genesis Odor-Free Interior Latex Semi-Gloss Enamel, 83-Series, MDF 1.5 mils.
 - 6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Dura Clad Universal Acrylic Metal Primer, White 33-015; MDF x.x mils. (MPI 76, Approved)
 - b. Each Finish Coat: Genesis Odor-Free Interior Latex Semi-Gloss Enamel, 83-Series, MDF 1.5 mils.
 - 7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: Interior Acrylic Enamel Undercoater 04-123; MDF 1.6 mils.(MPI 50, Approved)
 - b. Each Finish Coat: Genesis Odor-Free Interior Latex Semi-Gloss Enamel, 83-Series, MDF 1.5 mils.
 - 8. Wood Bumpers:
 - a. Stain: Interior Penetrating Oil Wood Stain 28-100; MDF N/A.
 - b. Clear Polyurethane: Heirloom "Clean Air" Formula Gloss Polyurethane 80-06010. (MPI 130, Approved)
- D. Devoe (ICI):
 - 1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Wonder-Tones Primer DR50801; MDF 1.5 mil.
 - b. Each Finish Coat: Wonder-Tone Eggshell Enamel DR34XX; MDF 1.5 mil.
 - 2. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Bloxfil 4000 Interior/Exterior Heavy Duty Acrylic Block Filler 4000-1000; 7.0-14.5 MDF
 - b. Each Finish Coat: Wonder-Tone Eggshell Latex Enamel DR34XX; MDF 1.5 mil.
 - 3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Mirrolac W/B Semi-Gloss Enamel DP83XX; MDF 1.5 mil.

4. Wood and Wood Doors : Satin, Water Base, Acrylic Latex.
 - a. Primer: Wonder-Prime DR51701; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Bloxfil 4000 Interior/Exterior Heavy Duty Acrylic Block Filler 4000-1000; 7.0-14.5 MDF
 - b. Each Finish Coat: Mirrolac W/B Semi-Gloss Latex Enamel DP83XX; MDF 1.5 mil.
6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Mirrolac W/B DTM Primer DP85XX; MDF 1.5 mil.
 - b. Each Finish Coat: Mirrolac W/B Semi-Gloss DP83XX.
7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: Wonder-Prime DR51701; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
8. Wood Bumpers:
 - a. Stain: Penchrome Interior Solventborne Semi-Transparent Oil Stain, DF 2XX; MDF 1.5 mil.
 - b. Clear Polyurethane: Penchrome Interior 100% Acrylic Finishes, DF 400 Satin; MDF 1.5 mil.
9. Concrete Floors: Seal all concrete floors not scheduled for other finish. Use densifier, minimum of 3 coats.

E. Frazee:

1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer :063 PVA Aqua Seal Drywall Vinyl Primer Sealer; MDF 1.4 mils.
 - b. Each Finish Coat: 026 Speed Sheen Interior Acrylic Eggshell Enamel; MDF 1.6 mils.
2. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: 262 Block Filler Latex Block Filler; MDF 10.2 mils.
 - b. Each Finish Coat: 026 Speed Sheen Interior Acrylic Eggshell Enamel; MDF 1.6 mils.
3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: 126 Mirro Glide Interior Low Sheen Acrylic Enamel; MDF 1.4 mils.
4. Wood and Wood Doors : Satin, Water Base, Acrylic Latex.
 - a. Primer: 172 Grip N Seal Enamel Undercoater; MDF 2.2 mils.
 - b. Each Finish Coat: 126 Mirro Glide Interior Low Sheen Acrylic Enamel; MDF 1.4 mils.
5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: 262 Block Filler Latex Block Filler; MDF 10.2 mils.
 - b. Each Finish Coat: 024 Speed Sheen Semi-Gloss Enamel; MDF 1.7 mils.
6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: 661F774 Metal Prime Alkyd Metal Primer; MDF 1.7 mils.
 - b. Each Finish Coat: 123 Satin Glide Semi-Gloss Enamel; MDF 1.7 mils.
7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: 172 Grip N Seal Enamel Undercoater MDF 2.2 mils.
 - b. Each Finish Coat: 024 Speed Sheen Semi-Gloss Enamel; MDF 1.7 mils.
8. Wood Bumpers:
 - a. Stain: ZAR Interior Penetrating Oil Wood Stain; MDF N/A.
 - b. Clear Polyurethane: 2002 Flecto Varathane Interior Clear Polyurethane Sealer/Finish; MDF 0.9

F. Glidden(ICI):

1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: ProMaster Interior Latex Primer-Sealer MP-5111; MDF 1.5 mil.
 - b. Each Finish Coat: ProMaster Interior Latex Eggshell MP-6800; MDF 1.5 mil.
2. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Bloxfil 4000 Interior/Exterior Heavy Duty Acrylic Block Filler 4000-1000; MDF 11 mil

- b. Each Finish Coat: ProMaster Interior Latex Eggshell MP-6800; MDF 1.5 mil.
 3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Devflex 4214HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
 4. Wood and Wood Doors : Satin, Water Base, Acrylic Latex.
 - a. Primer: Prime Interior 100% Acrylic Multi-Purpose Latex Stain Killer, PC 1000; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
 5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Bloxfil 4000 Interior/Exterior Heavy Duty Acrylic Block Filler 4000-1000; MDF 11 mil
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
 6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Devflex 4020 PF Direct to Metal Primer & Flat Finish; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
 7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: Prime Interior 100% Acrylic Multi-Purpose Latex Stain Killer, PC 1000; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
 8. Wood Bumpers:
 - a. Stain: DF200 semi-transparent; MDF 1.5 mil.
 - b. Clear Polyurethane: Penchrome Interior 100% Acrylic Finishes, DF 400 Satin; MDF 1.5 mil.
- G. Pittsburgh:
 1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: 6-2 Speedhide Latex Sealer; MDF 1.0 mils.
 - b. Each Finish Coat: 6-411 Speedhide Eggshell Latex; MDF 1.5 mils.
 2. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: 6-2 Speedhide Latex Sealer; MDF 1.0 mils.
 - b. Each Finish Coat: 6-411 Speedhide Eggshell Latex; MDF 1.5 mils.
 3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
 4. Wood and Wood Doors : Satin, Water Base, Acrylic Latex.
 - a. Primer: 6-855 Interior Water Base Undercoater; MDF 1.5 mils.
 - b. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
 5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: 6-7 Speedhide Block Filler; MDF 6.0 - 12.0 mils.
 - b. Each Finish Coat: 6-500 Speedhide Semi-Gloss Latex; MDF 1.2 mils.
 6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
 7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: 6-855 Interior Water Base Undercoater; MDF 1.5 mils.
 - b. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
 8. Wood Bumpers:
 - a. Stain: 77-560 Interior Oil Stain
 - b. Clear Polyurethane: 77-89 Interior Oil Satin Polyurethane
- H. Sherwin Williams:
 1. Gypsum Board: Low VOC, Eg-shell, Water Base, Acrylic Latex.
 - a. Primer: Harmony Latex Primer, MDF 1.6 mils.
 - b. Each Finish Coat: Harmony Latex Eg-Shel, MDF 1.6 mils.
 2. Masonry: Semi-Gloss, Water Base, Acrylic Latex.

- a. Primer: ProMar Interior/Exterior Block Filler, B25W25; MDF 10.0 mils
 - b. Each Finish Coat: ProMar 200 Interior Latex Egg Shell: MDF 1.5 mils.
- 3. Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Each Finish Coat: DTM Acrylic S-G, B66W200; MDF 3.0 mils.
- 4. Wood and Wood Doors : Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: PrepRite Classic Primer, B28W101, MDF 1.6 mils.
 - b. Each Finish Coat: ProClassic Waterborne S-G, MDF 1.4 mils.
- 5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: ProMar Interior/Exterior Block Filler, B25W25; MDF 10.0 mils.
 - b. Each Finish Coat: ProClassic Waterborne S-G, MDF 1.4 mils.
- 6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Pro-Cryl Universal Water Based Primer, B66-310, MDF 3.0 mils.
 - b. Each Finish Coat: DTM Acrylic S-G, B66W200; MDF 3.0 mils.
- 7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: PrepRite Classic Latex Primer, B28W300, MDF 1.6 mils.
 - b. Each Finish Coat: ProClassic Waterborne S-G, MDF 1.4 mils.
- 8. Wood Bumpers:
 - a. One Coat: Stain: Oil Stain, A48 Series.
 - b. Each Coat: Clear Polyurethane: WoodClassic Waterborne Polyurethane Varnish; A68 series MDF 1.0 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, and conditions otherwise detrimental to formation of a durable paint film.
- B. Perform preparation and cleaning procedures in accordance with paint manufacturer's published instructions for each particular substrate condition.
 - 1. Provide barrier coats over incompatible primers or remove and reprime as required.
 - 2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be painted or provide surface applied protection prior to surface preparation and painting operations. Reinstall all removed items after completion of paint work.
 - 3. Clean surfaces to be painted before applying paint of surface treatment. Remove oil and grease prior to mechanical cleaning.
- C. Ferrous Metals: Clean ferrous surfaces, that are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

1. Touch-up shop-applied prime coats, where damaged or bare. Clean and touch-up with same type shop primer.
- D. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent. Apply coat of etching primer if required by paint manufacturer.
- E. Cementitious Materials: Prepare cementitious surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.
 1. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests.
 - a. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct condition before application of paint.
 2. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed instructions.
 3. Clean floor surfaces scheduled to be painted with a commercial solution of muriatic acid, or other etching cleaner. Flush floor with clean water to neutralize acid, and allow to dry before painting.
- F. Wood: Clean wood surfaces to be painted of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes, and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
 1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends faces, undersides, and backsides of such wood, including cabinets and counters.
 2. Seal tops, bottoms, and cut-outs with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.
- G. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

3.3 APPLICATION

- A. Apply paint products in accordance with manufacturer's published instructions using application procedures approved for the particular application and substrate to the specified Minimum Dry Film Thickness (MDF). Apply each coat to uniform finish.
- B. Apply each coat slightly darker than preceding coat unless otherwise approved by Contracting Officer. Sand lightly between coats to achieve specified finish.
- C. Do not apply finishes on surfaces that are not dry.
- D. Number of coats and film thickness required is same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer.
- E. Apply additional coats when undercoats, stains, or other conditions show through final coat until paint film is of uniform finish, color, and appearance. Surfaces, including edges, corners, crevices, welds, and exposed fasteners to receive minimum dry film thickness equivalent to that of flat surfaces.
- F. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate. Provide minimum dry film thickness (MDF) of the entire coating system as indicated in Painting and Finishing Schedule at end of this Section.
- G. Block Fillers: Apply block fillers to concrete masonry units at rate to provide complete coverage with pores filled.
- H. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by manufacturer to material scheduled to be painted or finished that has not been shop primed. Recoat

primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

- I. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable.
- J. Hollow Metal Doors: Paint each door edge.
- K. Completed Work: Match Contracting Officer approved field samples for color and sheen.

3.4 MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Clean or replace identification markings on mechanical or electrical equipment when painted over or spattered.
- B. Paint both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.
- C. Prepaint Gas piping prior to installation. (Touch-up paint after installation.)
 - 1. Color:
 - a. Roof (Yellow): OSHA Standard "Safety Yellow."
 - b. Other Areas: Match adjacent surfaces.
- D. At Workroom locations, paint red background on wall behind fire extinguisher extending 6 inches on both sides of the extinguisher and from floor to ceiling, or to 12 feet above floor, whichever is lower. Color is to be OSHA Standard "Safety Red" and in accordance with ANSI Z53.1.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect painting and coating application for scheduled material, color, sheen, specified thickness (MDF), and coverage.

3.6 CLEANING

- A. As work proceeds and upon completion, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.
- D. Upon completion of work leave premises neat and clean.

3.7 PROTECTION

- A. Protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.

3.8 COLOR SCHEDULE

- A. Any proposal to substitute a color is to include manufacturer's certification that the color matches the specified Munsell notation.
- B. P-1 White (Munsell notation: #5Y 9.25/0.5NN)
 - 1. Benjamin Moore: #968.
 - 2. Comex Group (Color Wheel/Frazee/Kwal/Parker)/Duron/Frazee: #7760, Weaverbird.
 - 3. Glidden (ICI): #50YY 83/057.
 - 4. Pittsburgh: #512-1, Winter Mood.
- C. P-2 Light Gray (Munsell notation: #N8.0)
 - 1. Benjamin Moore: #1612 Base 1.
 - 2. Devoe (ICI): #1H51G, Catkin.
 - 3. Glidden (ICI): #50BG 62/007.
 - 4. Comex Group (Color Wheel/Frazee/Kwal/Parker)/Duron/Frazee: # 5441W.
- D. P-3 (Not Used)
- E. P-4 Red (Not Used)
- F. P-5 Blue (Munsell notation: #6.4PB3.24/11.0)
 - 1. Benjamin Moore: #819.
- G. P-6 Medium Gray (Munsell notation: #10B7/1)
 - 1. Sherwin Williams: SW#1232, Dublin Gray.
 - 2. ICI Dulux, #90BG41/040: Dauphin Gray.
 - 3. Comex Group (Color Wheel/Frazee/Kwal/Parker)/Duron/Frazee, # 5452M: Battleship.
- H. P-7 Semi-gloss Black

3.9 SCHEDULE OF ITEMS TO BE PAINTED

- A. Painted finishes shall be provided for, but not limited to, the following items. Refer to Drawings and Paint Color Schedule at end of this Section for designated finishes and colors of areas.
 - 1. Exterior: All exterior surfaces including, but not limited to:
 - a. Hollow metal doors and frames.
 - b. Metal opening frames and trim.
 - c. Metal flashing (if exposed from ground level) and downspout.
 - d. Metal gravelstops (vertical face).
 - e. Pipe Bollards, if not to receive plastic covers specified in Section 055000.
 - f. Metal railings.
 - g. Roof hatch.
 - h. Canopy supporting steel structure.
 - i. Wall louvers.
 - 2. Interior: All interior surfaces as scheduled on Drawings including, but not limited to:
 - a. Hollow metal doors and frames.
 - b. Hollow metal window frames.
 - c. Metal opening frames and trim.
 - d. Gypsum wallboard.
 - e. Exposed concrete unit masonry.
 - f. Pipe Bollards.
 - g. Metal railings.
 - h. Exposed structure columns.
 - i. Metal stair stringers and handrails.
 - j. Exposed wood trim.

B. Do not paint the following items:

1. Pre-finished items:
 - a. Aluminum, brass, bronze, stainless steel, and chrome plated steel.
 - b. Pre-finished items, such as toilet compartments, acoustical ceiling materials, mechanical, and electrical equipment.
 - c. UL, FM, and other code-required labels.
 - d. Equipment identification, performance rating, and name plates.
 - e. Finish hardware.
 - f. Factory finished metal wall panels, metal wall panel trim, and metal gravel stops.
2. Exposed items:
 - a. Exposed mechanical ductwork, hangers, and supports.
 - b. Exposed piping and conduit, hangers and supports.
 - c. Exposed fire protection piping, hangers and supports.
 - d. Exposed roof structure.
 - e. Exposed roof deck.

3.10 PAINTING AND FINISHING SCHEDULE

A. Interior Paint Systems:

1. Interior Gypsum Wallboard:
 - a. 1 coat Latex Wall Primer.
 - b. 1 coat Latex Eggshell Enamel
2. Interior Masonry:
 - a. 1 coat Latex Block Filler
 - b. 1 coat Latex Eggshell Enamel
3. Interior Metal:
 - a. 2 coats Latex Satin
4. Interior Wood (painted):
 - a. 1 coat Enamel Undercoat
 - b. 2 coats Alkyd Semi-Satin Enamel
5. Cast-In-Place Concrete:
 - a. One coat of Latex Masonry Block Filler.
 - b. Two tinted coats of Acrylic Latex Semi-Gloss Enamel.
6. Wood Doors - Painted.
 - a. One coat Enamel Undercoat.
 - b. Two tinted coats of Latex Semi-Gloss Enamel.
7. Ferrous Metals
 - a. Touch up Prime Coat.
 - b. Two tinted coats of Alkyd Enamel Semi-Gloss.
8. Wood Cabinets, Shelves, etc. - exposed surfaces.
 - a. One coat Primer-Sealer.
 - b. One coat Enamel Undercoat.
 - c. One coat Alkyd Enamel Semi-Gloss Enamel.
9. Wood Bumpers.

- a. Penetrating Oil Stain.
 - b. Two Coats of Clear Polyurethane Semi-Gloss Finish.
- B. Exterior Paint Systems:
 - 1. Galvanized Metal:
 - a. Touch up Prime Coat.
 - b. Two tinted coats Exterior Alkyd Enamel Semi-Gloss Enamel.
 - 2. Ferrous Metals:
 - a. Touch up Prime Coat.
 - b. Two tinted coats Exterior Alkyd Enamel Semi-Gloss Enamel.

END OF SECTION

USPS CSF Specifications issued: 5/1/2014
Last revised: 5/24/2011

SECTION 101404

POSTAL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior signage - building identification, directional and parking regulatory signs.
2. Interior signage for retail spaces.

B. The USPS Direct Vendor for supplying the exterior signage - building identification, directional and parking regulatory signs listed in this specification through the contractor is Gable Signs. No substitutions allowed.

1. In the Offer, include the estimated exterior signage cost from the Exterior Signage Pricing Form at the end of this section. This amount includes the exterior signage and shipping. It does not include installation which is part of the Work. Contractor may negotiate with the Direct Vendor for installation.
2. The contractor is to order the exterior signage from the Direct Vendor based on the Exterior Signage Pricing Form and Drawings in time to meet the schedule. Payment is to be received by the Direct Vendor from the contractor prior to shipment of the exterior signage.

C. The USPS Direct Vendor for supplying the interior signage listed in this specification through the contractor is Gable Signs. No substitutions allowed.

1. In the Offer, include the estimated interior signage cost from the Interior Signage Pricing Form at the end of this section. This amount includes the interior signage and shipping. It does not include installation which is part of the Work.
2. The contractor is to order the interior signage from the Direct Vendor based on the Interior Signage Pricing Form and Drawings in time to meet the schedule. Payment is to be received by the Direct Vendor from the contractor prior to shipment of the interior signage.

D. Related Documents:

1. The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 SUBMITTALS

A. Section 013300 - Submittal Procedures: Procedures for submittals.

1. USPS Exterior Signage vendor shop drawings have been approved by USPS Headquarters; no additional submittals are required from this vendor. Signs included in this agreement are building identification, directional and parking regulatory signs. DOT signs are not included in this agreement.
2. USPS Interior Signage vendor shop drawings have been approved by USPS Headquarters; no additional submittals are required from this vendor.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Store in original packaging, off the ground and under protective covering.
- C. Handle so as to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Exterior Signage - building identification, directional and parking regulatory signs: Gable Signs, Eric Crowe, Director of Sales & Account Management, 7440 Fort Smallwood Road, Baltimore, MD 21226, Phone (443) 817-0303, eric.crowe@gablesigns.com. USPS reserves the right to update these products through the Direct Vendor agreement.
- B. Interior Signage: Gable Signs, Eric Crowe, Director of Sales & Account Management, 7440 Fort Smallwood Road, Baltimore, MD 21226, Phone (443) 817-0303, eric.crowe@gablesigns.com. USPS reserves the right to update these products through the Direct Vendor agreements.
- C. Section 016000 - Product Requirements:
 - 1. Exterior Signage: Substitutions are not permitted.
 - 2. Interior Signage: Substitutions are not permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions by Contractor is required: Verify through field measurements that contract Documents are in accordance with actual site conditions. Verify that all sign site locations, wall surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Examine free standing sign placement locations, walls, doors, soffit and other areas scheduled to receive signs for conditions that would affect quality and execution of work.
 - 2. Check that electrical distribution for illuminated signs is complete and ready to receive signs.
 - 3. Contractor is responsible for obtaining any required permits.
- C. Contractor is to report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
- E. Contractor is responsible for reviewing contract documents to provide required electrical service to sign positions shown in the Drawings.

3.2 PREPARATION

- A. Contractor is responsible for the removal of any existing signs in preparation to receive new sign elements. Contractor will patch affected surfaces to match existing materials. Contractor must dispose of all signs in accordance with all state and local codes and ordinances. Recycling and re-use of existing sign materials is greatly encouraged. Contractor must consider the salvage value of removed signs in the cost of work.
- B. Contractor must verify that all signs ordered fit the as-built conditions of the facility.

3.3 INSTALLATION

- A. Install sign units and components at the locations shown in Drawings, securely mount with fasteners appropriate to the substrate conditions.
- B. Install signs on facility property clear of public right of ways and utilities.
- C. Install foundations for all free standing signs.
- D. Verify that all internal roadway, street and traffic conditions are in accordance with the signs selected and shown on Contract Documents prior to purchase and installation of exterior signage.
- E. Connect signs to control devices and electrical service as required in the Drawings. Coordinate with the USPS Sign Vendor time clock settings and power service required for checking lighting and operational status of all sign hardware.
- F. Install interior sign units and components at the locations shown or scheduled, securely mount with concealed theft-resistant fasteners. Attach signs to substrates in accordance with the manufacturer's instructions.
- G. Install level, plumb, and at the proper height and alignments. Cooperate with other trades for installation of sign units to finish surfaces.
 - 1. Coordinate the mounting height of the USPS "station ID", "Hours of Operation" or other door mounted vinyls with any code-required signs for automatic doors.
- H. Sign manufacturer to provide template for spacing of letters.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect signage locations, attachments, and messages to verify installation conforms with Drawings.

END OF SECTION

USPS CSF Specifications issued: 5/1/2014
Last revised: 5/31/2011

SECTION 101414

MISCELLANEOUS SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Miscellaneous building signage.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Indicate sign styles, lettering font, foreground and background colors, locations, and overall dimensions of each sign.
 - b. Setting details for installation in concrete footings.
 - 2. Samples: Submit two sample signs 12 inches (30 cm) x 12 inches (30 cm) in size illustrating type, style, letter font, and colors specified; method of attachment.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
 - c. Manufacturer's Instructions: Include installation template, attachment devices, and procedures for care of finished surfaces.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials to project site in manufacturer's original unopened protective packaging.
- C. Identify contents, manufacturer, brand name, thermal values, and applicable standards.
- D. Store in original packaging, off the ground and under protective covers.
- E. Handle so as to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. APCO, Atlanta, GA (404) 688-9000.
 2. ASI Sign Systems, Incorporated, Dallas, TX (800) 274 7732.
 3. Gable Signs, Eric Crowe, Director of Sales & Account Management, 7440 Fort Smallwood Road, Baltimore, MD 21226, Phone (443) 817-0303, eric.crowe@gablesigns.com
 4. Neokraft Signs, Incorporated, Lewiston, ME (800) 339-2258.
 5. Vomar Products, Incorporated, Van Nuys, CA (800) 521-2737.
 6. 2/90 Sign Systems, Grand Rapids, MI (800) 777-4310.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 SIGNAGE

- A. Construction Site Sign:
1. Silk-screened, painted or pressure-sensitive vinyl letters applied to Medium Density Overlay plywood sign.
 2. Red: Match Benjamin Moore OP-67.
 3. Blue: Match PPG 7062 Federal Blue.
 4. White background.
- B. Pictographs:
1. AIGA Symbol Signs reproducible art developed for the U.S. Department of Transportation is to be used whenever possible. Room signs shall have 1/32 inch raised one inch high Helvetica Medium (upper and lower case) lettering and Braille.
 2. Size: As indicated on drawings.
 3. Material: Plastic.
 4. Color: Use colors below, unless designated by AIGA.
 - a. Foreground (Characters and/or Graphics): White: Match P-1 in Section # 099100, Painting.
 - b. Background: Blue: Match P-5 in Section # 099100, Painting.
- C. Room and Directional Signage
1. Room signs shall have 1/32 inch raised one inch high Helvetica Medium (upper and lower case) lettering and Braille.
 2. Size: 16 inches (40 cm).
 3. Material: Plastic.
 4. Color:
 - a. Foreground (Characters and/or Graphics): White: Match P-1 in Section # 099100, Painting.
 - b. Background: Blue: Match P-5 in Section # 099100, Painting.
- D. Egress Signage:
1. When required by public authority, provide signage in one inch high Helvetica Medium (upper and lower case) letters, in contrasting color to background to read: "This Door To Remain Unlocked During Business Hours." Doors requiring signage will be indicated on either the hardware schedule or door schedule.
- E. Exit Door Tactile Sign

1. Provide signage to read "Exit" at egress doors. In contrasting color to background, signs shall have 1/32 inch raised one inch high Helvetica Medium (upper and lower case) lettering and Braille.
2. Product: Same as Room and Directional signage.
3. Size: 6 inch (15 cm)
4. Color:
 - a. Foreground (Characters and/or Graphics): White: Match P-1 in Section # 099100, Painting.
 - b. Background: Blue: Match P-5 in Section # 099100, Painting.

2.3 FASTENERS AND OTHER MATERIALS

- A. Provide non-corrosive fasteners, hangers, and mounting devices which are compatible with sign material and finish.
- B. Other materials, not specifically described, but required for a complete and proper installation of signs, shall be as selected and subject to approval of the Contracting Officer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 1. Examine foundations, walls, doors, ceilings and other areas scheduled to receive signs for conditions that would affect quality and execution of work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Install signage in accordance with manufacturer's published instructions.
- B. Install sign units and components at the locations shown or scheduled, securely mount with concealed theft-resistant fasteners. Attach signs to substrates in accordance with the manufacturer's instructions.
- C. Install level, plumb, and at the proper height. Cooperate with other trades for installation of sign units to finish surfaces.
- D. Sign manufacturer to provide template for spacing of letters.

3.3 CONSTRUCTION

- A. Interface with Other Work:

1. Furnish full-size spacing templates for individually bundled letters and numbers for coordination with work of other trades.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect signage locations, attachments, and messages to verify installation conforms to Drawings.

3.5 MISCELLANEOUS INTERIOR SIGNAGE

Item number	Description
1.	FIRST AID
2.	FIRE EXTINGUISHER
3.	NO SMOKING
4.	ELECTRICAL HAZARD
5.	TOILETS, MEN
6.	TOILETS, WOMEN
7.	TOILETS, UNISEX
8.	LUNCH ROOM
9.	OFFICE
10.	STORAGE
11.	CUSTOMER SERVICE MANAGER
12.	POSTMASTER OFFICE
13.	MANAGER
14.	MEETING ROOM
15.	CONFERENCE ROOM
16.	EXIT (Tactile Sign)
17.	JANITOR'S CLOSET
18.	EQUIPMENT ROOM
19.	STAMP ENVELOPE
20.	ELECTRICAL ROOM
21.	MEN'S LOCKER ROOM
22.	WOMEN'S LOCKER ROOM
23.	POSTAL SUPPLIES
24.	CUSTODIAL SUPPLIES
25.	POSTAL EQUIPMENT
26.	POSTAL RECORDS
27.	RECYCLING ROOM
28.	BATTERY CHARGING ROOM
29.	FLAMMABLE LIQUID STORAGE
30.	SCALE ROOM
32.	TEL.EQUIP. ROOM
33.	FOLDING GRILLE DOOR

END OF SECTION

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Last revised: 9/3/2013

SECTION 101453
TRAFFIC SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Department of Transportation (DOT) traffic control signs.

B. Related Documents:

1. The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 SUBMITTALS

A. Section 013300 - Submittal Procedures: Procedures for submittals.

1. Signage Schedule: Submit signage selection schedule indicating quantity and location of each type of DOT sign required to Contracting Officer.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.

B. Store in original packaging, off the ground and under protective covering.

C. Handle so as to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. DOT (Department of Transportation) Traffic Control Signs. The Contractor is responsible to furnish and install (including foundations) all DOT Traffic Control Signs as indicated in the Drawings.

B. Section 016000 - Product Requirements:

1. DOT Traffic Control Signs. See Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

A. Contractor is responsible to purchase and install all exterior DOT (Department of Transportation) traffic control signage as shown in the Drawings.

1. Traffic Signs: Sign post are to be steel tubes painted blue to match exterior signage by direct vendor. Size of posts and heights of signs are as indicated on the drawings. Sign face background is 0.063 inch aluminum plate, cut to size and attached to sign post with non-corrosive 3/8 inch machine bolts with washers, two per sign.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions by Contractor is required: Verify through field measurements that contract Documents are in accordance with actual site conditions. Verify that all sign site locations, wall surfaces, substrates and conditions are as required, and ready to receive Work.
 1. Examine free standing sign placement locations, walls, doors, soffit and other areas scheduled to receive signs for conditions that would affect quality and execution of work.
 2. Check that electrical distribution for illuminated signs is complete and ready to receive signs.
 3. Contractor is responsible for obtaining any required permits.
- C. Contractor is to report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
- E. Contractor is responsible for reviewing contract documents to provide required electrical service to sign positions shown in the Drawings.

3.2 PREPARATION

- A. Contractor is responsible for the removal of any existing signs in preparation to receive new sign elements. Contractor will patch affected surfaces to match existing materials. Contractor must dispose of all signs in accordance with all state and local codes and ordinances. Recycling and re-use of existing sign materials is greatly encouraged. Contractor must consider the salvage value of removed signs in the cost of work.
- B. Contractor must verify that all signs ordered fit the as-built conditions of the facility.

3.3 INSTALLATION

- A. Install sign units and components at the locations shown in Drawings, securely mount with fasteners appropriate to the substrate conditions.
- B. Install signs on facility property clear of public right of ways and utilities.
- C. Install foundations for all free standing signs.
- D. Verify that all Department of Transportation (DOT) traffic control signs shown in the Drawings are accurate and in compliance with all state and local codes and ordinances.

- E. Verify that all internal roadway, street and traffic conditions are in accordance with the signs selected and shown on Contract Documents prior to purchase and installation of DOT traffic control signs.
- F. Install level, plumb, and at the proper height. Cooperate with other trades for installation of sign units in all locations and to all finished surfaces.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect signage locations, attachments, and messages to verify installation conforms with Drawings.

END OF SECTION

USPS CSF Specifications issued: 5/1/2014
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SECTION 101500

BULLETIN BOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass enclosed metal framed bulletin boards.
 - 2. Fabric wrapped bulletin boards.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Claridge Products and Equipment, Incorporated, Harrison, AR (870) 743-2200.
 - 2. Greensteel, Incorporated, Dixonville, PA (800) 766-4204.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 METAL FRAMED BULLETIN BOARDS

- A. Manufacturer: Claridge.
- B. Model 294 and 296 including the following:
 - 1. Sizes:
 - a. 294: 36 inches high by 48 inches wide.
 - b. 296: 36 inches high by 72 inches wide.
 - 2. Doors: Two 1/4 inch thick tempered glass, sliding, with integral cylinder lock device.
 - 3. Door Shoe, Channel and Track Material: Heavy gauge extruded aluminum.
 - 4. Door Shoe, Channel and Track Finish: Clear anodized brushed aluminum.
 - 5. Back Panel: No. 930, Hook Fab, with 7/32 inch cork underlay.
 - 6. Back Panel Color: #949 "Cloud".

2.3 FABRIC WRAPPED BULLETIN BOARDS

- A. Manufacturer: Claridge
- B. Designer Series 3104EW
 - 1. Size: As indicated
 - 2. Color: Selected from manufacturer's standard colors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install bulletin boards in accordance with manufacturer's published instructions in locations indicated on Drawings.
- B. Mount bulletin board plumb and level.

END OF SECTION

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SECTION 102600

WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood Polymer Lumber Bumpers
 - 2. Wood Bumpers
 - 3. FRP Wall Protection
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- C. Related Sections:
 - 1. Section 061000, Rough Carpentry.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals:
 - 1. Product Data: Indicate materials, construction, configuration, dimensions, and finishes.
 - 2. Assurance / Control Submittals:
 - a. Certificates: Manufacturer's certificate that products meet or exceed specified requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements:
 - 1. Transport, handle, store, and protect products.

PART 2 - PRODUCTS

2.1 WOOD POLYMER LUMBER

- A. Subject to compliance with project requirements, manufacturers offering wood polymer lumber Products which may be incorporated in the Work include the following:
 - 1. Amazing Recycled Products, Denver, CO (800) 241-2174.
 - 2. Eagle Recycled Products, Anaheim, CA (800) 448-4409.
 - 3. Trex Company, LLC, Winchester, VA (800) 289-8739.
 - 4. Phoenix Recycled Plastics Corporation, Philadelphia, PA (610) 940-1590.
 - 5. Engineered Plastic Systems, Cary, IL (847) 462-9001.
- B. Product Description:
 - 1. Solid reclaimed polyethylene or solid homogenous blend of approximately 50 percent reclaimed polyethylene and 50 percent waste wood (non-virgin).

2.2 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

- A. Subject to compliance with project requirements, manufacturers offering plastic sheeting or fiberglass reinforced plastic (FRP) panels which may be incorporated in the Work include the following:

1. Crane Composites, Channahon, IL (800) 435-0080
2. Glasteel, _Moscow, TN (800) 238-5546
3. Kalwall, Bow, NH (800) 526-1609

B. PRODUCT DESCRIPTION

1. Nominal 1/8" thick, white embossed finish, Class A Fire Rated panels.
2. Provide Manufacturer's trim, joining and cap accessories and Install panels in strict accordance with Manufacturer's recommendations.

- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.3 WOOD LUMBER BUMPERS

- A. Wood lumber bumpers shall be constructed of Douglas fir, southern pine, or western larch. Grade to be select structural. Exterior wood lumber bumpers shall be pressure treated and carry the AWPA Standard U1 quality control mark.

- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.4 FASTENERS FOR WOOD AND WOOD POLYMER WALL BUMPERS

- A. Concrete wall - 5/8 inch diameter x 5-1/2 inch (minimum) hooked bolts with heavy flat washer, lock washer and hex head nut.

- B. Masonry wall - 5/8 inch diameter x 5-1/2 inch (minimum) hooked bolts with heavy flat washer, lock washer and hex head nut - plush fill concrete masonry block cavities with concrete to 48 inch minimum for double bumpers and to 24 inch minimum for single bumper.

- C. Metal stud wall - 1/2 inch diameter (minimum) toggle bolts plus a continuous 14 gauge metal plate backing welded to the metal studs.

- D. Wood stud wall - 5/8 inch diameter x 5-1/2 inch (minimum) lag bolts plus 3 x 4 wood blocking between studs for frame wall anchorage.

- E. Wood stud wall with 4 x 4 spacer - 5/8 inch diameter x 9-1/2 inch (minimum) lag bolts.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Section 017300 - Execution:

1. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive work.

B. Follow manufacturer's recommended guidelines for cutting, fastening and installing wood polymer lumber. Refer to Report Number A237-06170/MOB, printed 1994.

C. Provide for 1/8 inch gap at ends of pieces and parts of wood polymer lumber to wood polymer lumber and wood polymer lumber to other materials.

D. No color is to be applied to the wood polymer lumber. Use standard color (neutral).

3.2 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements - Field Inspection.

END OF SECTION

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SECTION 102613
CORNER GUARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Corner guards.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 061000 - Rough Carpentry.
 - 2. Section 092900 - Gypsum Board.
 - 3. Section 099100 - Painting.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Submit shop drawings indicating dimensions, locations, types, sizes, and finishes for Architect's approval.

1.3 SEQUENCING

- A. Coordinate installation with wall construction, including concealed blocking or anchoring devices, installation of wall base, and painting.

1.4 WARRANTY

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Balco/Metalines, Inc., Wichita, KS (800) 767-0082.
 - 2. Construction Specialties, Inc. (C/S), Muncy, PA (800) 233-8493.
 - 3. Pawling Corporation, Wassaic, NY (800) 431-3456.
 - 4. InPro Corporation, Muskego, WI, (800) 222-5556.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 CORNER GUARDS

- A. Subject to compliance with requirements, provide corner guards by one of the following manufacturers:
 - 1. Balco: Corner Guards Surface Mounted Type CGS-3, 177P Graphite.
 - 2. Construction Specialties: Acrovyn - SM-20, 111 Wedgewood Blue.
 - 3. Pawling: Pro-Tek Corner Guards Surface Mounted CG-10 with TC-10, A265 Windsor Blue.
 - 4. InPro Corporation: Type 150, 0135 Brittany Blue.
- B. Corner Guards: 4'-0" long snap-on covers of Class 1 fire-rated resilient material, minimum 0.078 inch thick, free-floated over continuous aluminum retainer, 0.063 inch thick, surface mounted and anchored to wall at 20 inches on center maximum; molded end caps color matched to covers.

2.3 ACCESSORIES

- A. Provide attachment accessories as recommended by corner guard manufacturer.

2.4 FABRICATION

- A. Fabricate components with tight joints, corners, and seams.
- B. Pre-drill holes for attachment.
- C. Form end trim closure by capping and finishing smooth.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's published instructions, square and plumb, secured rigidly in position.
- B. Install corner guards with tops at 5'-0" above finished floor.

END OF SECTION

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SECTION 102813
TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Toilet Accessories.
 - 2. Attachment hardware.
- B. Related Documents: The Contract Documents, as defined in the General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 061000 - Rough Carpentry: Placement of backing and blocking for attachment of accessories.
 - 2. Section 092216: Placement of backing plate reinforcement for attachment of accessories.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A 167 - Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - 3. ASTM A 366 - Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data for each accessory describing size, finish, details of function, and attachment methods.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to United States Postal Service "Standards for Facility Accessibility by the Physically Handicapped" Handbook RE-4 for mounting heights and locations of accessories.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver accessories in original labeled packaging, bearing manufacturer's name and type of accessory.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. American Specialties Company, Incorporated, Yonkers, NY (914) 476-9000.
 - 2. Bobrick Washroom Equipment, Incorporated, North Hollywood, CA (818) 764-1000.
 - 3. Bradley Corporation, Milwaukee, WI (414) 251-6000.
 - 4. McKinney Parker, Scranton, PA (570) 969-9770.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Sheet Steel: ASTM A 366.
- B. Galvanized Sheet Steel: ASTM A 366, ASTM A 123 to 1.25 ounces per square yard.
- C. Stainless Steel Sheet: ASTM A167, Type 304.
- D. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof.
- E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 MANUFACTURED UNITS

- A. AC-1 - Surface Mounted Liquid Soap Dispenser, (install one dispenser per lavatory):
 - 1. Model Numbers:
 - a. American Specialties: 0342.
 - b. Bobrick: B-2112.
 - c. Bradley: 6542.
 - d. McKinney: 304-H
 - 2. Description: Horizontal tank type for all-purpose liquid soap. Minimum 20 gage Type 304 stainless steel. Drawn one-piece construction. No. 4 satin finish. Concealed stainless steel wall plate. Clear plastic refill indicator window. Locked hinged stainless steel lid for top filling. Minimum 40 ounce capacity.
- B. AC-4A - Mirror with Stainless Steel Channel Frame:
 - 1. Model Numbers:
 - a. American Specialties: 0600.
 - b. Bobrick: 165 series.
 - c. Bradley: 780.
 - d. McKinney:
 - 2. Description: 18 inches wide x 36 inches high. Minimum 20 gage stainless steel, all joints mitered, welded and ground smooth. Type 430 bright polished finish. Galvanized steel back with slots for mounting screws and integral screw-head lock. Back protected by shock-absorbing water-resistant padding. Ten year warranty against silver spoilage.
- C. AC-5 - Mop and Broom Holder:
 - 1. Model Numbers:
 - a. American Specialties: 8215B.

- b. Bobrick: B-223.
 - c. Bradley: 9954.
 - d. McKinney: 233.
 - 2. Description: 36 inches long, 3 inch projection, 4 holders. Minimum 22 gage, Type 304 stainless steel hat channel. Spring loaded rubber cam-type mop holders. No. 4 Satin finish.
- D. AC-6 - Surface-Mounted Multi-Roll Tissue Dispenser:
- 1. Model Numbers:
 - a. American Specialties: 0030.
 - b. Bobrick: B-2888.
 - c. Bradley: 5402.
 - d. McKinney: 615.
 - 2. Description: Minimum 22 gage Type 304 stainless steel cabinet. Minimum 18 gage drawn one-piece Type 304 stainless steel unit front with pivot hinge and tumbler lockset. No. 4 satin finish. Holds 2 standard core 5 inch diameter tissue rolls. Reserve roll drops in-place by automatic release. Theft-resistant spindles.
- E. AC-8 - Grab Bar - 36 Inch:
- 1. Model Numbers:
 - a. American Specialties: 3100 series.
 - b. Bobrick: B-5806x36.
 - c. Bradley: 832 series.
 - d. McKinney: 9602.
 - 2. Description: 1-1/4 inch minimum to 2 inch maximum diameter (1-1/2 inch diameter when required by local code) 36 inch long, horizontal, 1-1/2 inch wall clearance. Type 304 minimum 18 gage stainless steel. Concealed screw attached mounting and anchorage. No. 4 satin finish. Minimum 900 pound supporting capacity.
- F. AC-9 - Grab Bar - 42 Inch:
- 1. Model Numbers:
 - a. American Specialties: 3100 series.
 - b. Bobrick: B5806x42.
 - c. Bradley: 832 series.
 - d. McKinney: 9602.
 - 2. Description: 1-1/4 inch minimum to 2 inch maximum diameter (1-1/2 inch diameter when required by local code) 42 inch long, horizontal. 1-1/2 inch wall clearance. Type 304 minimum 18 gage stainless steel. Concealed screw attached mounting and anchorage. No. 4 satin finish. Minimum 900 pound supporting capacity.
- G. AC-10 - Recessed Sanitary Napkin Disposal:
- 1. Model Numbers:
 - a. American Specialties: 0473.
 - b. Bobrick: B-353.
 - c. Bradley: 4731-15.
 - d. McKinney: 827.
 - 2. Description: Minimum 22 gage Type 304 stainless steel. Drawn and beveled one-piece seamless flange. Spring-loaded, self-closing door with full-length stainless steel piano hinge. No. 4 satin finish. Removable leak-proof, rigid molded polyethylene waste receptacle. International graphic symbol on door. Minimum 1.2 gallon capacity.
- H. AC-14 – Vertical Grab Bar:
- 1. Model Numbers:
 - a. American Specialties: 3100 Series
 - b. Bobrick: 5806 x 18
 - c. Bradley: 832 Series
 - d. McKinney: 9602 Series

2. Description: 1-1/4 inch *minimum to 2 inch maximum* diameter (1-1/2 inch diameter when required by local code) 18 inch long, vertical. 1-1/2 inch wall clearance. Type 304 minimum 18 gage stainless steel. Concealed screw attached mounting and anchorage. No. 4 satin finish. Minimum 900 pound supporting capacity.

2.4 FABRICATION

- A. Weld and grind smooth joints of fabricated components.
- B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.
- C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges.
- D. Shop assemble components and package complete with anchors and fittings.
- E. Provide steel anchor plates, adapters, and anchor components for installation.
- F. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 1. Verify correct location of opening in wall for recessed accessories.
 2. Verify that attachment blocking and backing plates are in place in the correct location for accessory connections.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site for scheduled installation.
- B. Provide and use templates and rough-in measurements as required.

3.3 INSTALLATION

- A. Install fixtures, accessories, and items in accordance with manufacturer's instructions, US Postal Service handicapped requirements, and as indicated on Drawings. Use tamper-proof fasteners.
- B. Install plumb and level, securely and rigidly anchored to substrate.

3.4 ADJUSTING AND CLEANING

- A. Adjust accessories for proper operation and verify mechanisms function smoothly.
- B. Remove temporary labels and protective coatings. Clean and polish exposed surfaces.

END OF SECTION

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SECTION 104400

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes.
 - 1. Fire extinguishers.
 - 2. Fire extinguisher cabinets.
 - 3. Mounting brackets.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 10 - Portable Fire Extinguishers.
- B. Underwriters Laboratories, Inc. (UL):
 - 1. UL 299 - Dry Chemical Fire Extinguishers.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Extinguisher type, operational features, color.
 - b. Cabinet type, materials, construction, features, color, finish and attachment method.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to NFPA 10 and local jurisdiction for requirements for extinguisher location and mounting.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products that may be incorporated in the work include the following:
 - 1. J.L. Industries, Bloomington, MN (800) 554-6077.
 - 2. Larsen's Manufacturing Company, Minneapolis, MN (800) 527-7367.
 - 3. Potter-Roemer, Incorporated, Cerritos, CA (800) 366-3473.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Extinguisher: Multipurpose dry chemical type, UL 299; UL-rated 4-A:60:B:C. 10 pound nominal capacity in enameled steel container.
- B. Mounting Bracket: Metal designed to prevent accidentally dislodging extinguisher, of size required for type and capacity of extinguisher specified, screw attached to wall. Brite chrome finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify rough openings for cabinet are correctly sized and located.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Install extinguisher and bracket or cabinet in accordance with manufacturer's published instructions in locations required by authority having jurisdiction.
- B. Secure rigidly in place.
- C. Locate extinguishers where indicated on Drawings.
- D. Mount brackets so top of extinguisher is maximum 60 inches above finish floor.
- E. At Workroom locations, paint red background on wall behind fire extinguisher extending 6 inches on both sides of the extinguisher and from floor to ceiling, or to 12 feet above floor, whichever is lower. Color is to be "Safety Red" as specified in Section 099100, Painting.

END OF SECTION

USPS CSF Specifications issued: 5/1/2014
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SECTION 105113

METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wardrobe locker units with hinged doors.
 - 2. Metal bases and filler panels.
 - 3. Locker room benches.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data on locker types, sizes, and accessories.
 - 2. Product Data: Data on bench construction, dimensions, configuration, and accessories.
 - 3. Shop Drawings: Indicate layout, dimensions, details of fabrication and installation. Include plans, elevations, sections, and attachments to other Work.
 - 4. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Manufacturer's Instructions: Indicate component installation assembly, and installation instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials to project site in manufacturer's original unopened protective packaging.
- C. Identify contents, manufacturer, brand name, thermal values, and applicable standards.
- D. Store materials in area protected from weather and construction operations.
- E. Protect Work from damaged during transportation, storage at Project Site, and throughout tenure of work. Protect adjacent Work and materials from damage during progress of specified Work. Damaged Work shall be repaired or replaced at no additional cost to the United States Postal Service. Furnish receipts of all loose or detachable parts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. HSS Industries, Incorporated, Traverse City, MI (800) 330-9701.
 - 2. Lyon Metal Products, LLC, Aurora, IL (800) 323-0096.
 - 3. Medart, Incorporated, Greenwood, MS (800) 647-7155.
 - 4. Penco Products, Incorporated, Oaks, PA (800) 562-1000.
 - 5. Republic Storage Systems Company, Canton, OH (800) 477-1255.
- B. Subject to compliance with project requirements, manufacturers offering Locker Room Benches which may be incorporated in the Work include the following:
 - 1. DeBourgh Manufacturing Company, La Junta, CO, (800) 328-8829
 - 2. Lyon Metal Products, Aurora, IL, (800) 323-0096
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Type: Double Tier lockers with sloped tops and "Z" type metal base.
- B. Sheet Steel: Commercial grade, mild annealed, cold rolled and stretcher leveled with the following thickness:
 - 1. Body and shelf: Minimum 24 gauge.
 - 2. Door Frames: Minimum 16 gauge:
 - 3. Tops and trim: Minimum 18 gauge.
- C. Hinges: Minimum 2 inches high, 0.050 inch thick steel, 4 or 5 knuckle with spun over pin ends.
- D. Fittings:
 - 1. Recessed locking handles with provisions for Contractor furnished padlocks.
 - 2. One double and three single prong coat hooks.
 - 3. Door numbers with numbers as directed.
 - 4. Rubber bumpers.
- E. Locker Unit Size: 12 inches wide by 15 inches deep by 72 inches high
- F. Bodies: Formed and flanged.
- G. Door Frames: Formed channel shaped, welded and ground flush.
- H. Doors: One piece with vertical edges channel shaped, top and bottom, flanged at 90 degree angle, hinges welded to door and bolted to frame and ventilation louvers and top and bottom.
- I. Sloped tops: Continuous with closed ends where exposed.
- J. Fasteners and Anchors: As recommended by locker manufacturer.
- K. Finish:
 - 1. Preparation: Clean, degrease and neutralize.
 - 2. Paint Materials and Application: Powder coat or electrostatically sprayed with heavy coat high quality enamel and baked at 300 degrees Fahrenheit, capable of withstanding hammer test without chipping and flaking.
 - 3. Finish Color: Gray to match specified interior paint finishes.
- L. Padlocks: Combination lock with master-key operation at back of lock.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication of special components, when possible, to ensure proper fitting of work. However, allow for adjustment and fitting of trim and filler panels whenever taking of field measurements before fabrication might delay Work.

3.3 INSTALLATION

- A. Install metal lockers at locations indicated on Drawings in accordance with manufacturer's published instructions.
- B. Install lockers plumb, level, rigid, and flush.
- C. Space fastenings about 48 inches on center, unless otherwise recommended by manufacturer. Install through back-up reinforcing plates where necessary to avoid metal distortion. Conceal fasteners.
- D. Install trim where indicated, use concealed fasteners to provide flush, hairline joints with adjacent surfaces.
- E. Install benches in accordance with manufacturer's published instructions in locations indicated on Drawings.
- F. Bench Quantity: As indicated on Drawings.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect installation of lockers, benches, attachments, and alignment with adjacent finishes.
- C. Operate locker doors and locking devices.

3.5 ADJUSTING AND CLEANING

- A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices are operating properly.

- B. Touch-up marred finishes. Use only materials and procedures recommended or furnished by locker and bench manufacturer. Replace units which cannot be restored to factory-finished appearance.

END OF SECTION

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SECTION 107500

FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum ground mounted flagpole.
 - 2. Truck, halyards, and accessories.
 - 3. Concrete flagpole foundation base.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 033000 - Cast-In-Place Concrete: Concrete base.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM B 241 - Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Pole With Flag Flying: Resistant without permanent deformation, 100 miles per hour wind velocity, non-resonant, safety design factor of 1.0.
 - 2. Flag Dimension: 4 foot x 6 foot. Coordinate recommended flag size with manufacturer.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data on pole, accessories, and configurations.
 - 2. Shop Drawings: Detailed dimensions, anchor requirements, imposed loads, and foundation system.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Design flagpole foundation under direct supervision of a Professional Structural Engineer licensed in the State where Project is located, experienced in the design of flagpole supports.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- C. Protect flagpole and accessories on site from damage or moisture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. American Flagpole, Division of Kearney-National Incorporated, Abingdon, VA (800) 368-7171.
 - 2. Concord Industries, Incorporated, Addison, TX (800) 527-3902.
 - 3. Eder Flag Manufacturing Company, Incorporated, Oak Creek, WI (800) 558-6044.
 - 4. Pole-Tech Company, Incorporated, East Setauket, NY (800) 633-6733.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Pole Type: Commercial internal halyard cone tapered aluminum with ground sleeve.
- B. Flagpole: ASTM B 241; 6063-T6 wrought alloy aluminum, cone tapered.
 - 1. Outside Butt Diameter: 5-1/2 inches.
 - 2. Outside Tip Diameter: 3-1/2 inches.
 - 3. Nominal Wall Thickness: 0.188 inches.
 - 4. Nominal Height: 25 foot 0 inches , measured from top of flagpole base.
 - 5. Mounting: Ground mounted to concrete foundation and base.
- C. Truck Assembly: Aluminum; revolving; stainless steel ball-bearings, non-fouling.
- D. Halyard: Stainless steel aircraft cable with four chrome plated bronze swivel snaphooks, plastic covered counterweight, and beaded sling.
- E. Hand Crank: Removable type with automatic brake system to permit locking of flag in any position.
- F. Collar: Spun aluminum to match pole.
- G. Foundation Sleeve: 16 gauge steel, galvanized corrugated tube with 3/16 inch thick steel base plate and support plate, 3/4 inch diameter x 18 inch long ground spike, and steel centering wedges.
- H. Concrete: Specified in Section 033000.
- I. Flags: Furnished and installed by United States Postal Service.

2.3 FINISHES

- A. Metal Surfaces in Contact with Concrete: Asphaltic paint.

- B. Aluminum: AA M32-C22-A41 Clear anodized.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.3 INSTALLATION

- A. Install flagpole base assembly, and accessories in accordance with manufacturer's published instructions.
- B. Electrically ground flagpole installation.
- C. Install foundation plate and centering wedges for flagpole base set in concrete base and fasten. Fill foundation tube sleeve with sand and compact.

3.4 CONSTRUCTION

- A. Site Tolerances:
 - 1. Maximum Variation From Plumb: One inch.

3.5 ADJUSTING AND CLEANING

- A. Clean flagpole surfaces immediately prior to installation.
- B. Adjust operating devices for smooth halyard and flag function.

END OF SECTION

USPS CSF Specifications issued: 5/1/2014
Last revised: 4/12/2011

SECTION 111300
LOADING DOCK EQUIPMENT

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dock bumpers.

1.2 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI MH14.1 - Industrial Loading Dock boards (Ramps).

1.3 SUBMITTALS

A. Submittal Procedures: Procedures for submittals.

1. Product Data:
 - a. Bumpers: Indicate unit dimensions, method of anchorage, and details of construction.
 - b. Levelers: Indicate materials and finish, installation details, roughing-in measurements, and operation of unit.
2. Shop Drawings: Indicate required opening dimensions, tolerances of opening dimensions, placement dimensions, and perimeter conditions of construction.
3. Certificate of Assurance:
 - a. Test Reports: Report from approved Independent Testing Agency indicating compliance of Dock Leveler with requirements of ANSI MH14.1.
 - b. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

A. Dock Levelers: Conform to requirements of ANSI MH14.1.

B. Qualifications:

1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Product Requirements: Transport, handle, store, and protect Products.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with project requirements, manufacturers offering Products, which may be incorporated in the Work, include the following:

1. APS Resource; Mequon, WI; (262) 518-1000
2. Blue Giant Equipment Corporation, ON; (800) 872-2583
3. Chalfant Dock Equipment, Inc.; Cleveland, OH; (800) 365-0389.

4. Frommelt Industries; Dubuque, IA; (800) 553-4834.
5. Kelley Dock Systems, Milwaukee, WI; (262) 679-6200
6. W.B. McGuire Company, Incorporated, Hudson, NY; (800) 624-8473.
7. Nordock USA, Greenville, SC (866) 885-4276
8. NOVA Technology, Inc., Menomonee Falls, WI; (800) 236-7325.
9. Pioneer Dock Equipment, Spring Hill TN; (931)486-2296.
10. Rite Hite Corporation, Milwaukee, WI; (800) 456-0600.
11. Southern Dock Products, (800)994-2361
12. Flexon Inc., Pittsburgh, PA; (800)365-3667
13. Serco Comp., Carrollton, TX; (800)933-483
14. Four Front Intermatic Carrollton, TX (972)466-0707.

B. Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 DOCK BUMPERS

A. Dock Bumpers at Non-Leveler Locations:

1. Molded rubber, ozone resistant, nylon or polyester reinforced, minimum Shore A Durometer of 80, tensile strength of 950 to 1050 psi.
2. Thickness from wall, 6 inch minimum.
3. Pre-drilled, countersunk mounting holes.

B. Attachment Hardware: 3/4-inch (2 cm) diameter galvanized bolts and "L" shape anchor rods cast into concrete.

2.3 DOCK SEALS

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Execution Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Install dock bumpers on steel bollards in accordance with manufacturer's instructions.
- C. Set square and level.

3.3 ADJUSTING

- A. Adjust installed unit for smooth and balanced operation.

3.4 OPERATING INSTRUCTION

- A. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance that is required to ensure normal operation.
- B. Provide one complete set of equipment operating, installation, and programming manuals that will remain at the installed location.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018
Last revised: 8/30/2018

SECTION 111304

DOCK LIFT (SCISSORS TYPE)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Surface mounted scissors type dock lift.
 - 2. Structure and operating characteristics.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 055000, Metal Fabrications: for pipe bollards.
 - 2. Section 08360, Sectional Overhead Doors

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI MH29.1 - Safety Requirements for Industrial Scissors Lifts.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Indicate materials and finish, installation details, roughing-in measurements, and operation of unit.
 - 2. Shop Drawings: Indicate required opening dimensions, tolerances of opening dimensions, perimeter conditions of construction, and electrical connections.
 - 3. Assurance/Control Submittals:
 - a. Test Reports: Report from approved Independent Testing Agency indicating compliance of Dock Lift with requirements of ANSI MH29.1.
 - b. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operating and Maintenance Data:
 - a. Manufacturer's operating and maintenance instructions.
 - b. Name, address, and telephone number of nearest authorized service representative.
 - c. Complete parts list.
 - 2. Operation Instruction: Document training by furnishing a sign-in sheet with a description of the training provided, instructors name and organization and those who received training. Refer to 017704 1.3, 1.4 and 1.5 for more specific training requirements.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of ANSI MH29.1.
- B. Qualifications:
 - 1. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. This product must be manufactured by a USPS Direct Vendor and is subject to a USPS price and requirements purchasing agreement. The order must be placed using the vendor's web-based ordering system: <https://www.uspslifts.com> .
 - 1. Advance Lifts Model 6568 (surface mounted).
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not permitted.

2.2 SURFACE MOUNTED SCISSORS TYPE DOCK LIFT

- A. Description:
 - 1. Type: Single-scissors-type hydraulic dock lift designed to be anchored to a concrete apron.
 - 2. Rated Lifting Capacity: ANSI MH29.1, 5,500 pounds.
 - 3. Vertical Travel: Minimum 53 inches.
 - 4. Travel Speed: 13 feet per minute.
 - 5. Lowered Height: 5 inches.
 - 6. Platform Size: 6 feet wide x 8 feet long with extended bridge.
 - 7. Audible travel warning device with adjustable volume control that operates in up and down travel motion.
 - 8. Flashing travel lights that that operates in up and down travel motion.
 - 9. Self contained power unit.
 - 10. Quick disconnect: Twist lock removable controls.
- B. Construction: Fabricate from structural steel shapes rigidly welded and reinforced to withstand deformation during operating and stored phases of service.
- C. Platform: Fabricate from heavy steel plate with beveled toe guards on all four sides complying with requirements of ANSI MH29.1. Provide matching hinged throw-over bridge where indicated, and removable handrails.
 - 1. Platform Surface: Non-skid safety tread deck plate.
- D. Hinged Bridge: Provide hinged bridge bolted to full length heavy-duty piano type hinge welded to toe guard at end of the platform. Hinge to be minimum 1/4 inch thick steel. Provide bridge complete with heavy-duty lifting chains. Chamfer edge of the bridge to prevent obstruction of material handling vehicle wheels.

1. Bridge Material: Non-skid safety tread aluminum for bridges 24 inches long or greater. Bridge material shall be a minimum of 1/4 inch reinforced steel and 3/4 inch minimum thickness for aluminum.
 2. Bridge Size: 60 inches wide x 24 inches long bridge.
- E. Ramp: Provide hinged ramp bolted to full length heavy-duty piano type hinge welded to the toe guard at end of the platform. Hinge to be minimum 1/4 inch long.
 1. Ramp Material: Bridge material shall be a minimum of 1/4 inch reinforced steel and three quarter inch minimum thickness for aluminum.
 2. Ramp Size: 60 inches wide x 30 inches long.
 - E. Handrails: Removable handrails on two sides of platform with single removable link chain across each end. Handrails 42 inches high with midrail and 4 inch high kickplate bottom. If rail sockets are provided with lift, mount flush with platform surface and fit securely in sockets.
 - F. Scissor Mechanism: Fabricate leg members from heavy steel formed tube or plate.
 - G. Cylinders: Equip with minimum two heavy-duty high pressure hydraulic ram type cylinders. Rams shall be either direct displacement plunger or rod and piston type with positive internal stops as standard with the manufacturer. Cylinder rods shall be chrome plated and polished to prevent rusting. Provide low temperature hydraulic oil.
 - H. Bearings: Provide pivot points with permanently lubricated anti-friction bushings or sealed ball bearings for minimum maintenance.
 - I. Operation
 1. Self-contained electric hydraulic power unit for raising and lowering of the lift, controlled from a remotely located push-button station.
 - J. Electrical Requirements: Coordinate wiring requirements and current characteristics with building electrical system.
 1. 230 volts/60 Hz/1 phase.
 - K. Power Unit: Self-contained, power unit mounted on the lift and housed in a weatherproof enclosure. Power unit shall consist of a 2 HP continuous duty motor, high pressure gear pump, valve manifold, oil line filters, oil reservoir and fluid level sight gauge.
 - L. Safety Devices: Provide hinged safety maintenance bars. Provide visible and audible warning when lift is in motion. Provide an automatic safety stop velocity fuse or comparable mechanism.
 - M. Steel surfaces must be clean and pretreated for optimum paint bond. Prime with a rust inhibitor primer and apply a hard enamel finish. Alternative painting processes must be approved by the USPS contracting officer. Painted toe guards shall have a minimum of 2" yellow with black diagonal stripes to comply with ANSI Z53.1. Unless otherwise indicated, paint other surfaces in the manufacturer's standard color.
 - N. Provide warning labels in accordance with ANSI 2535.4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.

- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Install unit in prepared opening in accordance with manufacturer's published instructions, ANSI MH29.1, and as indicated on Drawings.
- B. Set square and level.
- C. Anchor unit securely.
- D. Make electrical connections as specified in Division 26.

3.3 CONSTRUCTION

- A. Interface with Other Work: Coordinate forming of pit for hydraulic dock lifts to ensure that the pit depth is adequate to accommodate the lift in proper relationship to the loading platform. Attach the lift securely to the pit floor in accordance with the manufacturer's directions.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect unit connection to structure and to electrical service.
- C. Perform operational tests of unit in the presence of the Contracting Officer. Demonstrate each function or operation.
- D. Provide three (3) operator manuals, three (3) maintenance/repair manuals and three (3) parts breakdown diagrams.

E. OPERATING INSTRUCTION

1. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance that is required to ensure normal operation.
2. Provide one complete set of equipment operating, installation, and programming manuals that will remain at the installed location.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
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SECTION 000010

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SECTION 210000
FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire Protection Basic Materials and Methods:
 - a. Hangers and Supports.
 - b. Pipe and Fittings.
 - c. Piping Specialties.
 - d. Valves.
 - 2. Wet-Pipe Fire Suppression Sprinklers:
 - a. System design, installation, and certification.
 - 3. Dry-Pipe Fire Suppression Sprinklers:
 - a. System design, installation, and certification.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, and 250.
 - 2. ANSI B 16.3 - Malleable-Iron Threaded Fittings, Class 150 and 300.
 - 3. ANSI B 16.4 - Gray Iron Threaded Fittings.
 - 4. ANSI A 21.10 - Ductile Iron and Gray Iron Fittings, 2 in. through 48 in., for Water and Other Liquids.
 - 5. ANSI A 21.51 - Ductile-Iron Pipe, Centrifugally Cast.
- B. American Society of Mechanical Engineers (ASME):
 - 1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
 - 2. ASME B16.3 - Malleable Iron Threaded Fittings.
 - 3. ASME B16.4 - Gray Iron Threaded Fittings.
 - 4. ASME B16.5 - Pipe Flanges and Flanged Fittings.
 - 5. ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings.
 - 6. ASME B16.25 - Buttwelding Ends.
 - 7. ASME Sec 9 - Welding and Brazing Qualifications.
 - 8. FM - Approval Guide, latest Edition.
 - 9. FM Data Sheet 2-8N, latest Edition.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 13, latest Edition - Installation of Sprinkler Systems.
 - 2. UL Fire Directory B, Product Directory - Fire Protection Equipment Directory, latest Edition.
 - 3. UL 193 - Alarm Valves for Fire Protection Service.
 - 4. UL 199 - Automatic Sprinklers for Fire Protection Service.
 - 5. UL 346 - Water Flow Indicators for Fire Protective Signaling Systems.
 - 6. UL 405 - Standard for Fire Department Connections.
 - 7. UL 753 - Alarm Accessories for Automatic Water Supply Control Valves for Fire Protection Service.

1.3 DEFINITIONS

- A. Authority Having Jurisdiction: See Public Authorities.
- B. Delegated Engineer: A Professional Engineer or NICET certified designer Registered in the State where the project is located who undertakes final design of the fire protection system and is acceptable to the Authority Having Jurisdiction to design the fire sprinkler system.
- C. Owner: Any designated representative of the owner.
- D. Professional of Record: Architect or Engineer of Record indicated on the Contract Documents.
- E. Public Authorities: Local, State or Federal government body having jurisdiction over any portion of the project. This includes, but is not limited to: building departments, Fire Departments, Fire Marshals Offices, Water Departments, Insurance Regulatory Boards, Utility Companies or Districts, Cross Connection Control Departments, Transportation Departments, etc.

1.4 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. System to provide coverage for entire building. Densities shall be as listed below or as required by the AHJ, whichever is higher.
 - 2. Retail Areas, Canopies, Workroom and General Storage areas.
 - a. Density: 0.20 gpm/ft² for most hydraulically remote 1500 ft², with 250 gpm hose stream allowance. If Area is less than 1500 ft², calculate at 0.20 gpm/ft² for entire area with 250 gpm hose stream allowance.
 - b. Sprinkler Temperature Rating: Ordinary. High in combustible concealed spaces or near heat producing equipment.
 - c. Spacing: 130 ft² per sprinkler maximum, 15 feet spacing maximum.
 - d. Occupancy: Mercantile, Ordinary Hazard Group 2 per NFPA 13.
 - 3. Office Areas and Restrooms
 - a. Density: 0.10 gpm/ft² for most hydraulically remote 1500 ft², with 100 gpm hose stream allowance. If area is less than 1500 ft², calculate at 0.10 gpm/ft² for entire area with 100 gpm hose stream allowance.
 - b. Sprinkler Temperature Rating: Ordinary. High near heat producing equipment.
 - c. Spacing: 225 ft² per sprinkler maximum, 15 feet spacing maximum.
 - d. Occupancy: Light Hazard per NFPA 13.
 - 4. Combustible Concealed Spaces
 - a. Density: 0.10 gpm/ft² for most hydraulically remote 1500 ft², with 100 gpm hose stream allowance. If area is less than 1500 ft², calculate at 0.10 gpm/ft² for entire area with 100 gpm hose stream allowance.
 - b. Sprinkler Temperature rating: Intermediate. High near heat producing equipment.
 - c. Spacing: 130 ft² per sprinkler maximum, 15 feet spacing maximum.
 - d. Occupancy: Light Hazard per NFPA 13.
 - 5. Safety Factor: 10 percent of static and residual PSI.
 - 6. Hydraulic calculation areas of application shall be based on actual floor area protected by sprinklers. Use 1.2 multiplied by the square root of the area for design criteria.
 - 7. Hydraulic calculations for all dry pipe system piping shall be based on a C Value of 100.
 - 8. Entire hose allowance (gpm) shall be included in hydraulic calculations at the connection to the city water main or a yard hydrant, whichever is closer to the system riser.
 - 9. Other requirements as imposed by the AHJ.
- B. Scope of Work: Design, fabrication and installation of Fire Protection System Including the Following:
 - 1. Complete fire protection system as outlined in these Contract Documents, including all labor, materials, shop drawings and hydraulic needed to furnish and install a complete and functional fire

- protection system. System shall comply with NFPA 13, Public Authorities, Contracting Officer and Contract Documents.
2. Visit site to determine conditions and extent of work.
 3. Coordination of work with Contract Documents and all trades, including building design loads.
 4. The work under this section shall yield to all other trades.
 5. Warranty on new materials and labor.
 6. Provide all necessary permits, taxes and fees, including Public Authorities inspection and testing fees necessary to complete the specified work.
 7. Provide any required core drilling of walls, and required UL listed, non-combustible firestopping materials at all new sprinkler piping penetrations. Patch as required. New piping penetrations shall be adequately firestopped to maintain the fire resistance rating required.
 8. Access panels for service and access to valves in enclosed ceiling and walls.
 9. Provide coordination and interface of alarm initiating and supervisory devices with the fire alarm system.
 10. The fire protection piping and sprinkler layout shall function in such a manner so as not to interfere with lighting fixtures, air distribution devices, equipment, piping, beams, and ductwork. The work under this section shall yield to all other trades.
 11. Furnish, install and adjust as necessary all waterflow and valve supervisory switches.
 12. Fire protection systems complete with supervised control valves, inspector's test and main drain assemblies, vane type waterflow alarm switches, pressure gauge, main drain, auxiliary drains, and local alarm devices.
 13. Provide required signs at all new control valves, main drains, auxiliary drains and inspector's test connections, hydraulic placards, etc.
 14. System testing.
 15. Underground pipe modifications, including all necessary fittings, clamps, thrust blocking, backflow preventers, excavating and backfilling, etc.
 16. Fire department connection with check valve and ball drip, including interconnecting supply piping to sprinkler riser.
 17. If sprinkler system in any area is subject to freezing, then use non-freeze system (dry pipe system or dry type heads off wet system).
 18. Drawings must indicate specific method of freeze protection for all areas.

1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for Submittals.
1. Product Data:
 - a. Sprinkler heads, valves, and specialties.
 - b. Performance ratings rough-in details, weights, support requirements, and piping connections.
 2. Preliminary Shop Drawings: Prior to detailed submission, submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
 3. Shop Drawings: Indicate hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls. Prior to commencement of installation, submit licensed Professional Engineer's sprinkler system drawings (signed and sealed by Delegated Engineer) specified in "Quality Assurance" Article to Designated Reviewers. Include system hydraulic calculations and equipment data. Submittals shall be complete and in bound sets. Sprinkler system drawings, prepared according to NFPA 13 and FM 2-8N and Contract Documents. Submittals shall be made to Designated reviewers. Designated Reviewers are:
 - a. Additional Submittal: Submit shop drawings, product data, and hydraulic calculations to Public Authorities for approval. Submit proof of approval to Contracting Officer.
 - b. Submittals to Contracting Officer:

1.6 QUALITY ASSURANCE

- A. Qualifications:

1. Manufacturer: Company specializing in manufacturing the Products specified in this Section, whose equipment, specialties, and accessories are listed by product name and manufacturer in UL Fire Protection Equipment Directory and FM Approval Guide and that conform to other requirements indicated.
2. Installer: Company specializing in performing the Work of this Section with minimum of 3 years documented experience and approved by Public Authorities in the State and Jurisdiction where the project is located. Company qualified to install and alter fire protection piping, equipment, specialties, and accessories, and repair and service equipment. Company familiar with, and in compliance with, requirements of authorities having jurisdiction.
3. Delegated Engineer: Design fire protection system, develop working plans and shop drawings, and perform shop and site work under direct supervision of a Delegated Engineer experienced in design of this work and licensed in the State where the Project is located.

B. Regulatory Requirements:

1. Perform Work in accordance with NFPA 13.
2. Equipment and Components: UL listed and FM approved with appropriate label or marking.
3. Hydraulic Calculations, Product Data, Shop Drawings: Bear stamp of approval of Public Authorities.
4. Welding Materials and Procedures: Conform to AWS D10.9.
5. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
6. Comply with requirements of Public Authorities for submittals, approvals, materials, hose threads, installation, inspections, and testing.
7. Comply with requirements of Contracting Officer and Owner's insurance underwriter for submittals, approvals, materials, installation, inspections, and testing.
8. Provide certificate of compliance from Public Authorities indicating approval of field acceptance tests.
9. Conform to applicable code for submission of design and calculations, reviewed shop and erection drawings and as required for acquiring permits.
10. Cooperate with regulatory agency or authority and provide data as requested.

C. Pre-Installation Meetings:

1. Convene a pre-installation meeting one week prior to commencing Work of this Section.
2. Require attendance of parties directly affecting Work of this Section.
3. Review conditions of operations, procedures and coordination with related Work.
4. Agenda:
 - a. Tour, inspect, and discuss conditions of building and building structure.
 - b. Review fire sprinkler system design and requirements.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review fire protection system Drawings and data.
 - e. Review and finalize construction schedule related to fire sprinkler system and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - f. Review required inspections, testing, certifying, and material usage accounting procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: 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.
- C. Deliver and store valves in shipping containers, with labeling in place.
- D. Provide temporary protective coating on cast iron and steel valves.

- E. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.8 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to Contracting Officer.
 - 1. Provide extra sprinklers under provision of NFPA 13.
 - 2. Provide suitable wrenches for each head type.
 - 3. Provide metal storage cabinet in location designated (at riser, unless noted otherwise). Cabinet to be of sufficient size to store sprinklers, wrenches, and copy of all fire protection submittal documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Ames Company, Incorporated, Woodland, CA (530) 666-2493.
 - 2. Cla-Val Company, Costa Mesa, CA (800) 942-6326.
 - 3. Febco, Fresno, CA (209) 252-0791.
 - 4. The Viking Corporation, Hastings, MI (800) 968-9501.
 - 5. Watts Industries, North Andover, MA (978) 688-1811.
 - 6. Wilkins Regulator Division, Zurn Industries, Incorporated, Erie, PA (814) 455-0921.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 FIRE PROTECTION PIPING - ABOVE GROUND

- A. Black Steel Pipe: ANSI/ASTM A53; ASTM A795; ASTM A135; ANSI B36.10M; Schedule 10 or 40.
 - 1. Steel Fittings: ANSI/ASME B16.9, wrought steel, butt welded; ANSI/ASME B16.25, battled ends; ASTM A234, wrought carbon steel and alloy steel; ANSI/ASME B16.5, steel flanges and fittings; ANSI/ASME B16.11, forged steel socket welded and threaded.
 - 2. Cast Iron Fittings: ANSI/ASME B16.1, flanges and fittings; ANSI/ASME B16.4, screwed fittings.
 - 3. Malleable Iron Fittings: ANSI/ASME B16.3, screwed type. ANSI/ASTM A47.
 - 4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts, and washers; Victaulic FlushSeal gasket required for drypipe, preaction and double interlock dry systems.
 - 5. Fitting type to match pipe. Galvanized required for Drypipe Systems.
- B. Alternate Products: Acceptable alternatives to Schedule 10 and Schedule 40 pipe.
 - 1. "Superflow" Non-threadable Lightwall, by Allied.
 - 2. "Dyna-Flow" Non-threadable Lightwall, by American Tube.
 - 3. Schedule 5 pipe used with Victaulic "Pressfit" system.
 - 4. "Eddylite," by Bullmoose.
 - 5. Flexible sprinkler system assembly by SprinkFLEX, for the final connection between the branch line and the sprinkler head.
- C. Pipe must meet the following conditions:
 - 1. Threads: Shop cut according to applicable ANSI standards.

2.3 GLOBE OR ANGLE VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 - 2. Nibco, Incorporated, Elkhart, IN (800) 642-5463.
 - 3. Stockham Valves and Fittings, Incorporated, Cullman, AL (800) 786-2542.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Up to 2 inches: Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable composition disc, solder or screwed ends, with backseating capacity.
- C. Over 2 inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.4 CHECK VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 - 2. Nibco, Incorporated, Elkhart, IN (800) 642-5463.
 - 3. Stockham Valves and Fittings, Incorporated, Cullman, AL (800) 786-2542.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Up to and including 2 inches: Bronze swing disc, solder or screwed ends.
- C. Over 2 inches: Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer, flanged, or grooved ends.

2.5 DRAIN VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 - 2. Nibco, Incorporated, Elkhart, IN (800) 642-5463.
 - 3. Stockham Valves and Fittings, Incorporated, Cullman, AL (800) 786-2542.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Bronze compression stop with hose thread, nipple and cap. Use hose thread, nipple and cap only where piping to outside or other approved drainage facility is not readily available.
- C. Brass ball valve with cap and chain, 3/4 inch hose thread.
- D. Use hose thread, nipple and cap.

2.6 ALARM CHECK VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 - 2. Viking Corporation, Hastings, MI (800) 968-9501.

3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.7 DRYPIPE VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 2. The Viking Corporation, Hastings, MI (800) 968-9501.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.8 SPRINKLERS

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Gem Sprinkler Company, Division of Grinnell Corporation, Exeter, NH (603) 778-9200.
 2. Reliable Automatic Sprinkler Company, Incorporated, Mt. Vernon, NY (914) 668-3470.
 3. The Viking Corporation Hastings, MI (800) 968-9501.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Subject to compliance with requirements, provide automatic sprinklers, with 1/2 inch, 17/32 inch orifice; or 0.64 inch (extra large) orifice, unless noted otherwise. Sidewall sprinklers are not acceptable, unless noted otherwise.
 1. Areas With Exposed Structure Above:
 - a. Standard Sprinklers: Upright sprinkler, bronze.
 - b. Extra Large Orifice Sprinklers: bronze.
 2. Areas With Finished Ceilings, Not Visible To The Public: Pendent sprinkler, chrome, with two-piece chrome escutcheon plate.
 3. Areas With Finished Ceilings 10 Feet Above Finish Floor or Higher, Visible to the Public: Pendent sprinkler, chrome, with two-piece chrome escutcheon plate.
 4. Areas With Finished Ceilings Below 10 Feet Above Finish Floor, Visible to the Public: Pendent sprinkler, chrome, with two-piece 1/2 inch recessed chrome escutcheon plate.

2.9 SLEEVES AND ESCUTCHEONS

- A. Sleeves through structural concrete members and sleeves for walls below grade and floors on grade shall be standard weight galvanized Schedule 40 steel pipe. Sleeves through other than structural components of the building shall be 20 gage galvanized sheet metal with lock seam joints. Sleeve shall extend two inches past finished surface. USG Thermafiber safing insulation shall be installed between sleeve and pipe.
- B. Pipe escutcheon plates to be installed where exposed piping passes through walls, ceilings, and floors of building shall be minimum 20 gage steel, chrome.

2.10 ACCESSORIES

- A. Hangers and Supports: Provide hangers and supports as required by NFPA 13 and Public Authorities. Provide seismic bracing in accordance with NFPA 13, as required by state and local codes, and Public Authorities.

- B. Flushing Connections: Provide threaded, capped nipple or mechanical groove end cap on ends of cross mains. If nipple provided, diameter shall be same as pipe, but not larger than 2 inches.
- C. Auxiliary Drains:
 - 1. 5 gallons or greater: provide minimum 1 inch globe valve with hose adapter and cap.
 - 2. Less than 5 gallons: provide minimum 1 inch nipple and cap.
 - 3. All auxiliary drain facilities shall be placed to allow easy access.
- D. If piping or components of Inspector's test connection are modified as a result of this Work, then provide as required by Contractor.
- E. If inspector test valve and auxiliary drain valve are piped together then test drain assembly shall be an approved manufactured assembled unit. Subject to compliance with requirements, provide valves of one of the following manufacturers:
 - 1. "Test Master", by Victaulic, Easton, PA (610) 559-3300.
 - 2. Central Sprinkler Corp., Lansdale, PA (800) 523-6512.
 - 3. Globe Fire Sprinkler Corp., Standish, MI (800) 248-0278.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- F. Wet Sprinkler System Water Flow Detectors: Equip sprinkler system risers with double pole vane type flow detector, Model No. VSR-F, by Potter Electric Signal of St. Louis, Missouri, (800) 325-3936. Set adjustable delayed signal at 30 seconds. Connect to alarm system.
 - 1. Substitutions: Under provisions of Section 016000.
- G. Dry Sprinkler System Water Flow Detector: Equip Dry System risers with pressure activated flow detector by Potter Electric Signal of St. Louis, Missouri, (800) 325-3936. Connect to alarm system.
 - 1. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- H. Control Valve Supervisory Switches:
 - 1. Equip post indicator valves with tamper switches, Model No. PCVS, as manufactured by Potter Electric Signal of St. Louis, Missouri. Connect to alarm system.
 - 2. Equip outside screw and yoke valves with tamper switches, Model No. OSYSU-A2 as manufactured by Potter Electric Signal of St. Louis, Missouri. Connect to alarm system.
 - 3. All valves capable of controlling water supply shall have tamper switches. Connect to alarm system.
 - 4. If control valve is located remote from store building, provide 3/4 inch conduit, with pull string, from remote location to nearest electrical room.
 - 5. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- I. Wire Cage Sprinkler Guards: Fig. 6160, by Potter-Roemer or acceptable substitute.
 - 1. Provide sprinkler guards on sprinkler pendants that are located below 8 feet above finished floor, except at semi-recessed sprinklers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Examine areas in which Work of this Section is to be performed.

- 2. Verify that surfaces and site conditions are ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Coordinate work of this Section with other affected work and construction schedule.
- B. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- C. Remove scale and foreign material, from inside and outside, before assembly.
- D. Prepare piping connections to equipment with flanges or unions.
- E. Install system and equipment in accordance with manufacturers instructions, and NFPA Standards.

3.3 INSTALLATION - ABOVE GROUND PIPING

- A. Install piping in accordance with NFPA 13. Install sprinkler piping products in accordance with recognized industry practices to ensure that fire protection sprinkler piping complies with requirements and serves intended purposes.
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient. Use eccentric reducers to maintain top of pipe level. Slope piping and arrange systems to drain. Size drain piping as required to drain sprinkler system properly. Provide drain valves at main shut-off valves and low points of piping.
- C. Pitch piping as required in Drypipe systems. If applicable:
 - 1. Drypipe Branchlines: Slope 1/2 inch for every 10 feet.
 - 2. Drypipe Mains: Slope 1/4 inch for every 10 feet.
- D. Install piping to conserve building space. Do not interfere with use of building space and other work.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. All system components shall be concealed above ceilings where ceilings exist.
- H. Replace sprinklers having paint other than factory finish with new sprinklers. Cleaning and reuse of painted sprinklers is prohibited.
- I. Do not penetrate building structural members. Examine other work indicated on the Contract Documents and conditions at job site. Coordinate routing of work with other construction trades to avoid interference with other installations. Do not cut building structural members, beams, joists, etc. for routing of sprinkler piping. In the event of conflicts, consult Contracting Officer, and their decision shall govern.

- J. Provide sleeves when penetrating floors and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required. Provide wall plates at all penetrations.
- K. Die cut screw joints with full cut standard taper pipe threads with non-toxic joint compound applied to male threads only. Recoat threads on galvanized pipe with galvanized coating.
- L. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
- M. Route piping and locate sprinklers as required to avoid building structure equipment, plumbing piping, heating and air conditioning piping, ductwork, lighting fixtures, electrical conduits and bus ducts, and similar work. Final location of lighting will have priority over final sprinkler locations.
- N. Provide pipe offsets as required to complete installation. Modify shop prefabricated piping, pipe hangers, and other components as required to fit the job site conditions.
- O. Shop drill and weld weld-o-lets on piping.
- P. Conceal piping in chases, walls, furred spaces and above ceiling in areas with dropped ceilings.
- Q. If piping or components of Inspector's Test Connection are modified as a result of this Work, then:
 - 1. Provide one inspector's test valve for each system at the most remote point of the system along the exterior wall, piped to non-public areas.
 - 2. Install inspector's test valves at five feet (minimum) to seven feet (maximum) above finish floor to facilitate bi-monthly tests.
 - 3. Coordinate test valve locations with Contracting Officer.
 - 4. Test connection shall discharge at location approved by Contracting Officer.
 - 5. Outlet shall have same orifice as sprinklers.
- R. Piping shall maintain clearance from electrical equipment as required by NEC and Public Authorities. Drains and Inspector's test connection shall not be piped into or through electrical rooms/areas.
- S. Sprinkler piping that passes through unheated spaces in or under structures and are exposed to freezing shall be protected from freezing as indicated or in accordance with applicable methods in NFPA 13.
- T. Provide valves as required to comply with NFPA Standards and requirements of Public Authorities. Provide backflow prevention devices, check valves, and drains where required by Public Authorities.
- U. Make reductions in pipe sizes with one-piece reducing fittings. Bushings are not acceptable. Use flanged fittings at base of risers.
- V. Contractor shall notify Contracting Officer one week prior to any sprinkler system shutdown or work performed.
- W. All system components (i.e. pipe, fittings, supports, and accessories), except sprinklers, not concealed shall be prepared 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. Apply masking tape or paper cover to ensure sprinkler do not receive field paint finish. Remove tape or paper after painting.
- X. Locate sprinklers in suspended ceiling tiles along the centerline of the two foot dimension, and at one foot increments from the edge in the four foot dimension direction. Provide piping offsets as necessary to locate sprinklers.
- Y. Dry Pendent Sprinklers: Install concealed above ceilings where ceilings are used.

- Z. If applicable, install maintenance air compressor adjacent to dry pipe riser. Connect 1/4 inch compressor outlet with the 1/4 inch pipe through a shutoff valve to the system side of drypipe valve. Adjust pressure switch to the required setting.
- AA. Locate inspector test valves and associated sight glasses at remote ends of system, in accessible locations. Provide drain pipes as required by Contracting Officer.

3.4 PROTECTION OF WORK

- A. Protect work from danger of freezing, breakage, dirt, foreign materials, etc., and replace work so damaged. Use every precaution to protect work of others.

3.5 IDENTIFICATION

- A. Apply signs to control, drain, test and alarm valves, etc., to identify their purposes and functions. Provide lettering sizes and styles selected by Contracting Officer from NFPA's suggested styles.
- B. Stencil riser/zone numbers on risers.
- C. Provide hydraulic placard for each sprinkler system in accordance with NFPA 13.

3.6 CLEANING AND FLUSHING

- A. Prior to connecting overhead system piping to underground supply system piping, flush underground supply system piping per NFPA 13 and 24.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Procedures for field inspection and testing of installation.
- B. Site Tests - Leaks from System:
 - 1. Contractor shall identify to Contracting Officer any leaks or damage that occur within the system as a result of testing. Contractor shall take necessary precautions to limit any potential damage. Corrective action shall be performed at Contractors expense.
- C. Site Tests - Above Ground Fire Protection Piping:
 - 1. Test system pressure piping for leakage as required by and in presence of Public Authorities, and Contracting Officer Test to consist of holding the test pressure at the high end for a period of two hours. Test pressure: 200 psi or 50 psi over normal operating pressure, whichever is greater. Conduct test in accordance with NFPA 13. Send completed copy of the material and test certificate to Contracting Officer.
 - 2. All required tests shall be witnessed by Public Authorities, and Contracting Officer.
 - 3. Inspection of welds, and/or verification of welder's qualifications may be required by Public Authorities. Contractor shall comply with all requirements of Public Authorities, including but not limited to:
 - a. Provide written documentation of welders qualifications and certification.
 - b. Stamp imprint of welders identification adjacent to all welds.
 - c. Provide provisions for, schedule and conduct inspection of all welds. Inspection shall be scheduled at project site, with pipe at grade level, prior to installation.

END OF SECTION

SECTION 220500

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Dielectric fittings.
 - 3. Escutcheons.
 - 4. Grout.
 - 5. Plumbing demolition.
 - 6. Equipment installation requirements common to equipment sections.
 - 7. Plumbing identification.
 - 8. Hangers and Supports.

1.2 DEFINITIONS

- A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 QUALITY ASSURANCE

- A. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12.
- G. Solvent Cements for Joining Plastic Piping:
 - 1. ABS Piping: ASTM D 2235.
 - 2. CPVC Piping: ASTM F 493.
 - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. PVC to ABS Piping Transition: ASTM D 3138.

2.3 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.4 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - 1. Finish: Polished chrome-plated.

2.5 PLUMBING IDENTIFICATION

- A. Equipment Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.
- B. Tags:
 - 1. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches (38 mm) square.
 - 2. Metal Tags: Brass, Aluminum, or Stainless Steel with stamped letters; tag size minimum 1-1/2 inches (38 mm) diameter or square with smooth edges.
 - 3. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches (83 x 143 mm) with grommet and self-locking nylon ties.
 - 4. Tag Chart: Typewritten letter size list in anodized aluminum frame and plastic laminated.
- C. Pipe Markers:
 - 1. Color and Lettering: Conform to ASME A13.1.
 - 2. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
 - 3. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings with flow direction.
 - 4. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches (150 mm) wide by 4 mil (0.10 mm) thick, manufactured for direct burial service.

2.6 HANGERS AND SUPPORTS - GENERAL

- A. Finish:
 - 1. Indoor Applications: Electro-plated zinc in accordance with ASTM B 633, or hot-dip galvanized after fabrication in accordance with ASTM A 123; except that hanger straps may be formed from pre-galvanized steel.
 - 2. Outdoor Applications: Hot-dip galvanized after fabrication in accordance with ASTM A 123, ASTM A 153, or ASTM A 653 (as applicable to item).
- B. Identification: Steel pipe hangers and supports shall be stamped with the manufacturer's name, part number, and size.
- C. Hanger Rods: Threaded hot rolled steel. Hanger rods shall be sized so that the total load imposed (including pipe or duct, insulation, hangers, and fluid) does not exceed the following:

<u>Nominal Rod Diameter</u>	<u>Maximum Load</u>
5/16 Inch	440 Pounds
3/8 Inch	610 Pounds
1/2 Inch	1130 Pounds
5/8 Inch	1810 Pounds
3/4 Inch	2710 Pounds
7/8 Inch	3770 Pounds
1 Inch	4960 Pounds

- D. Beam Attachments: Constructed of malleable iron or steel, MSS standard types designed for clamping to building structural support beam. "C" clamp type shall have cup point set screws with locknuts and retaining straps. Center loaded type beam clamps shall have horizontally adjustable clamping bolt (or rod with nuts).
- E. Concrete Anchors: Wedge type expansion anchors, with hex nut and washer, and stainless steel split expansion rings. Tested to ASTM E 488 criteria, UL listed, with exposed anchor head stamped with code to identify anchor length.
- F. General Anchors (Screws, Nuts, Bolts, Fasteners):
 - 1. General: Constructed of materials suitable for the conditions exposed to and materials being joined, with minimum 50 year service life. Stainless steel construction where exposed to corrosive conditions. Configuration, size and grade to suit application, accommodate expected forces, and provide anchoring to structural element (or allow for proper fastening of items). Minimum safety factor of 2.5 (or as required by code, whichever is greater). Comply with ASTM A307, SAE J429, SAE J78, or ASTM A 563; bolts and nuts shall have unified inch screw threads (course, UNC).
 - 2. Test Reports: Provide independent test report indicating fastener strength (pullout and shear) as installed in the materials and applications of this project.
 - 3. Finish: In finished areas, the portion of fastener exposed to view shall match the exposed finish of item being fastened.
- G. Manufactured Strut Systems:
 - 1. Channels: Minimum 12 gauge, 1-5/8 x 1-5/8" (unless noted otherwise), with slots/holes to suit application.
 - 2. Accessories: Channel nuts press formed, machined and hardened with gripping slot, fabricated from steel conforming to ASTM A 108 or ASTM A 36. Fittings fabricated from steel in accordance with ASTM A 907.
 - 3. End Caps: Vinyl cap, capable of withstanding high temperatures without degradation, manufactured specifically for use with manufactured strut. Unistrut Series P2859 or P2860 (or approved).
- H. Steel: Structural steel per ASTM A 36.
- I. Wood: Only allowed to be used where building structural elements are of wood construction same type, grade used for building structural members. Where located outdoors shall be the pressure treated type; with all cut portions of wood painted with wood preservative.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION

- A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

- B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - 4. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - 5. Coordinate work scope with GC.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams 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.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Verify final equipment locations for roughing-in.
- N. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
 - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
 - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.6 INSTALLATION - PLUMBING IDENTIFICATION

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install tags using corrosion resistant chain. Number tags consecutively by location.
- D. Identify plumbing equipment with plastic nameplates. Locate equipment labels where accessible and visible.
- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify valves in main and branch piping with tags.
- G. Identify piping, concealed or exposed, with plastic pipe markers and plastic tape pipe markers. Use tags on piping 3/4 inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 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.
- H. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
 - 8. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

3.7 HANGERS AND SUPPORTS - INSTALLATION

- A. General: Provide all necessary bolts, nuts, washers, fasteners, turnbuckles, hanger rods, rod connectors, stanchions, wall/roof/floor backing and attachments, bridging between structural members, and any other miscellaneous accessories required for the support and anchoring of all pipes, ducts, and mechanical equipment. All supports, whether from floor, walls, or hung from structure, are Contractor's responsibility. Anchors and supports shall be adequate to accommodate forces equipment will be ex-

posed to. Any field cut pieces of galvanized materials shall be hot-dip galvanized after cutting; or be solvent and wire brushed clean and receive field applied galvanizing treatment.

- B. Backing: Install steel or wood backing in walls (anchored to studs) and in ceiling (anchored to joists or trusses), as required to provide support for items.
- C. Installation: Install all inserts, anchors, and supports in accordance with manufacturer's instructions, code requirements, and best professional practices. The most restrictive criteria governs.
- D. Welded Assembly Finish: All welded steel support assemblies shall have a power wire brush and primer paint finish where installed indoors and be have factory applied hot-dip galvanized finish where installed outdoors (or subject to moisture); unless another finish is specified.
- E. Attachments: Attach to anchoring element (i.e. building structure, concrete pads, etc.) as shown on drawings (reference structural drawings). Where not detailed on the drawings, the Contractor shall design and submit shop drawings of proposed attachment methods to the Engineer for review.
- F. Application:
 - 1. Where not detailed on the drawings (or otherwise indicated), the selection and design of supports is the Contractor's responsibility, in compliance with code and Contract Document requirements; subject to submittal review and acceptance by the Engineer.
 - 2. Exposed supports in finished areas shall be arranged to minimize their visibility; be free of dents, scratches and labels, and be configured in a manner to match the decorum and finish of the room they are installed in. Exposed supports in finished areas shall be cleaned to allow for field painting (unless a chrome, stainless steel, or similar finish has been indicated).
- G. Manufactured Strut ("Unistrut"): Provide end caps on all strut ends at the following locations:
 - 1. Where exposed to view in finished areas.
 - 2. Where near maintenance access paths.
 - 3. Where personnel injury could occur if the ends were not covered.
- H. Seismic: Provide bracing and added supports to restrain movement in a seismic event. Items serving as seismic restraints.
- I. General: Aboveground pipe shall be anchored to the structure to prevent sagging, to keep pipe in alignment, and to resist the forces the pipe will be exposed to; piping shall be supported independent of equipment so that no loads bear on the equipment. Underground pipe shall be evenly supported in trenches with proper bedding materials; see Section 20 05 90; except that piping below structural slabs (or where soil conditions will not provide suitable support) shall be supported of the structure that same as for aboveground piping. See drawings for extent of structural slab areas.
- J. Adjustment: All pipe supports shall be provided with a means of adjustment for the aligning and leveling of the pipe after installation.
- K. Applications: Selection, sizing, and installation of pipe supports and accessories shall be in accordance with the manufacturers recommendations, standards MSS SP-89 and MSS SP-69, UPC, and IMC. Refrigerant piping and similar piping subject to vibration (i.e. high pressure tubing) shall be installed with cushion clamps.
- L. Support Spacing: Provide piping support spacing according to the most restrictive of the following: UPC, IMC, ASME B31.1, B31.9, local codes, manufacturers recommendations or Contract Documents specific requirements. Provide supports at each change in direction of piping and at each side of concentrated loads (such as in-line pumps, valves greater than size 5", and similar items).
- M. Vertical Piping Supports: Support piping at each floor line with pipe clamps and at intermediate points as required so that hanger spacing does not exceed allowable spacing and as required to prevent excessive pipe movement and so as to comply with the maximum spacings cited above. Support all pipe

stacks at their bases with a concrete pier or suitable support. For vertical pipe drops which occur away from a wall or similar anchoring surface, provide angled bracing from nearest structure on two sides of drop to provide rigid anchoring of pipe drop. Provide riser clamps and vertical supports on all vertical vent piping where the vertical pipe length exceeds 5'.

END OF SECTION

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Last revised: 4/16/2014

SECTION 220719

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Piping insulation.
 - 2. Insulation jackets.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 2. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
 - 3. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 4. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - 5. ASTM C547 - Mineral Fiber Pipe Insulation.
 - 6. ASTM C553 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 7. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
 - 8. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 - 9. ASTM E84 - Surface Burning Characteristics of Building Materials.
 - 10. ASTM E96 - Water Vapor Transmission of Materials.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 3 years documented experience.

2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.

B. Materials:

1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
2. Insulation for duct, pipe and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1 inch thickness less than 53 seconds when tested in accordance with ASTM D1692.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- 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.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 1. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
 2. Maintain temperature during and after installation for minimum period of 24 hours.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Energy Efficiency:
 1. Insulation: Minimum thickness in accordance with ASHRAE 90.1. Provide additional thickness to ensure surface temperatures are below 100 degrees and to prevent condensation on cold surfaces.

PART 2 - PRODUCTS

2.1 PIPING INSULATION

- A. Glass Fiber
 1. Manufacturers:
 - a. CertainTeed Insulation, Valley Forge, PA (800) 233-8990.
 - b. Other acceptable manufacturers offering equivalent products.
 - 1) Knauf Fiber Glass.
 - 2) Manville Insulation, Inc.
 - 3) Owens-Corning Fiberglass
 2. Insulation: ASTM C547; rigid molded, noncombustible.
 - a. 'K' ('ksi') value: ASTM C335, 0.24 at 75 degrees F.
 - b. Minimum Service Temperature: -20 degrees F.
 - c. Maximum Service Temperature: 300 degrees F.
 - d. Maximum Moisture Absorption: 0.2 percent by volume.
 3. Vapor Barrier Jacket:

- a. ASTM C921, White kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 - b. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
 - c. Secure with self sealing longitudinal laps and butt strips.
 - d. Secure with vapor barrier mastic.
4. Tie Wire: 18 gage stainless steel with twisted ends on maximum 12 inch centers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 1. Verify that piping has been tested before applying insulation materials.
 2. Verify that ductwork has been tested before applying insulation materials.
 3. Verify that surfaces are clean, foreign material removed, and dry.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - PIPING INSULATION

- A. Install materials in accordance with manufacturer's instructions and ASHRAE 90.1.
- B. On exposed piping, locate insulation and cover seams in least visible locations.
- C. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory applied or field applied.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
 3. PVC fitting covers may be used.
 4. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
 5. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. For insulated pipes conveying fluids above ambient temperature:
 1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.
 3. Finish with glass cloth and adhesive.
 4. PVC fitting covers may be used.
 5. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
 6. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- E. Finish and seal all insulation at supports, protrusions, and interruptions.

- F. For all insulated piping located 8 feet and below, provide a PVC jacket. For all exposed insulated piping above 8 feet finish with manufacturer's standard all-service jacket for fiberglass or cellular glass insulated pipe. No jacket required for elastomeric foam insulation.

3.3 CONSTRUCTION

- A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.4 PIPING INSULATION SCHEDULE

- A. Glass Fiber Insulation Schedule:

PIPING SYSTEMS	PIPE SIZE Inch	THICKNESS Inch
Plumbing Systems:		
Domestic Hot Water Supply	All	1"
Domestic Hot Water Recirc	All	1"
Tempered Domestic Water Supply	All	1/2"
Tempered Domestic Water Recirc	All	1/2"
Domestic Cold Water	All	1/2"
Horizontal Rain Leaders - Above Grade	All	1"

END OF SECTION

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SECTION 221000

PLUMBING PIPING AND PUMPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe and pipe fittings.
 - 2. Valves.
 - 3. Sanitary sewer piping.
 - 4. Domestic water piping.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American National Standards Institute, Inc. (ANSI):
 - 1. ANSI B31.9 - Building Service Piping.
- B. American Society of Mechanical Engineers (AMSE):
 - 1. ASME Sec. 9 - Welding and Brazing Qualifications.
 - 2. ASME B16.1-1989 - Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.
 - 3. ASME B16.3-1992 - Malleable Iron Threaded Fittings.
 - 4. ASME B16.4-1992 - Cast Iron Threaded Fittings Class 125 and 250.
 - 5. ASME B16.18-1984 - Cast Bronze Solder-Joint Pressure Fittings.
 - 6. ASME B16.22-1995 - Wrought Copper and Bronze Solder-Joint Pressure Fittings.
 - 7. ASME B16.23-1992 - Cast Copper Alloy Solder-Joint Drainage Fittings - DWV.
 - 8. ASME B16.26-1988 - Cast Bronze Fittings for Flared Copper Tubes.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A47-99 - Ferritic Malleable Iron Castings.
 - 2. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
 - 3. ASTM A74-98 - Cast Iron Soil Pipe and Fittings.
 - 4. ASTM B32-96 - Solder Metal.
 - 5. ASTM B42-98 - Seamless Copper Pipe, Standard Sizes.
 - 6. ASTM B75-99 - Seamless Copper Tube.
 - 7. ASTM B88-99 - Seamless Copper Water Tube.
 - 8. ASTM B251-99 - Wrought Seamless Copper and Copper-Alloy Tube.
 - 9. ASTM C564-95a - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- D. American Welding Society (AWS):
 - 1. AWS A5.8-92 - Specification for Filler Metals for Brazing and Braze Welding.
- E. Cast Iron Soil Pipe Institute (CISPI):
 - 1. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
 - 2. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Actual locations of valves.
 - 2. Operation and Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: 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 is completed.
- 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 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Do not install underground piping when bedding is wet or frozen.

PART 2 - PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets, or oakum and lead.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.

- 2. Joints: ASTM C564, neoprene gasket system stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
 - 1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.
 - 2. Shall not be allowed in return air plenums or any other area not allowed by code.

2.2 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: ASTM C564, neoprene gasket system
- 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. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
 - 1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.

2.3 WATER PIPING, ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ASME B16.18, cast bronze, or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, solder, Grade 95TA. 100 percent lead free solder.

2.4 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches and Under:
 - 1. Copper tube and pipe: 150 psig bronze unions with soldered joints.
- B. Pipe Size Over 2 Inches:
 - 1. Copper tube and pipe: 150 psig slip-on bronze flanges: 1/16 inch thick performed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier. See Section 220500.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that excavations are to required grade, dry, and not over-excavated.
- C. Report in writing to Contracting Officer's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 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.

3.3 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.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Provide access where valves and equipment are not exposed. Coordinate size and location of access doors with Section 083113.
- H. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Section 099100.
- I. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

3.4 CONSTRUCTION

- A. Site Tolerances:
 - 1. Soil or Waste
 - a. System Component - Main or Branch
 - b. 2% slope
 - c. Direction of slope is the direction of flow.
 - 2. Domestic Water
 - a. System Component - Main or Branch
 - b. 1 inch fall in 60 feet
 - c. Direction of fall is the direction of flow.

END OF SECTION

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SECTION 221116
DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Domestic water pipes, tubes, and fittings.
 - 2. Escutcheons.
- B. Related Section:
 - 1. Division 22 Section "Facility Water Distribution Piping" for water-service piping and water meters outside the building from source to the point where water-service piping enters the building.

1.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7, where required by local codes/ordinance.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
- C. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: Type L water tube, drawn temper; see Section 221000.

2.3 PIPING JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. See Section 220500.

2.5 ESCUTCHEONS

- A. See Section 220500.

2.6 HANGERS AND SUPPORTS

- A. See Section 220500.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings. Comply with Section 221000.
- B. Install copper tubing according to CDA's "Copper Tube Handbook."
- C. Install shutoff valve immediately upstream of each dielectric fitting.
- D. Install domestic water piping level and plumb.
- E. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- H. Install piping adjacent to equipment and specialties to allow service and maintenance.
- I. Install piping to permit valve servicing.
- J. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

- K. Install piping free of sags and bends.
- L. Install fittings for changes in direction and branch connections.
- M. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- N. Provide valves at locations indicated and specified.

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Braze Joints" Chapter.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- F. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 64: Use dielectric flanges or flange kits.

3.4 HANGERS AND SUPPORT INSTALLATION

- A. Comply with requirements in Section 220500.
 - 1. Vertical Piping: MSS Type 8 or 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - 3. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support vertical piping and tubing at base and at each floor.
- C. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 - 6. NPS 6: 10 feet with 5/8-inch rod.

- D. Install supports for vertical copper tubing every 10 feet.
- E. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - 3. NPS 2: 10 feet with 3/8-inch rod.
 - 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 - 5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
 - 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
 - 7. NPS 6: 12 feet with 3/4-inch rod.

3.5 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to all fixtures and equipment requiring water service and as indicated.

3.6 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors. Comply with Section 220500.
- B. Escutcheons for New Piping:
 - 1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
 - 3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
 - 4. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish.
- C. Escutcheons for Existing Piping:
 - 1. Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
 - 2. Insulated Piping: Split plate, stamped steel with concealed hinge and spring clips.
 - 3. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish.
 - 4. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish.
 - 5. Bare Piping in Equipment Rooms: Split casting, cast brass.
 - 6. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.

3.7 IDENTIFICATION

- A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
- B. Label pressure piping with system operating pressure.

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Piping Inspections:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - 3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Piping Tests:
 - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 - 6. Prepare reports for tests and for corrective action required.
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.9 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Aboveground domestic water piping, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper solder-joint fittings; and soldered joints.

END OF SECTION

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SECTION 221316

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following soil and waste, sanitary drainage and vent piping inside the building:
 - 1. Pipe, tube, and fittings.
 - 2. Special pipe fittings.

1.2 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control inspection and test reports.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; and "NSF-drain" for plastic drain piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. See Section 221000.

2.2 PIPE HANGERS AND SUPPORTS

- A. See Section 220500.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Special pipe fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
- B. Aboveground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
 - 1. Hubless cast-iron soil pipe and fittings and heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
 - 2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints. Not to be used in plenum spaces.

3.2 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- D. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- F. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- G. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- H. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

- B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
 - 2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
- C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- D. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.4 HANGER AND SUPPORT INSTALLATION

- A. See Section 220500 for additional requirements.
- B. Support vertical piping and tubing at base and at each floor.
- C. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- D. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 4. NPS 6: 60 inches with 3/4-inch rod.
 - 5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- E. Install supports for vertical cast-iron soil piping every 15 feet.
- F. Install supports for vertical steel piping every 15 feet.
- G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 3. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 - 5. NPS 6: 10 feet with 5/8-inch rod.
- H. Install supports for vertical copper tubing every 10 feet.
- I. Install supports for vertical PVC piping every 48 inches.
- J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

- A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- B. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.6 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.
 1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 2. Prepare reports for tests and required corrective action.

3.7 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.8 PROTECTION

- A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION

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SECTION 221319

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following sanitary drainage piping specialties:
 - 1. Cleanouts.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for grease interceptors.

1.3 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 CLEANOUTS

- A. Exposed Cast-Iron Cleanouts :
 - 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:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
 - 3. Size: Same as connected drainage piping
 - 4. Body Material: As required to match connected piping.
 - 5. Closure: Countersunk brass or cast-iron plug.
 - 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
- B. Cast-Iron Floor Cleanouts:
 - 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:
 - a. Josam Company; Josam Div.
 - b. Oatey.
 - c. Sioux Chief Manufacturing Company, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Zurn Plumbing Products Group; Light Commercial Operation.
 - h. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M for adjustable housing cleanout.
 3. Size: Same as connected branch.
 4. Closure: Brass plug with straight threads and gasket OR cast-iron plug.
 5. Top Loading Classification: Medium Duty.
 6. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
- C. Cast-Iron Wall Cleanouts:
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:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
 2. Standard: ASME A112.36.2M. Include wall access.
 3. Size: Same as connected drainage piping.
 4. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 5. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.
 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 4. Locate at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

3.3 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each grease interceptor.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

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SECTION 224000
PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Water Closets.
 - 2. Lavatories.
 - 3. Sinks.
 - 4. Service Sinks.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 079200 - Joint Sealants: Seal fixtures to walls and floors.
 - 2. Section 221000 - Plumbing Piping and Pumps

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Operation and Maintenance Data: Include fixture trim exploded view and replacement parts lists.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. American Standard, Piscataway, NJ (800) 442-1902.
 - 2. Beneke/Sanderson Plumbing Products, Columbus, MS (800) 647-1042.
 - 3. Church Seat Co., Sheboygan Falls, WI (800) 233-7328.
 - 4. Delta Faucet Company, Indianapolis, IN (317) 818-0396.
 - 5. Eljer Plumbingware, Dallas, TX (800) 898-4048.
 - 6. Fiat Products, Evanston, IL (847) 864-7600.
 - 7. Gerber Plumbing Products, Woodbridge, IL (866) 538-5536
 - 8. Josam, Michigan City, IN (219) 872-5531.
 - 9. Just Manufacturing Company, Franklin Park, IL (847) 678-5150 (800) 456-4537.
 - 10. Kohler Plumbing, Kohler, WI (920) 457-4441.
 - 11. McGuire, Cheshire, CT (203) 699-1801.
 - 12. Sloan Valve Company, Franklin Park, IL (800) 982-5839.
 - 13. Jay R. Smith Manufacturing Company, Montgomery, AL (334) 277-8520.
 - 14. Stern-Williams, Shawnee Mission, KS (913) 362-5635.
 - 15. Woodford Manufacturing Company, Colorado Springs, CO (719) 574-1101 (800) 621-6031.
 - 16. Zurn Hydromechanics, Inc., Erie, PA (814) 455-0921.
- B. Furnish and install Products as indicated in Plumbing Fixture Schedule at the end of this Section.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
 - 2. Verify that electric power is available and of the correct characteristics.
- C. Report in writing to Contracting Officer's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

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. Plumbing Fixtures:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Install each fixture with trap, easily removable for servicing and cleaning.
 - 3. Provide chrome plated rigid or flexible supplies to fixtures with screwdriver stops, reducers, and escutcheons.
 - 4. Install components level and plumb.
 - 5. Install and secure fixtures in place with wall carriers and bolts.
 - 6. Seal fixtures to wall and floor surfaces with sealant as specified in Section 079200, color to match fixture.
 - 7. Connect wall hung urinals to waste piping with red brass nipples.
 - 8. Water Closets: Provide adjustable cast iron fixture supports for all wall hung water closets, except where single vertical carriers in shallow walls occur. Secure carrier foot supports to floor with 1/2 inch anchor bolts and 1/2 inch Phillips expansion shields drilled into concrete slab. Rough in centerline of carrier inlet in accordance with fixture manufacturer's standard rough-in dimensions.
 - 9. Urinals Supported on Steel Studding: To be securely attached to 1/4 inch thick by 6 inch wide steel wall plate extending at least one stud beyond fixture mounting point, welded to each stud it passes. Use 1/8 inch fillet weld across the full width of the steel stud flange, or bolt on by use of not less than two 1/4 inch "U" bolts per stud.
 - 10. Lavatories Supported on Steel Studding: To be securely attached to 1/4 inch thick by 4 inch wide steel wall plate extending at least one stud beyond fixture mounting point, welded to each stud it passes. Use 1/8 inch fillet weld across the full width of the steel stud flange or bolt on by use of not less than two 1/4 inch "U" bolts per stud.
 - 11. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.
- B. Trap Primers:
 - 1. Install primers under sinks and/or lavatories out of line of sight.
 - 2. Trap primers to have approval of plumbing and drainage institute.
 - 3. Install trap primers in accordance with manufacturer's recommendations.
- C. Protective Shielding Guards:
 - 1. Manufactured, plastic enclosure for covering hot- and cold-water supplies, trap and drain piping, and complying with ADA requirements and meeting ANSI code for barrier-free design. Provide at all accessible sinks and lavatories.

3.4 ADJUSTING

- A. Refer to Specification Section 017300.
- B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.5 CLEANING

- A. Refer to Specification Section 017000.
- B. At completion clean plumbing fixtures and equipment.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.

3.7 PLUMBING FIXTURE SCHEDULE

- A. Water Closet (P-1A)
 1. Bowl: Existing.
 2. Flush Valve: Existing.
 3. Seat:
 - a. Solid white plastic, open front, extended back, brass bolts, bolt caps, without cover.
 - b. Manufacturer:
 - 1) Beneke: #533.
 - 2) Church: #5321.112.
 - 3) Kohler: #K-4670-C.

- B. Lavatory - Single Lever Handicap (P-3A)
 1. Bowl:
 - a. 20 x 18 inch vitreous china lavatory.
 - b. Manufacturer:
 - 1) American Standard: #0355.012, Lucerne.
 - 2) Eljer: #051-2101, Signature.
 - 3) Kohler: #K-2007, Kingston.
 2. Faucet:
 - a. Single lever faucet with aerator with 0.5 GPM flow restrictor.
 - b. Manufacturer:
 - 1) American Standard: # 2000.100.
 - 2) Delta: #520.
 3. Fittings:
 - a. Manufacturer:
 - 1) McGuire: #155-A grid drain with 1-1/4 inch tailpiece.
 - 2) McGuire: #8872, 1-1/4 inch semi-cast brass P-trap.
 - 3) McGuire: #2165 supplies to wall, chrome nipple with stop.
 - 4) McGuire: #155-WC offset tailpiece. Provide insulation on drain and hot water supply.
 4. Mounting height of 32 inches from basin rim to finished floor.
 5. Offset p-trap.
 6. Concealed support arms in wall: Smith, Wade or Zurn.

- C. Sink - Stainless Steel (P-5A)
 1. Sink:
 - a. 19.5 inches x 22 inches left-to-right x 5.5 inch deep.
 - b. Type 304 stainless steel, 18 gauge.
 - c. Manufacturer:
 - 1) Elkay: #LRAD2219.
 2. Plumbing Brass: Stainless steel grid strainer with 1-1/2" stainless steel tailpiece and 1-1/2" cast brass "P" trap.
 3. Faucet: Chicago Faucet No. 1100-HA8XKABCP deck mount sink faucet on 8" centers, with No. 1000 handles, No. HA8 swing spout, ceramic cartridges, and Chicago E34VP vandal resistant "Softflo" 1.5 gpm aerator.

- D. Service Sink - Floor Mount (P-6A)
 1. Sink:
 - a. 24 inches by 24 inches by 10 inches deep, square fiberglass service basin.
 - b. Manufacturer:
 - 1) Fiat.
 - 2) Stern-Williams.
 - 3) Zurn.
 2. Fittings:
 - a. Manufacturer: T & S: #B-695 service sink faucet with vacuum breaker.
 3. Mounting height from center line of faucet to finished floor shall be 36 inches.
 4. Mounting height from center line of vacuum breaker to finished floor shall be 7 feet, 6 inches.
 5. See piping detail on drawings.

END OF SECTION

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SECTION 230500

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic Mechanical Methods.
 - 2. Supports and Anchors.
 - 3. Motors.
 - 4. Mechanical Identification.
 - 5. Sleeves and Seals.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. 078400 - Firestopping: Materials for closure of penetrations at rated assemblies.
 - 2. 079200 - Joint Sealants: Sealants.
 - 3. 099100 - Painting: Field painting.
 - 4. 019113 - General Commissioning Requirements: Requirements related to Division 23 Commissioning.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- B. American Society of Mechanical Engineers (ASME):
 - 1. ASME A13.1 - Scheme for the Identification of Piping Systems.
 - 2. ASME B31.5 - Refrigeration Piping.
 - 3. ASME B31.9 - Building Services Piping.
- C. National Fire Protection Association:
 - 1. NFPA 13 - Installation of Sprinkler Systems.
- D. Institute of Electrical and Electronic Engineers:
 - 1. IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.
- E. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Pipe Supports and Anchors: Provide manufacturers catalog data including load capacity.
 - b. Motors: Provide wiring diagrams with electrical characteristics and connection requirements.
 - c. Mechanical Identification: Provide manufacturers catalog literature for each product required.

- B. Section 017704 – Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Record actual locations of tagged valves; include valve tag numbers.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to applicable local code for support of plumbing piping.
 - 2. Supports for Fire Suppression Piping: In conformance with NFPA 13.
 - 3. 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 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering.

1.6 BASIC MECHANICAL METHODS

- A. Comply with manufacturer's published instructions for delivery, storage, protection, installation, and materials.
- B. When equipment is operable, and it is to the advantage of the Contractor to operate the equipment, he may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install new filter media, make all required adjustments, and complete all punch list items before final acceptance by the Construction Manager and Contracting Officer.
- C. 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.
- D. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.
- E. Items exposed (in areas without ceilings) shall be installed in a neat, orderly manner. Elements shall be perpendicular and parallel to building lines.
- F. Drawings and Specifications:
 - 1. The Drawings indicate the general arrangement of systems and are to be followed insofar as possible. If deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Contracting Officer, for approval before proceeding with the work.
 - 2. Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. Contractor shall coordinate this work with all other branches in such a manner as to cause a minimum of conflict or delay.
 - 3. Where any work is so placed as to cause or contribute to a conflict it shall be readjusted at the expense of the Contractor causing the conflict. The decision shall be final in regard to the arrangement of ducts, piping, etc., where conflict arises.
 - 4. Where offsets in systems are required to complete the installation, or for the proper operation of the system, these shall be deemed to be included in the Contract.

5. Significant deviations from the Drawings must be approved by the Contracting Officer's Representative (COR).
- G. Locations:
1. Mechanical layouts indicated on drawings are diagrammatic. Exact locations of ducts, pipes, and equipment may vary because of conflicts with work of other trades. Work out conflicts where relocations will not affect operation or appearance of systems.
 2. Locate equipment requiring periodic servicing so that it is readily accessible. Do not back up service sides to walls, nor place it too close to other equipment to make service impractical.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Grinnell, Exeter, NH (603) 778-9200.
 2. Other acceptable manufacturers offering equivalent products:
 - a. Elcen.
 - b. Fee and Mason.
 - c. Kin-Line.
 - d. Michigan.
 - e. Unistrut.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MOTORS

- A. Electric motors shall be new NEMA Standard, sized and designed to operate at full load and full speed continuously, or variable frequency drive duty as required, without causing noise, vibration, and temperature rise in excess of their rating.
- B. Motors on belt driven equipment shall have slide rails with adjusting screws for belt tension adjustment. Motors exposed to the weather shall be weather-protected.
- C. Premium efficiency electric motors shall be installed on air handling units, relief fans, and exhaust fans.
- D. Premium efficiency motors shall have efficiency and losses determined in accordance with the latest revisions of IEEE Standard 112. Polyphase squirrel-cage motors rated 1 through 125 horsepower shall be tested by dynamometer method B. The efficiency will be determined using segregated losses in which stray load loss is obtained from a linear regression analysis to reduce the effect of random errors in the test measurements. Guaranteed minimum load efficiency shall be as follows:

MOTOR HP	FULL LOAD RPM	GUARANTEED FULL LOAD EFF.
1	1800	85.5
1.5	1800	86.5
2	1800	86.5
3	1800	89.5
5	1800	89.5

- E. Motor sound power levels shall not be greater than recommended in NEMA MG 1-12.49.
- F. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned or balanced.

- G. Motor Characteristics:
 - 1. 120V/1/60 Hz: Capacitor start, open drip-proof type, ball bearing, rated 40 C. continuous rise.
 - 2. 460/3/60 Hz: NEMA B, normal starting torque, single speed, squirrel-cage type, open drip-proof, rated 40 C continuous rise, with ball bearings rated for B-10 life of 100,000 hours and fitted with grease fittings and relief ports. Provide motors with aluminum end brackets with steel inserts in bearing cavities.
- H. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - 1. GE
 - 2. Other acceptable manufacturers offering equivalent products:
 - a. Lincoln.
 - b. Reliance.
 - c. Louis Alis.
 - 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- I. Motor Sentinel Switches:
 - 1. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - a. Square D Class 2510.
 - b. Siemens SCN or SCF Series.
 - c. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- J. Combination Starter/Disconnect:
 - 1. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - a. Square D Class 8538 or 8539.
 - b. Siemens SCN or SCF Series.
 - c. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- K. Motor/Circuit Disconnects:
 - 1. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - a. Square D Class Type HU.
 - b. Siement/I-T-E Enclosed Switch.
 - c. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.3 MECHANICAL IDENTIFICATION

- A. Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.
- B. Tags
 - 1. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches (38 mm) square.
 - 2. Metal Tags: Brass, Aluminum, or Stainless Steel with stamped letters; tag size minimum 1-1/2 inches (38 mm) square with smooth edges.
 - 3. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches (83 x 143 mm) with grommet and self-locking nylon ties.
 - 4. Tag Chart: Typewritten letter size list in anodized aluminum frame, plastic laminated.
- C. Pipe Markers
 - 1. Color and Lettering: Conform to ASME A13.1.

2. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
3. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.4 SLEEVES AND SEALS

- 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 gage (1.2 mm thick) galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed, refer to Section 078400.
- D. Sleeves for Round Ductwork: Galvanized steel.
- E. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- F. Firestopping Insulation: Glass fiber type, non-combustible; refer to Section 078400.
- G. Sealant: refer to Section 079200.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION - MECHANICAL IDENTIFICATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.3 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

3.4 INSTALLATION - PIPE HANGER AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.
- C. Place hangers within 12 inches (300 mm) of each horizontal elbow.
- D. Use hangers with 1-1/2 inch (38 mm) minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet (1.5 m) maximum spacing between hangers.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.
- H. Provide copper plated hangers and supports for copper piping.
- I. Design hangers for pipe movement without disengagement of supported pipe.
- J. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.5 INSTALLATION - MOTORS

- A. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- B. Line up motors on direct drive dial type gauges.
- C. Check line voltage and phase and ensure agreement with nameplate.
- D. Make electrical connections and test motor for proper rotation/ phasing under Division 26.
- E. Adjust motors together with driven equipment to insure equipment is dynamically and statically balanced. Correct any excessive vibration or noise from the equipment.

3.6 INSTALLATION - MECHANICAL IDENTIFICATION

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install tags using corrosion resistant chain. Number tags consecutively by location.
- D. 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.
- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify valves in main and branch piping with tags.
- G. Tag automatic controls, instruments, and relays. Key to control schematic.
- H. Identify piping, concealed or exposed, with plastic pipe markers and plastic tape pipe markers. Use tags on piping 3/4 inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure.

Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 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.

- I. Identify ductwork with plastic nameplates. 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.
- J. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

3.7 PIPE HANGER AND SUPPORT SCHEDULE

PIPE SIZE Inches (mm)	MAX. HANGER SPACING Feet (m)	HANGER ROD DIAMETER Inches (mm)
1/2 to 1-1/4 (12 to 32)	6.5 (2)	3/8 (9)
1-1/2 to 2 (38 to 50)	10 (3)	3/8 (9)
2-1/2 to 3 (62 to 75)	10 (3)	1/2 (13)
PVC (All Sizes)	4 (1.8)	3/8 (9)

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 7/31/2017

SECTION 230593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Testing, adjustment, and balancing of air systems.
 - 2. Measurement of final operating condition of HVAC systems.
 - 3. Sound measurement of equipment operating conditions.
 - 4. Vibration measurement of equipment operating conditions.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 013543 - Environmental Procedures: Pre-occupancy ventilation
 - 2. Section 014000 - Quality Requirements: Employment of testing agency and payment for services.
 - 3. Section 017300 - Execution: Starting of systems.

1.2 REFERENCES

- A. Associated Air Balance Council (AABC):
 - 1. AABC - National Standards for Total System Balance.
- B. National Environmental Balancing Bureau.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Test Reports: Submit the following reports directly to Contracting Officer from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
 - 1) Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 2) Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for inclusion in operating and maintenance manuals.
 - 3) Provide reports in 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.
 - 4) Indicate data on AABC National Standards for Total System Balance forms.
 - b. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:

- a. Actual locations of balancing valves and rough setting.
2. Submit written special warranty with forms completed in United States Postal Service name and registered with manufacturer as specified in this Section.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 1. Company specializing in testing, adjusting, and balancing of specified with minimum 5 years documented experience. Company to be certified by one of the following.
 - a. AABC Certified Independent Testing and Balancing Agency.
 - b. National Environmental Balancing Bureau Certified Independent Agency. (NEBB).
- B. Certification: Certify the testing, adjusting, and balancing field data reports.
- C. Testing, Adjusting, and Balancing Reports: Use testing, adjusting, and balancing Agent's standard forms.

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.

3.2 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Contracting Officer to facilitate spot checks during testing.
- B. Provide additional balancing instruments 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.

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 Contracting Officer.
- 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. Perform this work with cooling system energized where applicable to obtain the extra resistance of wet coils.
- 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.
- 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. 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.

3.6 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality:

1. Pre-occupancy ventilation: Provide pre-occupancy ventilation as specified in Section 013543 - Environmental Procedures; provide prior to final testing, adjusting, and balancing of HVAC system.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 5/11/2011

SECTION 230713

DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ductwork insulation.
 - 2. Duct liner.
 - 3. Insulation jackets.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 3. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
 - 4. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 5. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - 6. ASTM C547 - Mineral Fiber Pipe Insulation.
 - 7. ASTM C553 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 8. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
 - 9. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 - 10. ASTM E84 - Surface Burning Characteristics of Building Materials.
 - 11. ASTM E96 - Water Vapor Transmission of Materials.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- D. Underwriters Laboratories, Inc. (UL):
 - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 3 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.
- B. Materials:
 - 1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
 - 2. Insulation for duct, pipe and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1 inch thickness less than 53 seconds when tested in accordance with ASTM D1692.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- 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.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 - 1. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
 - 2. Maintain temperature during and after installation for minimum period of 24 hours.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Energy Efficiency:
 - 1. Insulation: Minimum thickness in accordance with ASHRAE 90.1. Provide additional thickness to ensure surface temperatures are below 100 degrees and to prevent condensation on cold surfaces.

PART 2 - PRODUCTS

2.1 DUCTWORK INSULATION

- A. Glass Fiber, Flexible Duct Wrap:
 - 1. Manufacturers:
 - a. Owens/Corning, Toledo, OH (800) 438-7465.
 - b. Other acceptable manufacturers offering equivalent products.
 - 1) CertainTeed.
 - 2) Schuller (Manville).
 - 3) Knauf.
 - 2. Insulation: ASTM C553 flexible, noncombustible blanket.

- a. 'K' ('Ksi') value: ASTM C518, 0.30 at 75 degrees F.
 - b. Maximum service temperature: 250 degrees F.
 - c. Maximum moisture absorption: 0.20 percent by volume.
 - d. Density: 0.75 lb./cu ft.
 - 3. Vapor Barrier Jacket:
 - a. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 - b. Moisture vapor transmission: ASTM E96; 0.02 perm.
 - c. Secure with pressure sensitive tape.
 - 4. Vapor Barrier Tape:
 - a. Manufacturers:
 - 1) Owens/Corning.
 - 2) CertainTeed.
 - 3) Schuller (Manville).
 - b. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
 - 5. Tie Wire: Annealed steel, 16 gage.
- B. Glass Fiber Duct Liner, Flexible:
- 1. Manufacturers:
 - a. CertainTeed.
 - b. Other acceptable manufacturers offering equivalent products.
 - 1) Knauf.
 - 2) Schuller (Manville).
 - 3) Owens Corning.
 - 2. Insulation: ASTM C553; flexible, noncombustible blanket.
 - a. 'K' ('Ksi') value: ASTM C518, 0.28 at 75 degrees F.
 - b. Maximum service temperature: 250 degrees F.
 - c. Density: 1.5 lb./cu ft.
 - d. Maximum Velocity on Coated Air Side: 4,000 ft./min.
 - 3. Adhesive:
 - a. Waterproof fire-retardant type.
 - 4. Liner Fasteners: Galvanized steel, impact applied with integral head.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that piping has been tested before applying insulation materials.
 - 2. Verify that ductwork has been tested before applying insulation materials.
 - 3. Verify that surfaces are clean, foreign material removed, and dry.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - DUCTWORK INSULATION

- A. Install materials in accordance with manufacturer's instructions and ASHRAE 90.1.
- B. Insulated ductwork conveying air below ambient temperature:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. Insulated ductwork conveying air above ambient temperature:
 - 1. Provide with or without standard vapor barrier jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. For ductwork exposed in finished spaces below 10 feet above finished floor, finish with aluminum jacket.
- E. For exterior applications, provide insulation with vapor barrier jacket. Cover with caulked aluminum jacket with seams located on bottom side of horizontal duct section.
- F. Duct and Plenum Liner Application:
 - 1. Adhere insulation with adhesive for 100 percent coverage.
 - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing.
 - 3. Seal and smooth joints.
 - 4. Seal liner surface penetrations with adhesive.
 - 5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.3 CONSTRUCTION

- A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.4 DUCTWORK INSULATION SCHEDULE

- A. Flexible Glass Fiber Duct Wrap Insulation Schedule:

DUCTWORK	THICKNESS INCH	FINISH
Supply Ducts	1-1/2"	Aluminized Film
Return Ducts	1-1/2"	Aluminized Film
Outdoor Air Intake Ducts	2"	Aluminized Film
Exhaust Ducts	None Required	
Mixed Air Ducts	1-1/2"	Aluminized Film

- B. Flexible Glass Fiber Duct Liner Insulation Schedule: Provide 1-inch thick liner where indicated on the plans. Black Pimented, UL type.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 09/22/2015

SECTION 230800

COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Systems and equipment testing and start-up.
- B. Validation of proper and thorough installation of Division 23 systems and equipment.
- C. Systems balancing verification.
- D. Pre-functional performance testing of equipment and systems.
- E. Documentation of tests, procedures, and installations.
- F. Coordination of Training Events.
- G. Generic Start-Up Procedures for mechanical systems and equipment.

1.2 GENERAL DESCRIPTION

- A. Commissioning (Cx) is the process of ensuring that all building systems are installed and perform interactively according to the design intent; that systems are efficient and cost effective and meet the owner's operational needs; that the installation is adequately documented; and that the Operators are adequately trained. It serves as a tool to minimize post-occupancy operational problems. It establishes testing and communication protocols in an effort to advance the building systems from installation to full dynamic operation and optimization.
- B. The USPS shall retain an independent Commissioning Authority (CxA) to provide Commissioning Services or have Solicitation A/E for Design-Build Project or Design A/E for Design-Bid-Build Project hire the CxA.
- C. This Section outlines the Cx procedures specific to the Division 23 Contractors. Requirements common to all work are described in Specifications 019113.

1.3 SCOPE

- A. The following equipment and/or systems may be commissioned if in compliance with the guidelines provided in Specifications 019113, or with Contracting Officer approval:
 - 1. Split System Heat Pumps.
 - 2. Exhaust Fans.

1.4 RELATED WORK AND DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section
- B. Commissioning Plan: The Cx Plan shall be available for reference as it outlines responsibilities outside of the Construction Contract. It provides the Contractor and the Owner an understanding of the planned commissioning activities for that project.

- C. Section 013300 - Submittal Procedures: Stipulates additional copies of submittals to be submitted and refers to other sections for additional submittal requirements related to Cx.
- D. Section 017704 - Closeout Procedures and Training: Defines the milestones in completion incorporating the Cx process.
- E. Section 019113 - General Commissioning Requirements: Specifies the general facility commissioning procedures common across all Divisions and the Contractor's responsibilities for the commissioning process.
- F. Individual Specification Sections: Individual sections stipulate installation, start-up, warranty, O&M documentation, and training requirements for the system or device specified in the Section.

1.5 REFERENCE STANDARDS

- A. ASHRAE Guideline 0-2005, "Guideline for Commissioning HVAC Systems".
- B. National Environmental Balancing Bureau (NEBB).
- C. AABC Commissioning Group (ACG).
- D. National Fire Protection Association (NFPA).

1.6 DOCUMENTATION

- A. In addition to the documentation required in Section 019113, Contractor shall provide to the CxA the following per the procedures specified herein and in other Sections of the specification:
 - 1. HVAC Balancing Plan.
 - 2. All referenced charts such as vibration severity chart and room noise criteria (NC) curves.
 - 3. Vibration Severity Charts.
 - 4. Factory Test Reports: Contractor shall provide any factory testing documentation or certified test reports required by the specifications. These shall be provided prior to Acceptance Phase. Factory Test Reports should be provided in PDF electronic format. These may include but are not limited to:
 - a. Air Handling Units.
 - b. Fans Capacity.
 - c. Fan Sound Power Levels.
 - 5. Field Testing Agency Reports (other than TAB): Provide all documentation of work of independent testing agencies required by the specification. These shall be provided prior to Acceptance Phase. Field Testing Agency Reports should be provided in PDF electronic format. These may include but are not limited to:
 - a. Pipe Pressure Testing.
 - b. Duct Leakage Testing.
 - c. Vibration Testing.
 - d. Generated Noise and Resultant Noise Level.
 - e. Corrosion Protection.
 - 6. Completed Test and Balance Reports.

1.7 CONTRACTOR RESPONSIBILITIES

- A. Refer to Section 019113: Detailed Contractor responsibilities common to all Divisions are specified in this Section. The following are additional responsibilities or notable responsibilities specific to Division 23.
- B. Acceptance Phase:
 - 1. Assist CxA in functional performance testing. Assistance will generally include the following:

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- a. Manipulate systems and equipment to facilitate testing (as dictated in the Commissioning Plan; in some cases this will entail only an initial sample);
 - b. Provide any specialized instrumentation necessary for functional performance testing;
 - c. Manipulate BAS and other control systems to facilitate functional performance testing (as dictated Specification 250804; in some cases this will entail only an initial sample).
2. Provide a TAB technician to work at the direction of CxA for up to 24 hours beyond assistance specified above.
3. Provide a BAS technician to work at the direction of CxA for additional hours as specified in Section 250804.
4. Maintain trends and monitor the facility throughout the Endurance Period as specified in Section 250804.
5. Respond to all Action Items which are assigned to the respective Division 23 Contractors. Response shall be via the Project Portal or by response to the original Action Item E-mail.
6. Resolve all deficiencies which are determined to be within the Division 23 scope of work.

C. Warranty Phase:

1. Maintain record documentation of any configurations, set ups, parameters etc, that change throughout the period.
2. Provide representative for off season testing as required by CxA.
3. Respond to Warranty issues as required by Division 1 and the General Conditions.

1.8 EQUIPMENT SUPPLIER RESPONSIBILITIES

- A. Refer to Section 019113.

1.9 CONTRACTOR NOTIFICATION AND SCHEDULING

- A. Refer to Section 019113.

1.10 START-UP PROCEDURES AND DOCUMENTATION

- A. Refer to Section 019113 and as detailed in Section 3 below.

1.11 EQUIPMENT NAMEPLATE DATA

- A. Refer to Division 1.

1.12 EQUIPMENT SEQUENCE OF OPERATION

- A. Trending requirements are specified in Section 250804..

1.13 FUNCTIONAL PERFORMANCE TESTING

- A. Contractor shall participate in the initial samples of Functional Performance Testing as stipulated in Section 019113 and the Commissioning Plan.

1.14 FPT ACCEPTANCE CRITERIA

- A. Acceptance criteria for tests are indicated in the specifications applicable to the systems being tested. Generally, unless indicated otherwise, the criteria for acceptance will be that specified with the individual system, equipment, component, or device.

1.15 TRAINING

- A. Contractors, Subcontractor, Vendors, and other applicable Parties shall prepare and conduct training sessions on the installed systems and equipment they are responsible for the requirements of Section 019113 and the individual Specifications.

PART 2 - PRODUCTS

2.1 INSTRUMENTATION

- A. General: All testing equipment used by any Party shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:
- B. Standard Testing Instrumentation: Standard instrumentation used for testing air flows, temperatures, humidity, noise levels, amperage, voltage, and pressure differential in air systems shall be provided by CxA.
- C. Special Tools: 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 turned over to the Owner upon project completion.

2.2 TEST KITS FOR METERS AND GAGES

- A. Test kits for meters and gages shall be provided to the Owner new and in good condition. Previously used kits will be unacceptable. Kits shall be submitted prior to the Acceptance Phase. Kits included shall be as a minimum:
 - 1. Digital indication of temperature and pressure with associated sensors to work with the P/T test ports
 - 2. Companion readout kit (with fittings) for calibrated balancing valve with ranges as required by all devices on this project

PART 3 - EXECUTION

3.1 START-UP PROCEDURES - GENERAL

- A. This Section outlines 'generic' or minimally acceptable Start-Up Procedures and individual systems. These items shall provide a minimum or guideline for the Contractor to determine the level of care required for start-up of the systems. The CxA will provide draft start-up sheets and the Contractor shall synthesize their own internal quality control practices, those of the manufacturer, and any applicable codes and standards to supplement the draft sheets for project-specific application. These supplemented procedures will be turned over to the CxA for development of the project-specific start-up procedures.
- B. The following start up verifications/procedures are common to all systems:
 - 1. Checkout shall proceed from devices to the components to the systems.
 - 2. Verify labeling is affixed per spec and visible.
 - 3. Verify prerequisite procedures are done.
 - 4. Inspect for damage and ensure none is present.
 - 5. Verify system is applied per the manufacturer's recommendations.
 - 6. Verify system has been start up per the manufacturer's recommendations .
 - 7. Verify that access is provided for inspection, operation and repair.
 - 8. Verify that access is provided for replacement of the equipment.

9. Verify the record drawings, submittal data and O&M documentation accurately reflect the installed systems.
10. Verify all gages and test ports are provided as required by contract documents and manufacturer's recommendations.
11. Verify all recorded nameplate data is accurate.
12. Installation is done to ensure safe operation and maintenance.
13. Verify specified replacement material/attic stock has been provided as required by the Construction Documents.
14. Verify all rotating parts are properly lubricated.
15. Verify all monitoring and ensure all alarms are active and set per Owner's requirements.

3.2 OBSERVATION AND TESTING REQUIREMENTS

Equipment or Systems

Sampling Rate

HVAC Systems

Heat Pumps	100%
Gas Heat Electric Cooled Package Rooftop Equipment	100%
Temperature Control	100%
Ventilation Control	100%

END OF SECTION

USPS CSF Specification issued: 10/1/2018
Last revised: 8/31/2018

SECTION 230904

INSTRUMENTATION AND CONTROL FOR HVAC (CSF MEDIUM)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. HVAC System Thermostats.
 - 2. Electric Thermostats.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 230800 - Commissioning of HVAC.
 - 2. Section 238100 - Decentralized Packaged Rooftop Units.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. 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
 - 2. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system. Submittals shall be furnished as a complete package prior to installation.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
 - 4. Operating Instruction: Document training by furnishing a sign-in sheet with a description of the training provided, instructors name and organization, and those who received training. Refer to 017704 1.3, 1.4, and 1.5 for more specific training requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for close-out submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
 - 2. Submit written special warranty with forms completed in United States Postal Service name and registered with manufacturer as specified in this Section.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.

2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

B. Regulatory Requirements:

1. Conform to requirements of NFPA 70 (National Electrical Code).
2. Products: Listed and classified by Underwriters Laboratories, Incorporated and suitable for the purpose specified and indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
1. Grid Point, Inc., Roanoke, VA 866-800-8906.
 2. Carrier Corp., Miami, FL (305) 590-1000.
 3. Lennox, Dallas, TX (214) 497-5000.
 4. Trane Co., Lacrosse, WI (608) 787-2000.
 5. York, York, PA (717) 771-6225.
 6. Honeywell, Minneapolis, MN (800) 328-5111.
 7. White Rodgers, St. Louis, MO (314) 577-1300.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted, unless noted otherwise.
- C. Provide heavy duty, locking, ventilated, hinged all - metal enclosure locking guards for all thermostats located in workroom and customer accessible areas. Provide two keys.

2.2 HVAC SYSTEM CONTROLS

- A. Thermostats used shall be low voltage, digital, two-way communicating thermostats configurable for package rooftop heat pump systems and package gas heat, electric cool rooftop units; with accessories to provide the specified sequence of operation.
1. Microprocessor based.
 2. Temporary manual override of space temperature.
 3. Battery backup.
- B. Sensors used shall be low voltage, digital, with battery backup and capable of measuring the following parameters, either individually or collectively (see drawings for specific application):
1. Supply air temperature (-20oC to +70oC).
 2. Return air temperature.
 3. Mixed air temperature.
 4. Space temperature (-20oC to +70oC).
 5. Outside air temperature.

2.3 SWITCHES

- A. Bypass Switch: Shall be momentary contact type push button. Install in standard wall box with stainless steel cover.

- B. Interval Timer: 2 hour (unless specified longer) spring operated interval timer with wall plate indicating timer setting, and control knob. Timers shall not have a permanent HOLD position.

2.4 ACCESSORIES

- A. Wiring and Conduit: Shall comply with Division 26 specifications and with code. Wiring that performs code required life safety shutdown of equipment or fire alarm interface shall comply with NFPA standards and local codes for fire alarm system wiring.
- B. Relays: Shall be rated for the application, with a minimum of two sets of Form C contacts, enclosed in a dust-proof enclosure. Relays shall have Hand-Off-Auto switch, and LED's (or pilot lights) to indicate the energized mode. Relays shall be rated for a minimum life of one million cycles. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays should be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage. Contact rating, and configuration selected to suit application.
- C. Miscellaneous Components/Sensors/Transmitters/Transformers: Shall be manufacturer's standard, designed for application in commercial building HVAC control systems, compatible with other components so as to provide sequence of operation specified.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. At contract award, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the USPS.

3.2 INSTALLATION

- A. Provide control wiring as required for proper operation. All control wires installed under this contract shall be color coded, numbered or otherwise labeled for easy identification. All wiring shall be routed concealed unless noted otherwise. All control wiring exposed to damage in workrooms shall be installed in conduit painted to match the mounting surface. All control wiring exposed in offices or other public spaces shall be installed in wiremold or conduit painted to match the mounting surface. All concealed control wiring (i.e. routed above ceilings, or in attics) shall be plenum rated. Provide and install batteries as required for proper operation. New installation shall be in accordance with manufacturer's recommendations.
- B. Provide all necessary transformers, relays, contactors and other options as required for proper operation.
- C. Mount thermostats at 78 inches above the floor in workroom spaces where subject to damage from operations. Mount thermostats at 48 to 54 inches above the floor in other areas.

- D. Provide power for all control devices under this specification Section; work shall comply with Division 26. Coordinate with Division 26 contractor.

3.3 SYSTEM PERFORMANCE

- A. Thermostats including batteries, temperature controllers, relays, switches, and 24 volt wiring to be furnished and installed by the Heating Contractor, unless furnished with the equipment.
- B. The temperature control system is to maintain space temperature settings, within plus or minus 1 degree F. of space thermostat settings.

3.4 HEAT PUMP SEQUENCE

- A. General:
 - 1. Controls shall control the units cooling, heating, system dampers (economizer), in proper sequence to provide a supply air temperature that will satisfy space conditions.
 - 2. Heating and cooling shall be properly sequenced so that there is no overlap between the use of heating and cooling.
- B. Occupied Mode:
 - 1. Fan shall run continuously.
 - 2. Unit shall cycle in heating or cooling modes as required to satisfy space thermostat.
 - a. Heating: Heat pump shall operate at 1st stage of heating. Heat pump shall ramp up to 2nd stage if heating demand is not met. Electric heater shall be final stage of heating.
 - b. Cooling: Heat pumps with economizers shall use outside air as the first stage of cooling. Economizer shall be dry bulb or enthalpy type, using Outside Air (OA) temperature sensor, mixed air temperature sensor and supply air temperature control scheme. Economizer shall be enabled only when OA temperature (or enthalpy) is less than the units Return Air (RA) temperature (or enthalpy). The OA/RA dampers shall be modulated as required to satisfy the supply air temperature control scheme. Heat pump shall operate in 1st stage cooling mode if economizer cooling cannot meet the cooling demand, with 2nd stage heat pump cooling as the final stage. Motorized relief dampers (where applicable) shall operate in unison with the OA dampers to progressively open as the OA dampers open; provide with an offset control so that the relief dampers do not begin opening until the OA dampers are at least 15% open.
 - 3. Outside air dampers shall be under economizer control when unit is in cooling. OA damper shall not close below the minimum airflow setting indicated on the plans; coordinate with balancer for minimum setting.
- C. Unoccupied Mode: Fan shall not run continuously. Unit's fan and heating/cooling shall cycle on and off as required to maintain setback temperatures. Outdoor air dampers shall be fully closed.
- D. Warm-up Mode: Unit shall run as in the unoccupied mode (outdoor air dampers fully closed) until the space temperature has warmed up to the occupied mode heating setpoint, then unit shall operate as specified for the occupied mode.
- E. Mode Control: Units' mode of operation shall be determined by unit thermostat time schedule and time schedule override; warm-up mode shall be initiated by thermostat's optimum start controls.

3.5 PACKAGE GAS HEAT, ELECTRIC COOL ROOFTOP EQUIPMENT SEQUENCE

- A. General:
 - 1. Controls shall control the units cooling, heating, system dampers (economizer), in proper sequence to provide a supply air temperature that will satisfy space conditions.

2. Heating and cooling shall be properly sequenced so that there is no overlap between the use of heating and cooling.
- B. Occupied Mode:
1. Fan shall run continuously.
 2. Unit shall cycle in heating or cooling modes as required to satisfy space thermostat.
 - a. Heating: Gas heat shall operate upon a call for heating.
 - b. Cooling: Equipment with economizers shall use outside air as the first stage of cooling. Economizer shall be dry bulb or enthalpy type, using Outside Air (OA) temperature sensor, mixed air temperature sensor and supply air temperature control scheme. Economizer shall be enabled only when OA temperature (or enthalpy) is less than the units Return Air (RA) temperature (or enthalpy). The OA/RA dampers shall be modulated as required to satisfy the supply air temperature control scheme. Compressor shall operate in 1st stage cooling mode if economizer cooling cannot meet the cooling demand. Motorized relief dampers (where applicable) shall operate in unison with the OA dampers to progressively open as the OA dampers open; provide with an offset control so that the relief dampers do not begin opening until the OA dampers are at least 15% open.
 3. Outside air dampers shall be under economizer control when unit is in cooling. OA damper shall not close below the minimum airflow setting indicated on the plans; coordinate with balancer for minimum setting.
- C. Unoccupied Mode: Fan shall not run continuously. Unit's fan and heating/cooling shall cycle on and off as required to maintain setback temperatures. Outdoor air dampers shall be fully closed.
- D. Warm-up Mode: Unit shall run as in the unoccupied mode (outdoor air dampers fully closed) until the space temperature has warmed up to the occupied mode heating setpoint, then unit shall operate as specified for the occupied mode.
- E. Mode Control: Units' mode of operation shall be determined by unit thermostat time schedule and time schedule override; warm-up mode shall be initiated by thermostat's optimum start controls.

3.6 MISCELLANEOUS CONTROL SEQUENCE

- A. Fire Alarm System Shutdown: Shut-down all air handling equipment when the building fire alarm system goes into alarm. Zone contacts in the fire alarm system are available for this purpose. This added shut-down may be accomplished by use of control logic and is not required to be hardwired but shall be of a fail-safe nature so as to provide the necessary shut-down in case of control failure. Reset shall be same as that specified for hard-wired unit smoke-detector shut-down.

3.7 ADJUSTMENT AND TRAINING

- A. At completion of the project, the Contractor shall program and completely adjust the entire temperature control system. Provide all necessary training to building personnel to include demonstration of all functions and programming capabilities of electronic thermostats and time clocks. Provide Owner's manuals and installation manuals. Provide wiring schematic (control diagrams) showing wiring identification system. Contractor shall obtain a signed receipt that the Owner has received the instruction manuals and complete instruction on the operation of the system.
- B. Operation Instructions:
1. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance required to ensure normal operation.
 2. Provide one complete set of equipment operating, installation, and programming manuals that will remain at the installed location.

END OF SECTION

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SECTION 231123

FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipes, Tubes, and Fittings.
 - 2. Piping Specialties.
 - 3. Piping and Tubing Joining Materials.
 - 4. Valves.

1.2 PERFORMANCE REQUIREMENTS

- A. Minimum Operating-Pressure Ratings:
 - 1. Piping and Valves: 100 psig minimum unless otherwise indicated.
- B. Natural-Gas System Pressure within Buildings: More than 0.5 psig but not more than 5 psig.
- C. Natural-Gas System Pressures within Buildings: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 5 psig, and is reduced to secondary pressure of 0.5 psig or less.
- D. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Welding certificates.
- C. Field quality-control reports.
- D. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. Electrical Components, Devices, and Accessories: 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 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
 - 2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
 - 3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
 - 4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
 - a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

2.2 PIPING SPECIALTIES

- A. Appliance Flexible Connectors:
 - 1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
 - 2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
 - 3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
 - 4. Corrugated stainless-steel tubing with polymer coating.
 - 5. Operating-Pressure Rating: 0.5 psig.
 - 6. End Fittings: Zinc-coated steel.
 - 7. Threaded Ends: Comply with ASME B1.20.1.
 - 8. Maximum Length: 72 inches.
- B. Quick-Disconnect Devices: Comply with ANSI Z21.41.
 - 1. Copper-alloy convenience outlet and matching plug connector.
 - 2. Nitrile seals.
 - 3. Hand operated with automatic shutoff when disconnected.
 - 4. For indoor or outdoor applications.
 - 5. Adjustable, retractable restraining cable.
- C. Y-Pattern Strainers:
 - 1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
 - 2. End Connections: Threaded ends for NPS 2 and smaller.
 - 3. Strainer Screen: 60-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - 4. CWP Rating: 125 psig.
- D. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for natural gas.
- B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.4 MANUAL GAS SHUTOFF VALVES

- A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.
- B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.
 - 1. CWP Rating: 125 psig.
 - 2. Threaded Ends: Comply with ASME B1.20.1.
 - 3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
 - 4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - 5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
 - 6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.
- C. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BrassCraft Manufacturing Company; a Masco company.
 - b. Conbraco Industries, Inc.; Apollo Div.
 - c. Lyall, R. W. & Company, Inc.
 - d. McDonald, A. Y. Mfg. Co.
 - e. Perfection Corporation; a subsidiary of American Meter Company.
 - 2. Body: Bronze, complying with ASTM B 584.
 - 3. Ball: Chrome-plated brass.
 - 4. Stem: Bronze; blowout proof.
 - 5. Seats: Reinforced TFE; blowout proof.
 - 6. Packing: Separate packnut with adjustable-stem packing threaded ends.
 - 7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - 8. CWP Rating: 600 psig.
 - 9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - 10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BrassCraft Manufacturing Company; a Masco company.
 - b. Conbraco Industries, Inc.; Apollo Div.
 - c. Lyall, R. W. & Company, Inc.
 - d. McDonald, A. Y. Mfg. Co.
 - e. Perfection Corporation; a subsidiary of American Meter Company.
 - 2. Body: Bronze, complying with ASTM B 584.
 - 3. Ball: Chrome-plated bronze.
 - 4. Stem: Bronze; blowout proof.
 - 5. Seats: Reinforced TFE; blowout proof.
 - 6. Packing: Threaded-body packnut design with adjustable-stem packing.
 - 7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - 8. CWP Rating: 600 psig.
 - 9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - 10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- E. PE Ball Valves: Comply with ASME B16.40.

1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following:
 - a. Kerotest Manufacturing Corp.
 - b. Lyall, R. W. & Company, Inc.
 - c. Perfection Corporation; a subsidiary of American Meter Company.
2. Body: PE.
3. Ball: PE.
4. Stem: Acetal.
5. Seats and Seals: Nitrile.
6. Ends: Plain or fusible to match piping.
7. CWP Rating: 80 psig.
8. Operating Temperature: Minus 20 to plus 140 deg F.
9. Operator: Nut or flat head for key operation.
10. Include plastic valve extension.
11. Include tamperproof locking feature for valves where indicated on Drawings.

F. Valve Boxes:

1. Cast-iron, two-section box.
2. Top section with cover with "GAS" lettering.
3. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
4. Adjustable cast-iron extensions of length required for depth of bury.
5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

2.5 DIELECTRIC UNIONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Capitol Manufacturing Company.
2. Central Plastics Company.
3. Hart Industries International, Inc.
4. McDonald, A. Y. Mfg. Co.
5. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
6. Wilkins; Zurn Plumbing Products Group.

B. Minimum Operating-Pressure Rating: 150 psig.

C. Combination fitting of copper alloy and ferrous materials.

D. Insulating materials suitable for natural gas.

E. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

2.6 LABELING AND IDENTIFYING

- A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 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 yellow.

PART 3 - EXECUTION

3.1 OUTDOOR PIPING INSTALLATION

- A. Comply with NFPA 54, the International Fuel Gas Code for installation and purging of natural-gas piping.
- B. Install underground, natural-gas piping buried at least 36 inches below finished grade. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
 - 1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.
- C. Install underground, PE, natural-gas piping according to ASTM D 2774.
- D. Steel Piping with Protective Coating:
 - 1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
 - 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
 - 3. Replace pipe having damaged PE coating with new pipe.
- E. Copper Tubing with Protective Coating:
 - 1. Apply joint cover kits over tubing to cover, seal, and protect joints.
 - 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
- F. Install fittings for changes in direction and branch connections.

3.2 INDOOR PIPING INSTALLATION

- A. Comply with NFPA 54, the International Fuel Gas Code for installation and purging of natural-gas piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Locate valves for easy access.
- H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Verify final equipment locations for roughing-in.

- L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
- M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is 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.
- N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
- P. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- Q. Connect branch piping from top or side of horizontal piping.
- R. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment.
- S. Do not use natural-gas piping as grounding electrode.
- T. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

3.3 VALVE INSTALLATION

- A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing or copper connector.
- B. Install underground valves with valve boxes.
- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- D. Install earthquake valves aboveground outside buildings according to listing.
- E. Install anode for metallic valves in underground PE piping.

3.4 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
 - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 - 2. Cut threads full and clean using sharp dies.
 - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 - 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
 2. Bevel plain ends of steel pipe.
 3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
- E. Braze Joints: Construct joints according to AWS's "Braze Handbook," "Pipe and Tube" Chapter.
- F. Flare Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.
- G. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
1. Plain-End Pipe and Fittings: Use butt fusion.
 2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
- B. Install hangers for horizontal, corrugated stainless-steel tubing with the following maximum spacing and minimum rod sizes:
1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.
 2. NPS 1/2: Maximum span, 72 inches; minimum rod size, 3/8 inch.
 3. NPS 3/4 and Larger: Maximum span, 96 inches; minimum rod size, 3/8 inch.

3.6 CONNECTIONS

- A. Connect to utility's gas main according to utility's procedures and requirements.
- B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
- C. Install piping adjacent to appliances to allow service and maintenance of appliances.
- D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.7 LABELING AND IDENTIFYING

- A. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for piping and valve identification. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.8 FIELD QUALITY CONTROL

- A. Test, inspect, and purge natural gas according to NFPA 54, the International Fuel Gas Code and authorities having jurisdiction.

- B. Natural-gas piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.9 OUTDOOR PIPING SCHEDULE

- A. Aboveground natural-gas piping shall be the following:
 - 1. Steel pipe with malleable-iron fittings and threaded joints.
- B. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

3.10 INDOOR PIPING SCHEDULE

- A. Aboveground, distribution piping shall be the following:
 - 1. Steel pipe with malleable-iron fittings and threaded joints.
- B. Underground, below building, piping shall be the following:
 - 1. Steel pipe with malleable-iron fittings and threaded joints.
- C. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
- D. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.11 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

- A. Valves for pipe sizes NPS 2 and smaller at service meter shall be[one of] the following:
 - 1. One-piece, bronze ball valve with bronze trim.
 - 2. Two-piece, full-port, bronze ball valves with bronze trim.
 - 3. Bronze plug valve.
- B. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:
 - 1. One-piece, bronze ball valve with bronze trim.
 - 2. Two-piece, full-port, bronze ball valves with bronze trim.
 - 3. Bronze plug valve.
- C. Valves in branch piping for single appliance shall be one of the following:
 - 1. One-piece, bronze ball valve with bronze trim.
 - 2. Two-piece, full-port, bronze ball valves with bronze trim.
 - 3. Bronze plug valve.

END OF SECTION

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SECTION 233100

HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal Ductwork.
 - 2. Air Turning Devices.
 - 3. Duct Test Holes.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 230500 - Common Work Results for HVAC.
 - 2. Section 230713 - Duct Insulation.
 - 3. Section 233713 - Diffusers Registers and Grilles.
 - 4. Section 230593 - Testing, Adjusting and Balancing for HVAC.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 36 - Structural Steel.
 - 2. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
 - 3. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 4. ASTM A 480 - General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - 5. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process.
 - 6. ASTM A 568 - Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
- B. American Welding Society (AWS):
 - 1. AWS D9.1 - Welding of Sheet Metal.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
 - 2. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
- D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. SMACNA - HVAC Air Duct Leakage Test Manual.
 - 2. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- E. Underwriters Laboratories, Inc. (UL):
 - 1. UL 181 - Factory-Made Air Ducts and Connectors.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: 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

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Duct materials, duct liner, duct connectors, and flexible duct.
 - b. Factory or shop manufactured assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Actual locations of ducts and duct fittings.
 - b. Record changes in fitting location and type.
 - c. Show additional fittings used.
 - d. Actual locations of access doors, test holes, and fire dampers.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements: Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96 standards.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Protect dampers from damage to operating linkages and blades.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 - 1. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
 - 2. Maintain temperatures during and after installation of duct sealants.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Indoor Air Quality: Install insulation so that unfaced fiberglass and mineral fiber insulation are not in the interior of the ductwork.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Galvanized Steel Ducts: ASTM A653 having G90 zinc coating in conformance with ASTM A90.

- B. Insulated Flexible Ducts:
 - 1. Manufacturers:
 - a. Anco Products Inc.
 - b. Hart & Cooley.
 - c. Tuttle & Bailey
 - d. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
 - 2. Black polymer film supported by helically wound spring steel wire; fiberglass insulation; aluminized vapor barrier film.
 - 3. Pressure Rating: 1 inch WG (positive or negative, to suit application).
 - 4. Maximum Velocity: 1800 fpm.
 - 5. Temperature Range: 0 degrees F to 120 degrees F.
- C. Fasteners: Rivets, bolts, or sheet metal screws.
- D. Sealant:
 - 1. Manufacturers:
 - a. Duro Dyne Corporation, Farmingdale, NY (800) 899-3876.
 - b. H.B. Fuller Co, St. Paul, MN (888) 423-8553.
 - c. Hardcast, Inc, Wylie, TX (800) 527-7092.
 - d. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
 - 2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.
- E. Hanger Rod: ASTM A36; steel threaded both ends, threaded one end, or continuously threaded.

2.2 AIR TURNING DEVICES/EXTRACTORS

- A. Manufacturers:
 - 1. Semco, Inc, Columbia, MO (888) 473-6264.
 - 2. Metal-Fab, Inc, Wichita, KS (800) 835-2830.
 - 3. United McGill Corp, Groveport, OH (614) 836-9981.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

2.3 DUCT ACCESS DOORS

- A. See Section 233300.

2.4 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.

2.5 FLEXIBLE DUCT CONNECTIONS

- A. See Section 233300.

2.6 MANUAL DAMPERS

- A. See Section 233300.

2.7 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 turning vanes.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

2.8 DUCT HANGERS AND SUPPORTS

- A. Hangers: As shown in SMACNA-DCS except that wire shall not be used and all materials used shall comply with these specifications.
- B. Vertical Duct Supports at Floor: 1-1/2" x 1-1/2" x 1/8" (minimum) galvanized steel angle and to support ducts, maximum 12 foot on center, and as shown in SMACNA-DCS. For ducts over 30 inches wide provide riser reinforcing with hanger rods between the riser support and riser reinforcing.
- C. Vertical Duct Supports at Wall: 1-1/2" x 1/8" (minimum) strap or 1-1/2" x 1-1/2" x 1/8" (minimum) angle bracket and as shown in SMACNA-DCS.
- D. Hanger Attachments to Structure: As shown in SMACNA-DCS to suit building construction and as allowed on structural drawings. Provide washers at all fasteners through hanger straps (regardless of SMACNA-DCS allowances). Where C-clamps are provided, retainer clips shall be used. Friction beam clamps shall not be used.
- E. Hanger Attachments to Ducts: As shown in SMACNA-DCS except that wire shall not be used as any form of support or attachment for ducts.
- F. Flexible Duct Strap: Woven polypropylene hanging strap, minimum tensile strength of 400 lbs, minimum 1.75-inches wide, designed and intended for flexible duct support.
- G. HVAC Support Wire: Steel, minimum 12 gauge, soft-annealed wire, complying with Federal Specification QQ-W-461H, and IBC for support of ceilings and accessories installed in ceilings.

2.9 HANGERS AND SUPPORTS - GENERAL

- A. Finish:
 - 1. Indoor Applications: Electro-plated zinc in accordance with ASTM B 633, or hot-dip galvanized after fabrication in accordance with ASTM A 123; except that hanger straps may be formed from pre-galvanized steel.
 - 2. Outdoor Applications: Hot-dip galvanized after fabrication in accordance with ASTM A 123, ASTM A 153, or ASTM A 653 (as applicable to item).
- B. Identification: Steel pipe hangers and supports shall be stamped with the manufacturer's name, part number, and size.
- C. Hanger Rods: Threaded hot rolled steel. Hanger rods shall be sized so that the total load imposed (including pipe or duct, insulation, hangers, and fluid) does not exceed the following:

<u>Nominal Rod Diameter</u>	<u>Maximum Load</u>
3/8 Inch	610 Pounds
1/2 Inch	1130 Pounds
5/8 Inch	1810 Pounds
3/4 Inch	2710 Pounds
7/8 Inch	3770 Pounds
1 Inch	4960 Pounds

- D. Hanger Straps: Galvanized steel, minimum 1" x 22 gauge (except where required by Code to be heavier or noted otherwise), of lock-forming grade conforming to ASTM A924, G90 (minimum) galvanized coating conforming to ASTM A 653. Minimum yield strength of 30,000 psi. Straps shall be sized so that the total load imposed does not exceed the following:

<u>Strap Size</u>	<u>Maximum Load</u>
1" x 22 Gauge	230 Pounds
1" x 20 Gauge	290 Pounds
1" x 18 Gauge	380 Pounds
1" x 16 Gauge	630 Pounds
1-1/2" x 16 Gauge	990 Pounds

- E. Beam Attachments: Constructed of malleable iron or steel, MSS standard types designed for clamping to building structural support beam. "C" clamp type shall have cup point set screws with locknuts and retaining straps. Center loaded type beam clamps shall have horizontally adjustable clamping bolt (or rod with nuts).
- F. Concrete Anchors: Wedge type expansion anchors, with hex nut and washer, and stainless steel split expansion rings. Tested to ASTM E 488 criteria, UL listed, with exposed anchor head stamped with code to identify anchor length.
- G. General Anchors (Screws, Nuts, Bolts, Fasteners):
1. General: Constructed of materials suitable for the conditions exposed to and materials being joined, with minimum 50 year service life. Stainless steel construction where exposed to corrosive conditions. Configuration, size and grade to suit application, accommodate expected forces, and provide anchoring to structural element (or allow for proper fastening of items). Minimum safety factor of 2.5 (or as required by code, whichever is greater). Comply with ASTM A307, SAE J429, SAE J78, or ASTM A 563; bolts and nuts shall have unified inch screw threads (course, UNC).
 2. Test Reports: Provide independent test report indicating fastener strength (pullout and shear) as installed in the materials and applications of this project.
 3. Finish: In finished areas, the portion of fastener exposed to view shall match the exposed finish of item being fastened.
- H. Manufactured Strut Systems:
1. Channels: Minimum 12 gauge, 1-5/8 x 1-5/8" (unless noted otherwise), with slots/holes to suit application.
 2. Accessories: Channel nuts press formed, machined and hardened with gripping slot, fabricated from steel conforming to ASTM A 108 or ASTM A 36. Fittings fabricated from steel in accordance with ASTM A 907.
 3. End Caps: Vinyl cap, capable of withstanding high temperatures without degradation, manufactured specifically for use with manufactured strut. Unistrut Series P2859 or P2860 (or approved).
- I. Steel: Structural steel per ASTM A 36.
- J. Wood: Only allowed to be used where building structural elements are of wood construction same type, grade used for building structural members. Where located outdoors shall be the pressure treated type; with all cut portions of wood painted with wood preservative.

- K. Field Galvanizing Compound: Brush or spray applied galvanizing treatment; consisting of a premixed ready to apply liquid organic zinc compound, with 95% metallic zinc content by weight in dry film. ZRC worldwide "ZRC Cold Galvanizing Compound".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that electric power is available and of the correct characteristics.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - DUCTWORK

- 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 and smaller with crimp in direction of air flow.
- G. Use double nuts and lock washers on threaded rod supports.
- H. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp and tape.
- I. Connect flexible ducts to metal ducts with draw bands plus tape.
- J. Provide residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out. Use stainless steel for ductwork exposed to view and stainless steel or carbon steel for ducts where concealed.
- K. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- L. Install so that unfaced fiberglass and mineral fiber insulation are not in the interior of the ductwork.

3.3 INSTALLATION - DUCTWORK ACCESSORIES

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- 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, and elsewhere as indicated. Provide for cleaning kitchen exhaust ductwork in accordance with NFPA 96. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and 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 at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. Demonstrate re-setting of fire dampers to Owner.
- G. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
- H. 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.
- I. Use splitter dampers only where indicated.
- J. 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.

3.4 INSTALLATION OF DUCT HANGERS AND SUPPORTS

- A. General: Provide anchors and supports for all ductwork. Supports and hangers shall comply with SMACNA-DCS, except that hanger spacing and hanger maximum loads shall be governed by whichever is more restrictive between these specifications or SMACNA-DCS.

- B. Hanger Spacing -- Rectangular Duct:

<u>Duct Area</u>	<u>Maximum Spacing</u>
Up to 4 Square Feet	8 Feet
4.1 to 10 Square Feet	6 Feet
10 Square Feet and Up	4 Feet

- C. Hanger Spacing -- Round Duct:

<u>Duct Area</u>	<u>Maximum Spacing</u>
Up to 24 Inch Diameter	8 Feet
25 Inch to 48 Inch Diameter	6 Feet
49 Inch Diameter and Up	4 Feet

- D. Hanger Spacing - Flexible Duct: 4 feet, and at changes of direction as needed to maintain duct elevation and smooth airflow.
- E. Vertical Ducts: Support at each floor level, but in no case less than on 12 foot intervals.
- F. Flexible Duct: Support with methods shown in ADC. Metal strap in contact with the flexible duct shall have minimum 1.5-inch width.

- G. Fittings: Provide supports at each change in direction of duct for ducts with 4 square foot area or more, or for ducts larger than 24 inch diameter. Locate hangers at inside and outside corners of elbows--or at each end of fitting on each side.
- H. Concentrated Loads: Provide additional supports at each side concentrated loads such as modulating dampers (24" x 24" and larger), duct heaters (18" x 18" and larger), sound attenuators (all sizes), and similar items.
- I. Exterior Duct: Provide supports for exterior ductwork as shown in SMACNA-DCS; spacing as specified herein.
- J. End of Duct: At end of duct run, hangar shall be located no more than 1/2 the allowed hangar spacing from the end of the run.

3.5 CEILING SERVICES

- A. Less than 20 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing less than 20 pounds shall be positively attached to the ceiling suspension main runners (or ceiling support members) or to cross runners with the same carrying capacity as the main runners (or support members).
- B. 20 to 56 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing 20 pounds but not more than 56 pounds, in addition to the above, shall have two No. 12 gauge wire hangers (or minimum 1" x 22 gauge hangar straps) connected from the terminal or service to the ceiling system hangers or to the structure above. These added hangers may be slack.
- C. Greater Than 56 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing more than 56 pounds shall be supported directly from the building structure by approved hangers.

END OF SECTION

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SECTION 233300

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Backdraft and Pressure Relief Dampers.
 - 2. Manual Volume Dampers.
 - 3. Flange Connectors.
 - 4. Duct-Mounted Access Doors.
 - 5. Flexible Ducts.
 - 6. Duct Accessory Hardware.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
 - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control damper installations.
 - d. Fire-damper and smoke-damper installations, including sleeves; and duct-mounted access doors.
 - e. Wiring Diagrams: For power, signal, and control wiring.
- C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.

- 2. Exposed-Surface Finish: Mill phosphatized.
- C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and finish for exposed ducts.
- D. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Air Balance Inc.; a division of Mestek, Inc.
 - 2. American Warming and Ventilating; a division of Mestek, Inc.
 - 3. Cesco Products; a division of Mestek, Inc.
 - 4. Duro Dyne Inc.
 - 5. Greenheck Fan Corporation.
 - 6. Lloyd Industries, Inc.
 - 7. Nailor Industries Inc.
 - 8. NCA Manufacturing, Inc.
 - 9. Pottorff; a division of PCI Industries, Inc.
 - 10. Ruskin Company.
 - 11. SEMCO Incorporated.
 - 12. Vent Products Company, Inc.
- B. Description: Gravity balanced; counterbalanced type where indicated with adjustable weights.
- C. Frame: 0.052-inch-thick, galvanized sheet steel.
- D. Blades: Multiple single-piece blades, center-pivoted, maximum 6-inch width, 0.025-inch-thick, roll-formed aluminum with sealed edges.
- E. Blade Action: Parallel.
- F. Blade Seals: Neoprene, mechanically locked.
- G. Blade Axles:
 - 1. Material: Stainless steel.
 - 2. Diameter: 0.20 inch.
- H. Tie Bars and Brackets: Galvanized steel.
- I. Return Spring: Adjustable tension.
- J. Bearings: Steel ball.
- K. Accessories:
 - 1. Adjustment device to permit setting for varying differential static pressure.
 - 2. Counterweights and spring-assist kits for vertical airflow installations.
 - 3. Electric actuators.
 - 4. Chain pulls.

5. Screen Mounting: Front mounted in sleeve.
 - a. Sleeve Thickness: 20-gage minimum.
 - b. Sleeve Length: 6 inches minimum.
6. Screen Mounting: Rear mounted.
7. Screen Material: Aluminum.
8. Screen Type: Bird.
9. 90-degree stops.

2.3 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.
 - b. American Warming and Ventilating; a division of Mestek, Inc.
 - c. Flexmaster U.S.A., Inc.
 - d. McGill AirFlow LLC.
 - e. METALAIRE, Inc.
 - f. Nailor Industries Inc.
 - g. Ruskin Company.
 - h. Vent Products Company, Inc.
2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Frames:
 - a. Hat-shaped, galvanized-steel channels, 0.064-inch minimum thickness.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch thick.
6. Blade Axles: Stainless steel.
7. Bearings:
 - a. Molded synthetic.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
8. Tie Bars and Brackets: Galvanized steel.

B. Standard, Aluminum, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.
 - b. American Warming and Ventilating; a division of Mestek, Inc.
 - c. Flexmaster U.S.A., Inc.
 - d. McGill AirFlow LLC.
 - e. METALAIRE, Inc.
 - f. Nailor Industries Inc.
 - g. Ruskin Company.
 - h. Trox USA Inc.
 - i. Vent Products Company, Inc.
2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
5. Blades:

- a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
- 6. Blade Axles: Stainless steel.
- 7. Bearings:
 - a. Molded synthetic.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- 8. Tie Bars and Brackets: Aluminum.
- C. Jackshaft:
 - 1. Size: 1-inch diameter.
 - 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- D. Damper Hardware:
 - 1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
 - 2. Include center hole to suit damper operating-rod size.
 - 3. Include elevated platform for insulated duct mounting.
- E. Frames:
 - 1. Hat or U shaped.
 - 2. Galvanized-steel channels, 0.064 inch thick.
 - 3. Mitered and welded corners.
- F. Blades:
 - 1. Multiple blade with maximum blade width of 8 inches.
 - 2. Parallel- and opposed-blade design.
 - 3. Galvanized steel.
 - 4. 0.064 inch thick.
 - 5. Blade Edging: Closed-cell neoprene edging.
- G. Blade Axles: 1/2-inch- diameter; stainless steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
 - 1. Operating Temperature Range: From minus 40 to plus 200 deg F.
- H. Bearings:
 - 1. Molded synthetic.
 - 2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 3. Thrust bearings at each end of every blade.

2.4 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ductmate Industries, Inc.
 - 2. Nexus PDQ; Division of Shilco Holdings Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Material: Galvanized steel.
- C. Gage and Shape: Match connecting ductwork.

2.5 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. American Warming and Ventilating; a division of Mestek, Inc.
 - 2. Ductmate Industries, Inc.
 - 3. Flexmaster U.S.A., Inc.
 - 4. Greenheck Fan Corporation.
 - 5. McGill AirFlow LLC.
 - 6. Nailor Industries Inc.
 - 7. Ventfabrics, Inc.
 - 8. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."
 - 1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.
 - 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 - 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
 - c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches.
 - d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

2.6 FLEXIBLE DUCTS

- A. See Section 233100.
- B. Connectors:
 - 1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.
 - 2. Non-Clamp Connectors: Adhesive plus sheet metal screws.

2.7 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: See Section 233100.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

2.8 DUCT SMOKE DETECTOR

- A. See Division 26.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft and control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors; and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
- H. Install access doors with swing against duct static pressure.
- I. Access Door Sizes:
 - 1. One-Hand or Inspection Access: 8 by 5 inches.
 - 2. Two-Hand Access: 12 by 6 inches.
 - 3. Head and Hand Access: 18 by 10 inches.
 - 4. Head and Shoulders Access: 21 by 14 inches.
 - 5. Body Access: 25 by 14 inches.
 - 6. Body plus Ladder Access: 25 by 17 inches.
- J. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- K. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- L. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.

END OF SECTION

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SECTION 233713

DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Diffusers.
 - 2. Registers/grilles.
- B. Related Sections:
 - 1. Section 099100 - Painting: Painting of ductwork visible behind outlets and inlets.

1.2 REFERENCES

- A. Air Diffusion Council (ADC):
 - 1. ADC 1062 - Certification, Rating and Test Manual.
- B. Air Movement and Control Association (AMCA):
 - 1. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
- C. Air Conditioning and Refrigeration Institute (ARI):
 - 1. ARI 650 - Air Outlets and Inlets.
- D. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
 - 1. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
- F. National Fire Protection Association (NFPA):
 - 1. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

1.3 SUBMITTALS

- A. Section 013300 - Submittals: Procedures for submittals.
 - 1. 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 schedule of outlets and inlets showing type, size, location, application, and noise level.

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. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Titus, Richardson, TX (214) 899-1030.
 - 2. Ruskin, Kansas City, MO (816) 761-7476.
 - 3. Tuttle & Bailey, Holland, MI (800) 270-5686.
 - 4. Krueger.
 - 5. Price.

2.2 AIR OUTLETS

- A. Type: Manufacturer's type/model as scheduled on drawings.
- B. Frame: Surface mount, Snap-in, Inverted T-bar, or Spline type as required to match ceiling installed in.
- C. Fabrication: Steel or Aluminum with baked enamel, "off-white" finish.
- D. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.
- E. Insulation: Back plate covered with glass fiber insulation with an aluminum foil vapor barrier to prevent harmful effects of condensation.

2.3 AIR INLETS

- A. Type: Manufacturer's type/model as scheduled on drawings.
- B. Frame: Surface mount, Snap-in, Inverted T-bar, or Spline type as required to match ceiling installed in.
- C. Fabrication: Steel with 20 gage minimum frames and 22 gage minimum blades, steel and aluminum with 20 gage minimum frame, or aluminum extrusions, with factory baked enamel, "off-white" finish.
- D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate location of outlets and inlets with Architectural reflected ceiling plan and make necessary adjustments in position to conform with architectural features, symmetry, and electrical lighting arrangement.
- C. Install air inlets and outlets to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to all inlets and outlets; 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 099100.

END OF SECTION

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SECTION 238100

DECENTRALIZED UNITARY HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Packaged Rooftop Air Conditioning Unit (RTU).
 - 2. Temperature Controls.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 077213 - Manufactured Curbs.
 - 2. Section 283100 - Fire Detection and Alarm.
 - 3. Section 233100 - HVAC Ducts and Casings.
 - 4. Section 230904 - Instrumentation and Control for HVAC (MSBD).
 - 5. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.

1.2 REFERENCES

- A. ANSI/AHRI 210/240-2008 - "Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment".
- B. U.S. EPA Final Rule 21 (40 CFR Part 82 – 81 FR 86778).
- C. NFPA 70 - National Electrical Code.
- D. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- E. UL 465 - Central Cooling Air Conditioners.

1.3 DEFINITIONS

- A. Roof Top Air Conditioning Unit (RTU): Single-packaged, self-contained, factory-assembled, pre-wired, Door unit consisting of cabinet and frame, evaporator fan, evaporator-coil, fuel-fired furnace or heat-pump, condenser coil, condenser fan, compressor(s), controls and filters in draw-through air flow configuration.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Provide product data for manufactured Units. Indicate performance capacities, energy-efficiency ratings and electrical characteristics.
 - 2. Shop Drawings: Provide shop drawings for manufactured Units. Indicate gas pipe connections, ductwork connections, filter size and quantity, condensate drain connection, thermostatic valves, temperature controls connections and electrical rough-in connections with electrical characteristics and connection requirements.
 - 3. Assurance/Control Submittals:

- a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Plan view of installed location of Units.
 - b. Elevation or section view of installed Units.
 - 2. Warranty: Submit written minimum five (5) years warranty to include coverage for refrigeration compressors condenser and evaporator with forms completed in United States Postal Service name and registered with manufacturer as specified in this Section.
 - 3. Extra Products: Submit extra products as specified in this Section.
 - 4. Operating instruction: Document training by furnishing a sign-in sheet with a description of the training provided instructors name and organization, and those who received training. Refer to 017704 1.3, 1.4, and 1.5 for more specific training.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum five (5) years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum five (5) years documented experience.
- B. Regulatory Requirements:
 - 1. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.
 - 2. ASHRAE Standard 15-2016 for safety codes for mechanical refrigeration.
 - 3. ASHRAE Standard 34-2016 for safety classifications of refrigerants based on toxicity and flammability data.
 - 4. ASHRAE Standard 147-2013 for refrigerant leaks, recovery, and handling and storage requirements.
 - 5. Comply with U.S. EPA Final Rule 21 (40 CFR Part 82 – 81 FR 86778) for acceptability status of substitute refrigerants.
 - 6. Comply with any state, fire marshal, building code or other local authority prohibitions or regulations related to flammable refrigerants.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Carrier 1-800-227-7437
 - 2. York 516-937-2327
 - 3. Trane 1-972-406-3656
 - 4. Lennox 972-497-5317
 - 5. AAON (918) 382-6400

6. Daikin/McQuay 1-800-432-1342

- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not Permitted.

2.2 MATERIALS

A. Cabinet:

1. Frame and Panels: Minimum 18 gauge galvanized steel structural frame members, minimum 20 gauge cabinet panels with baked enamel or powder coated finish, easily removed access doors or panels with quick release fasteners.
2. Provide with hail guards to protect condenser coils in hail prone locations.
3. Insulation: Minimum one half (1/2") inch (13 mm) thick acoustic duct liner with smooth, black neoprene air-side surface for lining cabinet interior. Edges exposed to conditioned air path shall be coated with black neoprene surface.
4. Drain Pan: Galvanized steel with corrosion-resistant coating, insulated, high-slope for positive drainage per ASHRAE Standard 62-89. Drain pan shall extend under the complete coil section.

B. Evaporator Fan:

1. Fans: Direct-driven or V-Belt driven, with permanently lubricated bearings, double width, double inlet, forward curved centrifugal fan, statically and dynamically balanced, resiliently mounted. Minimum three (3)-speed, blower to provide required CFM at medium speed with minimum external static pressure of 0.75 in. wg.
2. V-Belt Drive: Cast iron or steel sheaves, 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 as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.
3. Motors: High efficiency type. See Section 230500.

C. Evaporator Coil:

1. Direct expansion cooling coil shall be constructed of seamless copper tubes expanded into aluminum fins. Maximum coil face velocity shall not exceed five hundred feet per minute.
2. Refrigeration circuit with externally equalized thermal expansion valve, filter-drier, and charging valves.

D. Heater:

1. Fuel Fired Furnace: natural-gas, self-contained, package unit complete with burner and controls. Aluminized steel heat exchanger, AGA certified, minimum AFUE efficiency of 75 percent. Electronic pilot ignition shall be provided. Unit shall be provided as an integral part of the Roof Top Air Conditioning Unit.
2. Heat Pump: Refrigerant system reversing valve. Provide auxiliary heaters.

- E. Air Filters - Easily removed one 2" inch thick throw-away type with 25-30 percent ASHRAE Dust Spot Efficiency filter. Maximum filter face velocity shall not exceed five hundred feet per minute.

- F. Condenser Fans - Direct-driven, with permanently lubricated bearings, thermal overload protection, weatherproofed, vertical discharge propeller type with fan guard, statically and dynamically balanced, resiliently mounted.

- G. Condenser Coil - Shall be thick seamless copper tubes expanded into aluminum fins with sub-cooling circuits, tested for leaks up to 425 psig. Suction and Liquid line service gauge ports and full charge of refrigerant. Provide refrigerant pressure switches to cycle condenser fans. Coil coating shall be one of the following:

1. Surface treatment on aluminum fin on copper tubing or solid aluminium micro channel coils shall have a factory dipped process flexible epoxy polymer e-coat uniformly applied to all coil surface areas without material bridging between fins or channels. Coating process shall ensure complete coil encapsulation and a uniform dry film thickness from 0.8 - 1.2 mil on all surface areas including

- fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and a cross-hatch adhesion of 4B-5B per ASTM B3359-93. Impact resistance shall be up to 160 in/lb per ASTM D2794-93. Humidity and water immersion resistance shall be up to a minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 5,000 hours salt spray per ASTM B117-97. Coating can be field applied for smaller equipment to prevent delays during construction.
2. Surface treatment shall be ambient air temperature cured, inorganic film structures and shall not act as an insulating barrier to the substrate, which would inhibit or degrade heat transfer coefficients or increase energy consumption of the condenser. The dry film thickness shall be no greater than 8 microns. Pass ASTM G-21, with a zero (0) microbial spore growth development rating. The standard ASTM G-21 test must have been conducted by an accredited, third party, independent laboratory. Surface treatment shall meet or exceed 6,000 hours of corrosion protection using ASTM B117 testing protocols and conducted by an accredited, third party, independent laboratory.
- H. Compressor - Shall be hermetically sealed, 3600 rpm maximum, resiliently mounted with positive lubrication internal motor protection, refrigerant line filter drier, and crankcase heater. Reversing valve for heat-pump units.
- I. Refrigerant - Only R-410A refrigerant is permitted.
1. Note: As of this update, EPA has not designated a schedule for phase out of R-410A in RTUs. System must comply with U.S. EPA's Significant New Alternatives Policy (SNAP) program for acceptable substitute refrigerants. If/when EPA deems R-410A unacceptable, new generation equipment utilizing lower Global Warming Potential (GWP) hydrofluoroolefin (HFO) refrigerants and blends should be considered.
 2. Refrigerant Compatibility: Parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
- J. Economizer - Factory:
1. General: Unit shall have economizer system manufactured by unit manufacturer to allow use of 100% outside air for economizer cooling. System shall have outside air and return air dampers, each operable from 0% to 100% of unit total airflow capacity. Dampers shall have linkage to allow return air damper to close as outside air damper opens. Outside air inlet shall have an aluminum mesh water entrapment filter and intake hood.
 2. Relief: Unit shall have barometric relief damper to allow for pressure relief of building air as outside air damper is opened. Relief shall be gravity closing and prohibit the backdraft or entrance of outside air thru the relief passage. Relief outlet shall have hood with birdscreen.
 3. Powered Exhaust: Where indicated on the plans, unit shall have powered exhaust with fan sized to exhaust no less than 80% of unit supply air. System shall include exhaust fan, exhaust hood, and exhaust fan, backdraft damper. Fan shall be direct drive centrifugal type, with permanently lubricated bearings and motor with thermal overloads.
- K. Controls:
1. General: Unit shall have factory installed controls which allow for the building control system to control unit fan, cooling, heating, supplementary heating, and economizer operations. Unit shall be furnished with all necessary relays, starters, wiring terminal strips, timers, safety devices, etc. to allow for the sequence of operation as specified in Section 230904 using the Section 230904 control system, and allowing unit's safeties to protect unit components. Unit wiring shall be color coded and numbered corresponding to unit's wiring diagram. Access panels to unit controls shall be hinged with latches (or equivalent device), requiring no tools to open.
 2. Economizer Controls: System shall include a spring return modulating actuator on the outdoor air and return air damper, with actuator controlled by unit's controls. Exhaust fan VFD shall be controlled by unit furnished space pressurization sensor, set to maintain space 0.05 to 0.10 inch wc positive. Exhaust fan shall be enabled once the OA damper is more than 50% open using unit provided controls.
 3. Low Ambient Controller: Cycles condenser fan to permit operation down to low temperature observed in project location.

4. 3-Phase rooftop air conditioning equipment shall be provided with a Voltage Phase Monitor. Phase monitor shall provide 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor is equipped with an LED that provides an ON or FAULT indicator.
- L. Mixed-Air Casing:
 1. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fail to closed position. Relief dampers may be gravity balanced.
 2. Gaskets: Provide tight fitting dampers with edge gaskets maximum leakage 5 percent at 2 inches (500 Pa) pressure differential.
 3. Damper Operator: 24 volt with gear train sealed in oil with spring return to fail to closed position.
- M. Pre-fab Roof Mounting Curb - Section 077213 - Curbs to be supplied and installed by General Contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
- C. Verify that proper power supply is available.
- D. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- E. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Mount RTU(s) on roof mounting curb providing water-tight enclosure to protect ductwork and utility services.
- B. Install RTU(s) level and in accordance with manufacturer's instructions.
- C. Install condensate drain pipes from Unit drain pan to designated location shown on drawings. Provide minimum 1/8 inch per foot slope on all horizontal pipes.
- D. Mechanical equipment, appliances, and supports that are exposed to wind shall be designed and installed to resist the wind pressures determined in accordance with the local Building Code.
- E. For High-Velocity Hurricane Zones, all rooftop equipment and supports shall be secured to the structure in compliance with the loading requirements of the local Building Code.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.

B. Operating Instruction:

1. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance that is required to ensure normal operation.
2. Provide one complete set of equipment operating, installation, and programming manuals that will remain at the installed location.

END OF SECTION

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SECTION 000010

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DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

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SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic Electrical Methods.
 - 2. Grounding and Bonding.
 - 3. Hangers and Supports.
 - 4. Electrical Identification.
 - 5. Motor Starters, Controls, and Connections to Mechanical Equipment.
 - 6. Electrical System Testing and Inspection.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 019113 - General Commissioning Requirements.
 - 2. Section 078400 - Firestopping.
 - 3. Section 220500 - Common Work Results for Plumbing.
 - 4. Section 230500 - Common Work Results for HVAC.
 - 5. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
 - 6. Section 260533 - Raceway and Boxes for Electrical Systems.
 - 7. Section 260623 - Lighting Control Devices.
 - 8. Section 260800 - Commissioning of Electrical Systems.
 - 9. Section 262416 - Panelboards.
 - 10. Section 262726 - Wiring Devices.
 - 11. Section 262816 - Enclosed Switches and Circuit Breakers.
 - 12. Section 264128 - Surge Protective Devices (SPD's).
 - 13. Section 265100 - Interior Lighting (LED-Solid State).
 - 14. Section 265600 - Exterior Lighting.
 - 15. Section 270500 - Common Work Results for Communications.
 - 16. Section 271300 - Communications Backbone Cabling.
 - 17. Section 271500 - Horizontal Cabling.
 - 18. Section 272133 - Wireless Access Points.
 - 19. Section 275116 - IP Integrated, Public Address Zone Paging System.
 - 20. Section 281600 - Intrusion Detection System.
 - 21. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.

1.2 REFERENCES

- A. National Electrical Contractors Association (NECA):
 - 1. NECA SI - Standard of Installation.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA KS 1 - Enclosed Switches.
- C. National Electrical Testing Association (NETA):
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Grounding electrodes and connections.
 - b. Starter electrical characteristics and connection requirements.
 - 2. Assurance/Control Submittals:
 - a. Electrical System Test Reports: Submit report including the following directly to USPS Project Manager from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.
 - 1) Summary of project.
 - 2) Description of equipment tested.
 - 3) Description of test.
 - 4) Test results.
 - 5) Conclusions and recommendations.
 - 6) Appendix, including appropriate test forms.
 - 7) List of test equipment used and calibration date.
 - 8) Signature of responsible Testing Laboratory Officer.
 - b. Certificates: Manufacturer's certificate that each Product specified meet or exceed specified requirements.
 - c. Qualification Documentation: Submit documentation of experience indication compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following.
 - a. Locations of components and grounding electrodes.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing Work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements:
 - 1. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for the purpose specified and indicated.
 - 2. Work herein shall conform to all applicable laws, ordinances and regulations in accordance with the latest applicable requirements of:
 - a. National Electrical Manufacturer's Associates.
 - b. Standards of National Fire Protection Association (NFPA 72, 90A and 101).
 - c. Underwriter's Laboratories.
 - d. Occupational Safety and Health Agency Standards.
 - e. Illuminating Engineering Society Handbook.
 - f. The International Existing Building Code.
 - g. The International Electrical Code.
 - h. ASHRAE Standard 90.1.
 - i. The International Energy Conservation Code.

1.5 BASIC ELECTRICAL METHODS

- A. Drawings are schematic and diagrammatic. Use judgment and care to install electrical Work to function properly and fit within building construction and finishes. Electrical conductors, conduit, components, not shown or specified, which are required for any device or system to produce a complete and operative system are required to be furnished and installed.
- B. Exact location of outlets are determined from dimension on Drawings, manufacturer's shop drawings, or as may be determined at Project Site. Do not scale Drawings for exact location of any item. Verify item mounting heights as required by project conditions prior to rough-in.
- C. Route conduits and wiring associated with new equipment and systems above ceilings, in existing chases, and concealed within building structure.
- D. Surface mounted raceways or conduit permitted only at locations indicated on Drawings.
- E. Circuit grouping, conduit or cable runs and home runs are indicated with number of conductors shown in each raceway to clarify operation and function of various systems. Provide proper number of conductors and conduits or cables to provide operative system as indicated on Contract Documents. Do not regroup any feeder circuits, branch circuits, home runs, and zone alarms at any point, from that shown on Contract Documents. Each conduit run shall contain no more than (6) current carrying conductors.
- F. Branch and home run circuits are indicated as 2, 3, or 4 wire circuits unless otherwise noted. Do not connect two ungrounded conductors to same circuit breaker/fused switch in any panel. Circuit runs consist of a maximum of five conductors; 3 phase conductors, 1 neutral conductor, and 1 equipment ground conductor, unless otherwise noted. Do not splice branch circuit conductors in any panels, safety switches, or circuit breakers in separate enclosures.
- G. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutrals.
- H. Proposed equipment, switches or devices, shown mounted on and/or adjacent to equipment, which if installed, would impair proper operation of existing or new equipment, shall be removed and relocated by Contractor as required so equipment will function properly. Notify USPS Project Manager immediately if any such condition exists.
- I. Seal and make permanently watertight penetrations by electrical raceways or equipment through ceilings, walls or floors.
 - 1. Seal penetrations in non-fire rated ceilings, walls or floors material specified in Section 079200 - Joint Sealants.
 - 2. Seal penetrations in fire rated walls with material specified in Section 078400 - Firestopping.
- J. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A, and NFPA 70.
- K. Install equipment and materials to provide required maintenance and code working clearance for servicing and maintenance. Coordinate final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow required space for removal of parts that require replacement or servicing.
- L. Remove existing equipment, lighting fixtures, switches, and receptacles as required to facilitate proposed installation and as specified in Section 024119 - Selective Structure Demolition. Remove existing wiring and conduit serving items to be removed. Conduit in inaccessible areas shall be cut off below finished surfaces and existing surface patched to match existing. Provide blank plates on existing flush mounted outlet boxes that will be abandoned. Remove all abandoned conductors from raceways.

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING

- A. Grounding System Resistance: Five ohm.
- B. Rod Electrodes:
 - 1. Material: Copper.
 - 2. Diameter: 3/4 inch.
 - 3. Length: 10 feet.
- C. Mechanical Connectors: Bronze.
- D. Electrode Conductor:
 - 1. Material: Bare stranded copper.

2.2 HANGERS AND SUPPORTS

- A. Product Requirements: Furnish and install approved materials, sizes, and types of anchors, fasteners, and supports to carry loads of equipment and conduit, including weight of wire in conduit plus 300 pounds.
- B. Materials and Finishes: Corrosion resistive.
- C. Anchors and Fasteners:
 - 1. Steel Structural Elements: Beam clamps and welded fasteners.
 - 2. Concrete Surfaces: Self-drilling anchors and expansion anchors.
 - 3. Hollow Masonry, Plaster, and Gypsum Board Partitions: Toggle bolts and hollow wall fasteners.
 - 4. Solid Masonry Walls: Expansion anchors.
 - 5. Sheet Metal: Sheet metal screws.
 - 6. Wood: Wood screws.

2.3 ELECTRICAL IDENTIFICATION

- A. Nameplates:
 - 1. Engraved three-layer laminated phenolic plastic, white letters on black background.
 - 2. Locations:
 - a. Each electrical distribution and control equipment enclosure.
 - b. Communication cabinets.
 - c. Terminal Cabinets.
 - d. Individual motor starter.
 - e. Separately enclosed circuit breakers.
 - f. Panelboards.
 - g. Pull boxes.
 - h. Lighting contactor/control panel enclosure.
 - i. Relays.
 - j. Switches and disconnects.
 - 3. Letter Size:
 - a. Use 1/8 inch letters for identifying individual equipment and loads.
 - b. Use 1/4 inch letters for identifying grouped equipment and loads.
- B. Wire and Cable Markers:
 - 1. Description: Cloth tape or tubing type wire markers.

2. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
3. Identification:
 - a. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings.
 - b. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on Drawings.
 - c. Communications Cable: Per section 270500.
- C. Conduit Markers:
 1. Underground conduit routings shall be marked utilizing magnetic marker tape set atop of the entire conduit run.
 - a. Underground-Type Plastic Line Marker: Manufacturer's standard detectable permanent, bright colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide by 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried cable. Locate tape 12 inches above top of conduit.
- D. Arc Flash warning Signs: Furnish signs in accordance with NEC Article 110.16, warning of potential arc flash hazard and requiring suitable Personal protective equipment. Locate and install signs per INSTALLATION Section of this specification.

2.4 MOTOR STARTERS, CONTROLS, AND CONNECTIONS TO MECHANICAL EQUIPMENT

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Allen-Bradley Company, Milwaukee, WI (414) 382-2000.
 2. Cutler-Hammer Eaton Corp, Milwaukee, WI (800) 833-3927.
 3. Square D Company, Palatine, IL (847) 397-2600.
 4. General Electric Company, Plainville, CT (860) 747-7111.
 5. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
 6. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Motor Starters:
 1. Provide manual, single phase, 120/277V, toggle type, motor rated switches with thermal overload element (sized at 115 percent of full load current) for fractional horsepower motors not requiring automatic control interfaces.
 2. Provide across-the-line, AC magnetic motor starters in applications where controls other than manual on and off are involved. Motor starters shall be UL labeled. Provide starters with the following features:
 - a. Rating for the voltage and current imposed.
 - b. Enclosure for the application usage: NEMA 1 for dry, indoors, NEMA 3R for outdoors, etc.
 - c. Control circuit voltage and amperage to match coil voltage and ratings of control apparatus.
 - d. Control transformers with primary and secondary fusing for control circuits, as required.
 - e. Overload elements for every conductor leg above ground. Elements are to be "thermal alloy" type, resettable and properly sized to motor nameplate rating. Elements located near boilers, heat strips, duct heaters or other heat sources or where heating by conduction or radiation can occur, shall be ambient temperature compensated types.
 - f. Adjustable phase loss/phase reversal protection (0-15 seconds), factory set at 7 seconds and a minimum of two field convertible auxiliary contacts.
 - g. Cover-mounted control switch is to be a "start-stop" or "hand-off-auto" type with "running" and "auto" pilot lights, as required by the control sequence. A suitable reset device for manually resetting overcurrent trip shall be provided.
 3. Magnetic starters for motors 10 hp or less shall be connected to automatically return the motor to service after a power interruption. Starters for motors over 10 hp shall be equipped with time delay relays so that after a power resumption and after a preset delay of 0-30 seconds, the motor shall automatically be returned to service.

- 4. Combination magnetic motor starter/fused disconnect unit shall be utilized wherever possible.
- C. Furnish and Install the Following:
 - 1. Conduit, wiring and electrical connections to motors, safety switches, starters, relays, electrical interlock circuits, valves, unit heaters, fan coil units, air handling units, and other similar equipment, required for complete and ready for operation. Coordinate with and review other sections of the specifications describing electrical equipment in order to fully understand the wiring requirements.
 - 2. Starters as indicated on Drawings except factory provided starters such as those physically mounted on the unit or any piece of equipment where starter is furnished as an integral part of the equipment.
 - 3. Electrical line voltage control components and installation as specified in Division 26 Sections.
 - 4. Furnish and install low voltage (below 50 volts) control wiring as indicated on Drawings using metallic conduit and No. 12 type THHN wire, minimum.
- D. Refer to Drawings for quantity and size of motor starters.
- E. Individual motor starters and those starters factory provided integral with the equipment shall be furnished in accordance with paragraph 2.4 B.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to USPS Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - GROUNDING AND BONDING

- A. Provide bonding and grounding in conformance with NFPA 70.
- B. Equipment Grounding Conductor: Provide separate, insulated conductor within all lighting and power raceways. Terminate each end on suitable lug, bus, or bushing.
- C. Testing and Inspection:
 - 1. Inspect and test in accordance with NETA ATS, where applicable.
 - 2. Perform inspections and tests listed in NETA ATS, Section 7.13.
 - 3. Test ground resistance of system with ground resistance tester. The resistance of the grounding system shall not exceed 5 ohms. Where tests show resistance-to-ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms, or less, but driving additional ground rods; then retest to demonstrate compliance. Install rods at least 8 feet apart.
 - 4. Method for testing individual ground rods and overall grounding system shall be accomplished by the three point method per military handbook 419. Test probes shall be placed minimum of 30 feet and 60 feet from rod being tested. Furnish written report of all test results for all ground rods.

3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Install products in accordance with manufacturer's published instructions.
- B. Furnish and install anchors, fasteners, and supports in accordance with NECA SI.
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Do not use spring steel clips and clamps.
- E. Do not use powder-actuated anchors.
- F. Obtain permission from structural engineer before drilling or cutting structural members.
- G. Fabricate supports from structural steel angle or structural steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- I. In wet and damp locations use structural steel channel supports to stand cabinets and panelboards one inch off wall.
- J. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

3.4 INSTALLATION - ELECTRICAL IDENTIFICATION

- A. Install nameplate parallel to equipment lines.
- B. Secure nameplate to equipment front using stainless steel screws. Use minimum two screws at each end of nameplate.
- C. Secure nameplate to outside surface of door on panelboards.
- D. Install Arc Flash Warning Signs on switchboards, panelboards, control panels, meter socket enclosures, and motor control centers likely to require examination, adjustment, servicing, or maintenance while energized. Locate sign so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

3.5 INSTALLATION – MOTOR STARTERS, CONTROLS, AND CONNECTIONS TO MECHANICAL EQUIPMENT

- A. Verify and check equipment manufacturer's nameplate and installation instructions to obtain exact location of outlets for equipment before installation.
- B. Wire and connect line voltage controls in accordance with approved wiring diagrams. Provide line voltage interlock and control wiring as indicated on Drawings using conduit and No. 12 type THHN wire.

3.6 FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION

- A. Section 014000 - Quality Requirements: Field testing and inspection.

- B. Section 260800 - Commissioning of Electrical Systems: Requirements related to Division 26 Commissioning.
- C. Conduct testing to Determine that Electrical Equipment and Systems:
 - 1. Are in conformance with Contract Documents and applicable reference standards.
 - 2. Is properly installed without damage due either to installation or shipment.
 - 3. Operate correctly, meet design intent, and are performing at optimum level, in safe manner.
- D. Provide a complete written record of operational values to be used as a baseline for future operational testing.
- E. Instrumentation:
 - 1. Provide calibration program that assures applicable test instrumentation is maintained within rated accuracy and directly traceable to National Bureau of Standards.
 - 2. Calibrate instruments in accordance with following frequency schedule:
 - a. Field Instruments:
 - 1) Analog - 6 months maximum.
 - 2) Digital - 12 months maximum.
 - b. Leased Specialty Equipment: 12 months. (Where accuracy is guaranteed by lessor.)
 - 3. Dated Calibration Labels: Visible on test equipment.
 - 4. Keep records current; show date and result of instruments calibrated or tested.
 - 5. Maintain current instrument calibration instruction and procedure for each test instrument.
 - 6. Calibrating Standard: Higher accuracy than that of instrument being calibrated.
- F. Regulatory Requirements:
 - 1. Safety Practices: Include, but not limited to, the following requirements:
 - a. Occupational Safety and Health Act of 1970 - OSHA.
 - b. Accident Prevention Manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
 - c. Applicable State and Local Safety Operating Procedures.
 - d. NETA Safety/Accident Prevention Program.
 - e. United States Postal Service Safety Practices.
 - f. NFPA 70E - Electrical Safety Requirements for Employee Workplace.
 - g. American National Standards for Personnel Protection, ANSI Z244.1.
 - 2. Perform tests with apparatus de-energized except where otherwise specifically required herein.
 - 3. Testing Laboratory: Provide a designated safety representative present at Project Site and supervise safety operations.
 - 4. Power Circuits: Conductors shorted to ground by a hot line grounded device approved for the purpose.
 - 5. Do not proceed until safety representative has determined that it is safe to do so.
 - 6. Testing Laboratory: Provide sufficient protective barriers and warning signs to conduct specified tests safely.
- G. Tests and inspections include, but are not limited to the following:
 - 1. Proper operation of lights and equipment.
 - 2. Continuity of raceway system.
 - 3. Insulation leakage and impedances.
 - 4. Ground system resistance.
 - 5. Elimination of reverse rotation and single-phasing of motors.
 - 6. Sub-system tests indicated in other Sections.
 - 7. Proper operation of communications systems specified in Section 270500.
 - 8. Proper operation of intrusion detection systems specified in Section 281600.
 - 9. Proper operation of video surveillance system specified in Section 282305.
 - 10. Proper operation of fire alarm system specified in Section 283100.
- H. Load balance all electrical phases, at device, panels, and switchboards.

- I. Perform electrical system testing and inspection as specified in each related Section and as specified in this Section.

END OF SECTION

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SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Building Wire and Cable.
 - 2. Branch-Circuit Cable.
 - 3. Wiring Connectors and Connections.
 - 4. Drop Cords.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver in accordance with NEMA WC 26.

PART 2 - PRODUCTS

2.1 BUILDING WIRE AND CABLE

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Alcan Cable, Atlanta, GA (770) 392-2376.
 - 2. Anixter, Inc., Skokie, IL (800) ANIXTER.
 - 3. General Cable, Highland Heights, KY (800) 526-4391.

4. General Electric, Plainville, CT (860) 747-7111.
5. Okonite, Ramsey, NJ (201) 825-0300.
6. Southwire Company, Carrollton, GA (800) 444-1700.
7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

B. Description: Single conductor insulated wire.

C. Conductor: Copper, except conductors #1/0 AWG and larger may be compact stranded aluminum if equipped with compression lugs and installed per manufacturer's recommendations and the National Electrical Code.

D. Insulation Voltage Rating: 600 Volts.

E. Insulation: NFPA 70, Type THHN/THWN or Type XHHW-2

F. Multiconductor cable: Metal clad cable, Type MC with ground wire.

1. Type "MC" cable shall be permitted for use in exposed or accessible ceiling spaces only. Type "MC" cable shall not be utilized above inaccessible hard ceilings or in damp locations. Cable shall be supported and secured where such support does not exceed 3 ft. intervals and shall be properly color coded to identify phase, neutral, ground and switch legs.

2.2 WIRING CONNECTORS

A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:

1. Buchanan Construction Products, Hackettstown, NJ (800) 610-5201.
2. Thomas and Betts, Memphis, TN (800) 695-1901.
3. 3M, St. Paul, MN (800) 364-3577.
4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

B. Compression Connectors; Conductor sizes #12 through #6 AWG:

1. Buchanan: 2006S or 2011S.
2. Thomas and Betts: Approved.
3. 3M: Approved.

2.3 DROP CORDS

A. Description: Continuous length of cable with 20 Amp, 120 Volt, locking blade type connector body at one end as indicated on Drawings. Secure cable at both ends with wire type stainless steel cable grips to prevent transmission of tension directly to conductors or terminal screws.

B. Junction Box: Furnished and installed flush with ceiling anchored to building structure for fastening of uppercord grip.

C. Cable: Type SO 600 volt flexible cord with three #12 stranded wires.

D. Connector Body: Single 20 Amp, 120 volt, grounding receptacle of twistlock type at one end and straight blade type at other end that grips on cable insulation and is manufactured for use with wire cable grips. Furnish and install drop cords in length required for a receptacle height of 6 feet 8 inches above finished floor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Wiring methods
 1. Concealed Dry Interior Locations: Use building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
 2. Exposed Dry Interior Locations: Use building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
 3. Above Accessible Ceilings: Use building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
 4. Wet or Damp Interior/Exterior Locations: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in raceway.
- B. Install products in accordance with manufacturers published instructions and NECA SI.
- C. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- D. Use stranded conductors for control circuits and final connections to all vibration equipment.
- E. Use conductor not smaller than 12 AWG for power and lighting circuits.
- F. Use conductor not smaller than 14 AWG for control circuits.
- G. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- H. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
- I. Pull all conductors into raceway at same time.
- J. Use approved wire pulling lubricant for all building wire.
- K. Protect exposed cable from damage.
- L. Neatly train and lace wiring inside boxes, equipment, and panelboards in accordance with NECA Standards.
- M. Clean conductor surfaces before installing lugs and connectors.
- N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- O. For splices and taps, use only compression connectors for copper conductors, 6 AWG and larger or aluminum conductors 1/0 and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

- P. Use solderless pressure compression connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- Q. Use conductors rated 90 degrees C, inside a ballast compartment or within 6 inches of any ballast.
- R. Conductor Sizes #8 and Larger: Class B stranding.
- S. Install Drop Cords to building structure at locations indicated on Drawings as indicated on Drawings.
- T. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutral conductors.

3.4 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Identify wire and cable using Thomas and Betts type WM vinyl markers.
 - 2. Identify each conductor with its circuit number or other designation indicated on Drawings in all junction, pull, terminal boxes and cabinets. Identify neutrals with common circuit numbers in all junction, pull and terminal boxes, panels and cabinets.

3.5 WIRING COLOR CODE

- A. Comply with the following color code for each voltage system.
- B. 208Y/120 Volt System:
 - 1. Phase A - Black
 - 2. Phase A Switch Leg - Black with "S" tag.
 - 3. Phase B - Red
 - 4. Phase B Switch Leg - Red with "S" tag.
 - 5. Phase C - Blue.
 - 6. Phase C - Switch Leg - Blue with "S" tag.
 - 7. Travelers - Yellow.
 - 8. Neutral - White.
 - 9. Equipment Ground - Green.
- C. Use same color for same phase throughout. Use same colors for switch legs. Travelers shall be yellow. Phase rotation shall be same in all panels. Identify large cables with colored tape.
- D. Provide identification tags on each conductor entering panel, switch, junction box and pull box to identify conductor.

3.6 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Cables, 600 Volt or less and size no. 3 or larger, shall be meggered using an industry-approved "megger with a minimum of 500 Volt internal generating voltage. All inspection, cleaning and testing procedures shall be in compliance with the recommendations and standards outlined in the "maintenance testing specifications for electrical power distribution equipment and systems", latest edition, published by International Electrical Testing Association (NETA). Insulation resistance test values shall be no less than 250 megaohms. A typewritten report of all readings shall be prepared and submitted.

END OF SECTION

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SECTION 260533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal Conduit.
2. Flexible Metal Conduit.
3. Liquidtight Metal Conduit.
4. Electrical Metallic Tubing.
5. Fittings and Conduit Bodies.
6. Wall and Ceiling Outlet Boxes.
7. Pull and Junction Boxes.
8. Cable Trays.
9. Floor Boxes with Covers (other uses.)

B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:

1. Section 230500 - Common Work Results for HVAC.
2. Section 260500 - Common Work Results for Electrical.
3. Section 262726 - Wiring Devices.
4. Section 270500 - Common Work Results for Communication.
5. Section 281600 - Intrusion Detection System.
6. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.
7. Section 283100 - Fire Detection and Alarm.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 123 - Specification for Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.

B. American National Standards Institute (ANSI):

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
3. ANSI C80.5 - Rigid Aluminum Conduit.

C. National Electrical Contractors Association (NECA):

1. NECA "Standard of Installation."

D. National Electrical Manufacturers Association (NEMA):

1. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
2. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
3. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
4. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
5. NEMA VE 1 - Metallic Cable Tray Systems.

- E. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Conduit Size: NFPA 70, unless indicated otherwise on Drawings.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Provide products listed and classified by Underwriters Laboratories, Incorporated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Accept conduit on site. Contractor inspect for damage prior to acceptance.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Where conduit is required by standards, codes, or required elsewhere, minimum size shall be as follows:
 - 1. 1/2 inch for power and branch circuit wiring, unless indicated otherwise. All homerun conduits shall be 3/4 inch, minimum.
 - 2. 3/4 inch for communications cable, unless indicated otherwise.
 - 3. 3/4 inch for low voltage, control, intercom, security and communications unless indicated otherwise.

2.2 METAL CONDUIT

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Allied Tube & Conduit, Harvey, IL (800) 882-5543.
 - 2. Wheatland Tube Co., Collinswood, NJ (800) 257-8182.
 - 3. Republic Wire & Cable, Rocky Mount, NC (800) 533-8198.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Rigid Galvanized Steel Conduit (GRC): ANSI C80.1, UL6.
- C. Intermediate Metal Conduit (IMC): UL1242.

- D. Fittings and Conduit Bodies: NEMA FB1 Material to match conduit.

2.3 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Millford, CT (203) 882-4800.
 - 2. Electrifix, Roselle, IL (800) 323-6174.
 - 3. O-Z/Gedney, Farmington, CT (860) 677-5541.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: Interlocked steel and aluminum construction.
- C. Fittings: NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Millford, CT (203) 882-4800.
 - 2. Electrifix, Roselle, IL (800) 323-6174.
 - 3. Anixter, Inc., Skokie, IL (800) ANIXTER.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: Interlocked steel and aluminum construction with PVC jacket.
- C. Fittings: NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Allied Tube & Conduit, Harvey, IL (800) 882-5543.
 - 2. Wheatland Tube Co., Collinswood, NJ (800) 257-8182.
 - 3. Republic Wire & Cable, Rocky Mount, NC (800) 533-8198.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel set-screw type. Die-cut Zinc not permitted.

2.6 NONMETALLIC CONDUIT

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Carlon, Cleveland, OH (800) 322-7566.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: NEMA TC 2; Schedule 40 PVC.

- C. Fittings and Conduit Bodies: NEMA TC 3.

2.7 FITTINGS

- A. Manufacturer: Racor, Inc., South Bend, IN (219) 234-7151.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Steel City.
 - b. O-Z/Gedney.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Conduits 1/2 inch thru 1 inch enter junction boxes, pull boxes, panels, cabinets, and gutters, provide the following:
 - 1. Rigid Conduit: Racor 1222, 1223, 1224.
 - 2. Flexible Metal Conduit: Racor 3302, 3303, 3304, 3305, 3306, 3308.
 - 3. Liquidtight Flexible Metal Conduit: Racor 3511, 3512, 3513, 3541, 3542, 3543.
- C. Conduits 1-1/4 inch and larger entering junction boxes, pull boxes, panels, cabinets, and gutters, provide Insulated throat type bushings; Racor 1225, 1226, 1228, 1230, 1232, 1234, 1236.
- D. Provide threaded joint connectors and malleable iron no thread compression box connectors on rigid conduit. Do not provide fittings requiring set screws or indenter type applications including BM connectors.
- E. Provide only steel set-screw couplings and connectors on EMT conduit.

2.8 CONDUIT STRAPS AND HANGERS

- A. Strap Manufacturer: Racor, Inc., South Bend, IN (219) 234-7151
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Steel City.
 - b. Unistrut.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Hanger Manufacturer: Steel City/Thomas & Betts, Memphis, TN (800) 888-0211.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Unistrut.
 - b. Racor.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Straps: Two hole push on stamped steel straps on surface areas such as concrete, masonry, wide flange beams, columns, and wood.
 - 1. Rigid Conduit: Racor 2232, 2233, 2234, 2235, 2236, 2238.
 - 2. Electrical Metallic Tubing: Racor 2092, 2093, 2094.
- D. Hangers: Lay-in pipe hanger.
 - 1. Conduits 1-1/4 Inch and Larger: Steel-City C-149.

- E. Trapeze Hangers for Conduits Grouped Together: Hangers consisting of all thread rods sized as required and Kingdorff channel.
 - 1. Steel City B-909, 1/2 inch x 1-7/8 inch (12 gauge) with single bolt channel pipe straps.
 - 2. Steel City C-105, C-105-AL, or C-106, (no wire permitted for anchoring conduit).

2.9 SEAL-OFF AND EXPANSION FITTINGS

- A. Seal-Off Fitting Manufacturer: Crouse-Hinds, Syracuse, NY (315) 477-5531.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Killark.
 - b. Appleton.
 - c. O-Z/Gedney.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Expansion Fitting Manufacturer: OZ/Gedney, Farmington, CT (860) 677-5541.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Crouse-Hinds.
 - b. Killark.
 - c. Appleton.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Provide seal-off fittings where required by governing authority, code, or as indicated on Drawings.
 - 1. Vertical Runs: Crouse-Hinds Type EYS.
 - 2. Horizontal and Vertical Runs: Crouse-Hinds Type EZS.
 - 3. Elbows: Crouse-Hinds Type EYS.
 - 4. Sealing Compound: "Chico X" fiber and "Chico A".
- D. Provide expansion fittings in conduits where indicated on Drawings or where required to pass through expansion joints embedded in concrete.
 - 1. O-Z/Gedney Type AX.

2.10 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 - 2. Receptacle and Device Boxes - 4 inch square x 2-1/8 inch deep with raised, single gang, plaster ring unless indicated otherwise.
 - 3. Switch Boxes: 2 inch x 4 inch x 2-1/8 inch deep, unless indicated otherwise.
 - 4. Communication Boxes: 4 inch square x 3 inch deep with raised gang plaster ring unless indicated otherwise.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- C. Wall Plates for Finished Areas: Specified in Section 262726.

2.11 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

2.12 CABLE TRAY

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
1. Chalfant Cable Trays, Cleveland, OH (216) 521-7922.
 2. Cable Management Solutions, Incorporated, Deer Park, NY (800) 308-6788.
 3. GS Metals Corporation, Pinckneyville, IL (800) 851-9341.
 4. Southwire Co., Carrollton, GA (800) 444-1700.
 5. Mono-Systems, Inc., Rye Brook, N.Y. (914) 934-2075.
 6. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide factory shop drawing submittals for each type of cable tray.
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.
 2. Seismic-Restraint Details: Signed and sealed by a qualified Professional Engineer, licensed in the state where Project is located, who is responsible for their preparation.
 - a. Design Calculations: Calculate requirements for selecting seismic restraints.
 - b. Detail fabrication, including anchorages and attachments to structure and to supported cable trays.
- C. Description: NEMA VE 1, ladder tray, wire mesh tray or solid bottom tray as indicated on drawings.
- D. Material: Steel or aluminum.
- E. NEMA Load/Span Class: 20C
- F. Finish: ASTM A 525, pre-galvanized or clear aluminum.
- G. Inside Width and Depth: Indicated on Drawings. Inside Radius of Fittings: 24 inches (minimum).
- H. Provide with compartment dividers as indicated on drawings. Same materials and finish as tray.
- I. Straight Section Rung Spacing: 9 inches on center (ladder tray only).
- J. Provide approved manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps. Obtain cable tray components from a single manufacturer.
- K. Engraved Nameplates: 1/2 inch high black letters on yellow laminated plastic nameplate, engraved with the following wording:

WARNING! DO NOT USE CABLE TRAY AS WALKWAY, LADDER, OR SUPPORT. USE ONLY AS MECHANICAL SUPPORT FOR CABLES AND TUBING!

2.13 FLOOR BOXES

- A. Type: Modular, flush-type dual-service units suitable for wiring method used. Provide dual-service units within carpeted areas only.
- B. Compartmentation: Barrier separates power and signal compartments.
- C. Housing Material: Die-cast aluminum, satin-finished.

- D. Power Receptacle: NEMA WD 6, Configuration 5-20R, ivory finish, unless otherwise indicated.
- E. Signal Outlet: Blank cover with brushed cable opening, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify routing and termination locations of conduit prior to rough-in.
- C. Report in writing to the USPS Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION - RACEWAYS

- A. Install in accordance with the following schedule, unless indicated otherwise on Drawings: Plastic flexible PVC conduit shall not be permitted. Flexible metal conduit shall be permitted for electrical power and security wiring only and not permitted for fire alarm cables. Intermediate grade rigid conduit permitted where indicated below.
 - 1. Above suspended ceilings: Galvanized or sheradized thick wall rigid steel (GRC), or intermediate grade rigid steel (IMC), or electrical metallic tubing (EMT).
 - 2. Metal stud walls: Galvanized or sheradized thick wall rigid steel (GRC), intermediate grade rigid steel (IMC), or electrical metallic tubing (EMT).
 - 3. Exposed interior areas: Galvanized or sheradized thick wall rigid steel (GRC), intermediate grade rigid steel (IMC), electrical metallic tubing (EMT).
 - 4. Exposed exterior areas: Galvanized or sheradized thick wall rigid steel (GRC).
 - 5. Underground or below slab areas: Rigid polyvinyl chloride conduit (PVC-Sched. 40).
- B. Install conduit in accordance with NECA "Standard of Installation."
- C. Install nonmetallic conduit in accordance with manufacturer's instructions. Nonmetallic conduit shall only be used under slabs or direct buried in earth. Conduit penetrations through slab including elbows shall be galvanized rigid conduit.
- D. Conduit routing indicated on Drawings are approximate locations unless dimensioned. Route parallel and perpendicular to building construction for complete wiring system regardless whether exposed or concealed.
- E. Arrange supports to prevent misalignment during wiring installation.
- F. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- G. Group related conduits; support using conduit rack. Construct rack using approved steel channel and provide space on each rack for 25 percent additional conduits.

- H. Fasten conduit supports to building structure and surfaces under provisions of this section.
- I. Do not support conduit with wire or perforated pipe straps in any type structure. Remove wire used for temporary supports. Steel tie wire may be used to anchor conduit down to reinforcing rods in concrete encasement only.
- J. Do not attach conduit or boxes to ceiling support wires. Boxes shall be independently supported.
- K. Arrange conduit to maintain headroom and present neat appearance. Maintain required clearance between conduit and piping.
- L. Route all conduit, whether exposed or concealed, parallel and perpendicular to walls, ceilings, building structures, etc.
- M. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- N. Cut EMT conduit square using saw or pipe cutter; de-burr cut ends and ream. Bring conduit to shoulder of fittings; fasten securely.
- O. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- P. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes. Use Myers hub connectors on all conduit entering top or sides of all junction boxes, pull boxes, wiring gutters, exposed to weather.
- Q. The number of conduit bends per box shall comply with NFPA 70, Article 360. Conduit bends for "SCS" installation shall not exceed two 90 degree bends or exceed a total of 180 degrees of bend between pull boxes or conduit ends. Pull boxes shall be sized per NEC codes per conduit installed. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or use factory elbows for bends in metal conduit larger than 2 inch size.
- R. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- S. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- T. Provide suitable nylon pull string or #14 AWG steel wire in each conduit excluding sleeves and nipples.
- U. Ground and bond conduit per NFPA 70.
- V. Coat all metallic conduit with "General Electric" RTV silicone sealer where conduit is installed in exterior areas or in contact with concrete or earth.
- W. Conduits shall be sized as indicated on Drawings. Where sizes are not indicated, conduit shall be sized per NFPA 70.
- X. Cap all upturned conduits during construction rough-in to prevent moisture or debris from entering. Pull through each and every conduit a dry swab of sufficient size to remove any and all moisture.
- Y. Maximum length of flexible metal conduit (Greenfield), or flexible liquidtight shall be 5 feet.
- Z. Assure ground continuity on all branch circuitry conduits with two locknuts, one inside and one outside of all boxes, cabinets and gutters for rigid conduit. One locknut inside of all boxes, cabinets, and gutters for EMT.

- AA. Provide conduit supports as follows:
1. Galvanized rigid thick wall conduit (GRC), intermediate grade rigid conduit (IMC) and electrical metallic conduit (EMT) within three feet of all outlet boxes, junction boxes, cabinets, gutters, or fittings. Horizontally anchored at 10 foot maximum intervals. Other spacings indicated on Drawings.
 2. Flexible metal conduit (Greenfield) and liquid-tight flexible metal conduit (sealtite), within 12 inches of all outlet boxes, junction boxes, cabinets, gutters, or fittings and bends or turns. Horizontally anchored at 4-1/2 foot intervals. 1/2 inch minimum size permitted.

3.3 INSTALLATION - BOXES

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with NFPA 70.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated or as required for specific project requirements. Orient boxes to accommodate wiring devices as specified in Section 262726.
- D. Electrical boxes are indicated on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose with no additional cost to contract. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- E. Maintain headroom and present neat mechanical appearance.
- F. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. Install pull boxes in freezer and dock area above bottom chord of structural joist. Pullboxes sized in excess of 12 inches shall be equipped with hinged and hasped covers.
- G. Install outlet and junction boxes within inaccessible ceiling areas, no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- H. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
- I. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- J. Locate flush mounted box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening. Use approved raised gang covers in masonry and stud walls.
- K. Flush mounted boxes shall not be mounted back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
- L. Secure flush mounted box to interior wall and partition studs. Accurately position to allow for surface finish thickness. Use approved stamped steel bridges to fasten box between studs.
- M. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- N. Use approved adjustable steel channel fasteners spanning joist for hung ceiling outlet box.
- O. Provide factory sectioned multi-gang boxes where more than one adjacent device is to be mounted. Sectional boxes shall not be permitted.

3.4 INSTALLATION - CABLE TRAYS

- A. Install trays level and plumb in accordance with manufacturer's published instructions.
- B. Install metallic cable tray in accordance with NEMA VE 2.
- C. Support cable trays as follows:
 - 1. Use anchors and fasteners as specified in Section 260500.
 - 2. Provide supports at each connection point and at the end of each run.
 - 3. Design supports including attachment to structure to carry the greater of calculated load multiplied by a factor of four or the calculated load plus 200 lb.
- D. Locate cable tray with sufficient space to permit access for installing cables.
- E. Make changes in directions and elevations using standard fittings. Use expansion connectors where required.
- F. Ground and bond cable tray under provisions of Section 260500.
- G. Provide continuity between tray components.
- H. Use anti-oxidant compound to prepare aluminum contact surfaces before assembly.
- I. Provide #2 AWG bare copper equipment grounding conductor through entire length of tray; bond to each section.
- J. Connections to tray may be made using mechanical connectors.
- K. Install warning signs at 50 feet on center along cable tray, located to be visible.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspect conduit installation, types, sizes, fittings and attachment to structure.
- C. Inspect box installation, locations, connection to conduit, and attachment to structure.
- D. Inspect cable tray installation, locations, connection to conduit, and attachment to structure.

3.6 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused box openings.

3.7 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish like new.

END OF SECTION

260533 - 10

SECTION 260623

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Lighting Control System for Workroom.
 - 2. Lighting Control System for Box Lobby.
 - 3. Control of Interior/Exterior Lighting.
 - 4. Control of Administrative Area Lighting.
 - 5. Occupancy Sensors.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- C. Related Sections:
 - 1. Section 019113 - General Commissioning Requirements.
 - 2. Section 260500 - Common Work Results for Electrical.
 - 3. Section 260800 - Commissioning of Electrical Systems.

1.2 REFERENCES

- A. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.
 - 2. NFPA 101 - Life Safety Code.
- C. Codes and Standards:
 - 1. International Building Code / National Electrical Code.
 - 2. Occupational Safety and Health Agency Standards.
 - 3. Illuminating Engineering Society Handbook.
 - 4. ASHRAE Standard 90.1.
 - 5. The International Energy Conservation Code.
- D. U.L. Standards:
 - 1. UL 916 Energy Management Equipment.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 - 1. Product Data: Data for each component of the lighting control system indicating electrical characteristics and connection requirements.
 - a. Lighting Control Components.
 - b. Digital Interval Timer.
 - c. Digital Time Switch.
 - d. Exterior Photo Sensor.
 - e. Occupancy Sensors.

2. Shop Drawings: Indicate electrical characteristics and connection requirements, including layout of completed assemblies, interconnecting cabling, dimensions, and power requirements.
 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products and components meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
1. Project Record Documents: Accurately record the actual locations of Products.
 2. Operating Instruction: Document training by furnishing a sign-in sheet with a description on the training provided, instructors name and organization and those who received training. Refer to 017704 1.3, 1.4 and 1.5 for more specific training.

1.4 SYSTEM DESCRIPTION

- A. Each space enclosed by walls or floor-to-ceiling height partitions must be equipped with at least one automatic control device to independently control the general lighting within the space. This control device must automatically de-energize the space lighting within 30 minutes of all occupants leaving the space. Interior lighting for all spaces must utilize automatic occupancy sensors to turn off lighting in all spaces without occupant intervention.
- B. The workroom and enclosed platform lighting systems shall be provided to achieve the required light levels for the lighting groups as shown on the drawings.
- C. The functional characteristic of each luminaire within the workroom and enclosed platform shall be as follows:
1. Lamp and ballast combinations within individual luminaires, groups of luminaires or at every other luminaire must be controlled as zones to achieve the required illumination levels under different lighting conditions. Control solutions such as turning off every other luminaire or row of luminaires are acceptable. Fluorescent dimming systems, due to their high cost, are not an acceptable control strategy.
 2. All luminaires must be automatically controlled by ceiling or luminaire mounted occupancy sensors. The occupancy sensors selected must be appropriate for the ceiling height or luminaire mounting height within the workroom or platform. Ceiling mounted sensors shall be located to overlap their coverages and provide a seamless transition from one sensor zone to the next.
 3. The occupancy sensors shall be dual-technology type and must turn the ambient lighting groups "off" within 20 minutes of the last detected presence in the workroom.
- D. Limit lighting in the workroom area to an average maintained level of 25 footcandles and use bi-level AC switching. Average maintained high output level illumination is limited to 25 footcandles, low output level illumination to 12.5 footcandles.
1. "High output level illumination" condition. This condition must provide 25 fc for normal workroom activities and must be both automatically and countdown timer controlled using countdown timers fed downstream of the occupancy sensors. The high output level illumination groups must only be energized upon detection of presence by the occupancy sensor(s) and activation of the countdown timer(s). When the override countdown timer is activated, high level lighting illumination must come on for a period of no more than four (4) hours. This must be the primary lighting system provided for the workroom.
 2. "Low output level illumination" condition. This condition must provide 12.5 fc for the workroom area when less visual activity is needed and must be automatically controlled using occupancy sensors.
- E. The lighting within exterior, open platform and carrier canopies must be provided with bi-level control (0%, 50% to 100%). The lower output illumination level of 12.5 footcandles shall be automatically controlled by photo-sensor(s) and the higher output level of 25 footcandles must be both automatically

and countdown timer controlled utilizing photo-cells with countdown timers fed downstream of the photo-sensor(s).

- F. Exterior lighting shall be energized by photo-sensor(s) and de-energized by time control functions.
 - 1. The control of the exterior and building mounted signs shall operate similar to the exterior lighting control scheme, but shall utilize independent time schedules.
- G. Box Lobby Control System Performance Requirements:
 - 1. 24 hour Box Lobby lighting shall be automatically controlled utilizing occupancy sensors.
 - 2. All other Box Lobby spaces shall have manual on/off controls wired downstream of the area occupancy sensors.
- H. Daylighting automatic controls shall be provided for the rooms and spaces indicated on the drawings and provided as specified herein.

1.5 QUALITY ASSURANCE

- A. Single Source: Provide occupancy sensors, photocells, time switches, digital override timer switches, and other lighting control components from a single lighting control system supplier.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70 and NFPA 101.
 - 2. Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.
 - 3. Comply with NEC, NEMA and FCC Emission requirements for Class A applications.
 - 4. UL Approvals: Lighting control components are to be UL listed under UL 916 Energy Management Equipment.
- D. Testing:
 - 1. Component Pretesting: All component and assemblies are to be pretested and burned-in prior to installation.
 - 2. System Checkout: A factory trained technician shall test each component in the system after installation to verify proper operation. Submit check-out memo from factory representative.
 - 3. Functional testing of the lighting control system shall be provided by an independent commissioning authority in accordance with ASHRAE 90.1. Refer to Section 260800 - Commissioning of Electrical Systems.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, Handle, Store, and Protect Products.
- B. Store products in clean, dry area; maintain temperature to NEMA ICS 1 requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering products which may be incorporated in the Work include the following:
1. Cooper Controls, Peachtree City, GA (800) 553-3879.
 2. Encelium Technologies, Inc., Philadelphia, PA (267) 286-0336.
 3. General Electric Company, Plainville, CT (800) 626-2000.
 4. Hubbell Building Automation, Inc, Austin, TX (888) 698-3242.
 5. Intermatic, Inc., Spring Grove, IL (815) 675-7000.
 6. Leviton, Little Neck, NY (800) 824-3005.
 7. Lighting Control & Design, Glendale, CA (800) 345-4448.
 8. Lutron Electronics, Co. Coopersburg, PA (800) 523-9466.
 9. Novitas, Culver City, CA (310) 568-9600.
 10. Sensor Switch, Wallingford, CT (800) 727-7583.
 11. Tork, Mount Vernon, NY (914) 664-3542.
 12. WattStopper, Santa Clara, CA (800) 879-8585.
- B. Section 016000 - Product Requirements: Product options and substitutions. Unless otherwise noted, substitutions are permitted.

2.2 LOW VOLTAGE-DIGITAL TIMER SWITCH

- A. Provide flush mounted, low voltage, digital, countdown timer switch with the following features:
1. The timer switch shall be programmable to turn loads "off" after a preset time interval of (4) hours maximum. Switch shall be equipped with manual "on/off" pushbutton.
 2. Time switch shall be five terminal, completely self-contained control system that replaces a standard toggle switch and shall operate at 24 VAC/VDC/VAC half wave rectified.
 3. Time scroll features shall allow manual overriding of the preset time-out period. Selecting time scroll UP shall allow time-out period to scroll up throughout the timer possibilities to the maximum. Time scroll DN (down) shall allow time-out period to scroll down to minimum.
 4. Optional flash and beep warnings shall notify occupants when the interval countdown reaches one minute. Switch shall have a Liquid Crystal Display that shows the timer's countdown.
 5. Timer switch shall have manual feature for timer reset where pressing the ON/OFF switch for more than 2 seconds resets the timer to the programmed time-out period.
 6. Timer switch shall mount behind a decorator style face plate. The calibration switch for setting time-out, time scroll and warnings shall be concealed to prevent tampering of adjustments and hardware.
 7. Sensor shall have no minimum load requirement and shall be capable of switching all solid-state LED and electronic fluorescent ballast loads at the rating of the power pack.
 8. Switch shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1 percent. Sensors shall have standard five (5) year warranty and shall be UL and CUL listed.
 9. Provide universal voltage, power pack for 24 VDC operating voltage to the timer switch.
 10. Basis of Design: WattStopper TS-400-24.

2.3 DIGITAL TIME SWITCH

- A. Provide 365/7 day, digital time switch with astronomical clock, holiday scheduling and automatic daylight savings time adjustment. Time switch shall have the following features:
1. Provide maximum (2) hour manual override switch and capacitor carry-over (minimum 100 hours).
 2. Switch shall be compatible with all solid-state LED and electronic fluorescent ballast loads rated 20 Amps at 120 or 277 VAC, DPST.
 3. Provide indoor/outdoor plastic enclosure.
 4. Basis of Design:
 - a. Tork/NSI #DG100A Series.
 - b. Intermatic #ET2000 Series.

2.4 EXTERIOR PHOTOCONTROL SENSOR

- A. Provide weatherproof line voltage photo-sensor for measuring exterior light levels: ON @ 1 to 5 fc / OFF @ 3 to 15 fc. The photo-sensor shall be mounted facing north as indicated on the plans. The photo-sensor shall be rated as follows: 1800 Watts @ 120VAC; 4150 Watts @ 277 VAC.
1. Basis of Design:
 - a. Intermatic # K4141C (120/277 VAC).
 - b. Tork/NSI #2001 (1800 Watts @ 120 VAC).
 - c. Tork/NSI #2002 (4620 Watts @ 277 VAC).

2.5 ANALOG, DUAL TECHNOLOGY, SINGLE RELAY, WALL BOX OCCUPANCY SENSOR

- A. Provide flush mounted, single relay, wall box type occupancy sensor with the following features:
1. The Occupancy Sensor Switch shall be a designer-style, multiple-detection technology, universal voltage occupancy sensing wall switch.
 2. Sensor shall be designed to accept and control universal voltage (120VAC to 277VAC, 60Hz.) and rated to control up to 800-watt lighting loads @ 120VAC and 1200 Watts @ 277VAC.
 3. Sensor shall be a two-wire switch capable of handling the following loads:
 - a. Quartz Halogen
 - b. Solid-State LED
 - c. Electronic Low-Voltage
 - d. Magnetic Low-Voltage
 - e. Fluorescent Non-Dimming Ballasts
 4. Sensor shall have a viewing area of not less than one hundred seventy (170°) degrees at an axial distance of forty feet (40'), fifty feet (50') at 0 degrees, and shall have a total coverage area of not less than four-thousand square feet (4,000 Sq. Ft.) with an unobstructed view.
 5. Sensor shall utilize non-intrusive, passive dual detection technologies consisting of:
 - a. Passive Infrared (PIR) to read and detect occupants' body heat and movement, and;
 - b. Enhanced microphonics to hear and detect occupancy throughout the entire space.
 6. Under no circumstances shall the unit emit energy of any type into the space that can potentially interfere with electrical, electronic, or medical devices (i.e. hearing aids), etc.
 7. Each unit shall provide manual on/automatic off operation and accept on/off commands from an unlimited number of multi-location 3-way Remotes.
 8. Remote stations shall provide multi-location On / Off control of the switch using conventional 3-way wiring.
 9. The unit shall, when manually turned off by the user, continue to monitor the space, but will not turn on the lights. User shall be able to, at anytime, override this feature by manually turning on the lights.
 10. The unit's operational/parameter programming shall be accomplished with the unit installed and operational without the need to remove the unit from its installed location.
 11. Each unit shall provide a LED indicator to provide indication when the sensor detects movement.
 12. Device shall mount in a single gang wall box and be gangable with other designer-style electrical devices and faceplates.
 13. The Sensor shall be UL Listed to U.S. and Canadian standards for 120VAC to 277VAC capacity.
 14. Basis of Design:
 - a. Sensor Switch #WSD PDT Series.
 - b. WattStopper #PW-100 Series.

2.6 ANALOG DUAL TECHNOLOGY, DUAL RELAY, WALL BOX OCCUPANCY SENSOR

- A. Provide flush mounted, dual relay, wall box type occupancy sensor with the following features:
1. The occupancy sensor switch shall be a designer style, multiple detection technology, universal voltage, occupancy sensing wall switch.
 2. Sensor shall be capable of detecting presence in the control area by detecting Doppler shifts in transmitted ultrasound and passive infrared heat changes. Sensor shall utilize Dual Sensing

- Verification Principal for coordination between ultrasonic and PIR technologies. Each sensing technology shall have a LED indicator that remains active at all times in order to verify detection within the area to be controlled.
3. Sensor shall feature a trigger mode where the end-user can choose which technology will activate the sensor. Selection of technologies for initial, maintain and re-trigger shall be done with DIP switches. Sensor shall have its trigger mode factory preset to allow for quick installation. In this default setting, both technologies must occur in order to initially activate lighting systems. Detection by either technology shall maintain lighting on, and detection by either technology shall turn lights back on after lights were turned off for 5 seconds or less in automatic mode and 30 seconds or less in manual mode.
 4. Sensor shall have 4 occupancy logic options for customized control to meet application needs.
 5. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing which automatically adjusts the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.
 6. The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources.
 7. Sensor shall utilize SmartSet™ technology to optimize automatic time delay to fit occupancy usage patterns. The use of SmartSet shall be selectable with a DIP switch.
 8. Sensor shall utilize Zero Crossing circuitry on both relays to reduce stress on relays and increase sensor life.
 9. Sensor shall utilize two relays capable of simultaneously controlling independent lighting loads or circuits. The secondary relay shall be isolated, allowing for two-circuit control.
 10. Sensor shall have no minimum load requirement and shall be capable of switching from 0 to 800 Watt solid-state LED; 0 to 800 Watt fluorescent or 1/6 hp at 120 VAC, 60 Hz; and 0 to 1200 Watt fluorescent at 277 VAC, 60 Hz.
 11. Sensor shall feature a walk-thru mode, where lights turn off 3 minutes after the area is initially occupied, if no motion is detected after the first 30 seconds, set by a DIP switch.
 12. Sensor shall cover up to 1,000 s.f. for walking motion with a field view of 180 degrees and shall have automatic-ON or manual-ON operation for both relays adjustable for each relay.
 13. The sensor shall act as a “service switch” to allow operation in the unlikely event of a failure and shall be able to control incandescent, magnetic low voltage, electronic low voltage, “LED” solid state, and fluorescent lighting loads
 14. Sensors shall have a built-in light level featuring simple, one-step daylighting setup that works from 8 to 180 footcandles.
 15. Wall switch sensor shall be a completely self contained control unit that replaces a standard toggle switch.
 16. To ensure quality and reliability, sensor shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1%. Sensor shall have standard 5-year warranty and shall be UL and CUL listed.
 17. Basis of Design: WattStopper #DW-200.

2.7 CEILING MOUNTED OCCUPANCY SENSOR

- A. Provide low voltage, ceiling mounted, 360 degree, dual technology occupancy sensor with the following features.
 1. The sensor shall be capable of detecting presence in the control area by detecting doppler shifts in transmitted ultrasound.
 2. Sensor shall have a retrigger feature in which detection shall retrigger the lighting system on within 5 seconds of being switched off.
 3. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing that automatically adjusts the detection threshold dynamically to compensate for changing levels of activity and airflow throughout controlled space.
 4. To avoid false ON activations and to provide immunity to RFI and EMI, Detection Signature Analysis shall be used to examine the frequency, duration, and amplitude of a signal, to respond only to those signals caused by human motion.

5. Sensors shall utilize SmartSet™ technology to optimize time delay and sensitivity settings to fit occupant usage patterns. The use of SmartSet shall be selectable with a DIP switch. Sensors shall have a time delay that is adjusted automatically (with the SmartSet setting) or shall have a fixed time delay of 5 to 30 minutes.
6. Sensors shall feature a walk-through mode, where lights turn off 3 minutes after the area is initially occupied if no motion is detected after the first 30 seconds.
7. Sensor shall have an LED indicator that remains active at all times in order to verify detection within the area to be controlled. The LED can be disabled for applications that require less sensor visibility.
8. Sensor shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1%. Sensors shall have standard 5 year warranty and shall be UL and CUL listed.
9. Basis of Design: WattStopper #WT-2200.
10. Provide universal voltage, power pack for 24 VDC operating voltage to the occupancy sensors. Power pack shall enable manual on, hold on, hold off and load shed for bi-level switching applications. Basis of Design: WattStopper BZ-150.

2.8 ANALOG DAYLIGHTING CONTROLLER

- A. Provide low voltage, ceiling mounted, daylighting photo-controller to control the space lighting when sufficient daylighting is present. Controllers shall have the following features:
 1. The light level controller shall be capable of detecting changes in lighting levels and shall utilize an internal photocell that measures light in a 100 degree angle cutting the unwanted light from bright sources outside of this cone.
 2. The light level controller shall be capable of controlling any type of lighting through use of power packs. Light level controller shall operate from a 24 volts DC power supply with a current draw of 22 milliamps.
 3. The light level controller shall be capable of turning lighting on and off for a single zone with an extended range of 1 to 1400 fc. The controller shall have an adjustable deadband feature with 25%, 50%, 75% or 100% in relation to the setpoints and shall have an adjustable time delay range of 3, 10, 15 or 30 minutes.
 4. The controller shall provide a connection for an optional low voltage, normally open momentary contact wall switch override or occupancy sensor interface.
 5. The controllers shall be a microprocessor type with LED status indicator. Light level controller shall have full 5-year warranty.
 6. Basis of Design: WattStopper #LS-102

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. The Lighting Control System shall be installed and wired completely as shown on the plans by the contractor, who shall make all necessary wiring connections to external devices and equipment.

3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.

- B. Perform operational testing on lighting control system to verify proper operation and field wiring connections.
- C. System Start Up and Commissioning:
 - 1. Manufacturer shall provide a factory authorized technician to confirm proper installation and operation of all lighting control system components.
 - 2. Lighting control devices shall be tested to ensure they are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions.
 - a. Provide functional performance testing as required by Section 260800 - Commissioning of Electrical Systems.
- D. System Training:
 - 1. Manufacturer shall provide factory authorized technician to train owner personnel in the operation, programming and maintenance of the lighting control system including all occupancy sensors and daylighting controls.
- E. System Programming:
 - 1. Manufacturer shall provide system programming including:
 - a. Wiring documentation.
 - b. Switch operation.
 - c. Operating schedules.

END OF SECTION

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SECTION 260800

COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Systems and equipment testing and start-up.
- B. Validation of proper and thorough installation of Division 26 systems and equipment.
- C. Functional performance testing of electrical systems.
- D. Documentation of tests, procedures, and installations.
- E. Coordination of Training Events.
- F. Generic Start-Up Procedures for electrical systems and equipment.

1.2 SCOPE

- A. The following electrical equipment and/or systems shall be commissioned if in compliance with the guidelines provided in Specification 019113, or with Contracting Officer approval:
 - 1. Lighting and Lighting Control System – Per ASHRAE 90.1, Table 9.4.3.
 - 2. Security / Physical Access Control CCTV System.

1.3 GENERAL DESCRIPTION

- A. Commissioning (Cx) is the process of ensuring that all building systems are installed and perform interactively according to the design intent; that systems are efficient and cost effective and meet the USPS's operational needs; that the installation is adequately documented; and that the Operators are adequately trained. It serves as a tool to minimize post-occupancy operational problems. It establishes testing and communication protocols in an effort to advance the building systems from installation to full dynamic operation and optimization.
- B. The USPS shall arrange to retain an independent Commissioning Authority (CxA) to provide Commissioning Services.
- C. Commissioning Authority (CxA) shall work with the Contractor and Engineer to direct and oversee the Cx process and perform functional performance testing.
- D. This Section outlines the Cx procedures specific to the Contractor's electrical responsibilities. Requirements common to all work are described in Specification section 019113.

1.4 RELATED WORK AND DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section
- B. Commissioning Plan: The Cx Plan shall be available for reference as it outlines responsibilities outside of the Construction Contract. It provides the Contractor and the USPS an understanding of the planned commissioning activities for that project.

- C. Section 013300 - Submittal Procedures: Stipulates additional copies of submittals to be submitted and refers to other sections for additional submittal requirements related to Cx.
- D. Section 017704 - Closeout Procedures and Training: Defines the milestones in completion incorporating the Cx process.
- E. Section 019113 - General Commissioning Requirements: Specifies the general facility commissioning procedures common across all Divisions and the Contractor's responsibilities for the commissioning process.
- F. Individual Specification Sections: Individual sections stipulate installation, start-up, warranty, O&M documentation, and training requirements for the system or device specified in the Section.
- G. Section 250804 - Building Automation System Commissioning: Details the commissioning procedures specific to the BAS.

1.5 REFERENCE STANDARDS

- A. AABC Commissioning Group (ACG)
- B. NEBB – Procedures for Building Systems Commissioning
- C. National Electric Code (NEC)
- D. American Society for Testing and Materials (ASTM)
- E. Electronics Industry Association/Telecommunications Industry Association (EIA/TIA)
- F. Illuminating Engineering Society (IES)
- G. Institute of Electrical and Electronics Engineers (IEEE)
- H. International Electrical Testing Association (NETA)
- I. National Electrical Manufacturers Associates (NEMA)
- J. National Fire Protection Association (NFPA)
- K. Underwriters Laboratory, Inc. (UL)

1.6 DOCUMENTATION

- A. As required in Specification 019113 and the following as they apply to the commissioning of equipment:
 - 1. Factory Test Reports: Contractor shall provide any factory testing documentation or certified test reports required by the specifications. These shall be provided prior to Acceptance Phase. Factory Test Reports should be provided in pdf electronic format. These include but are not limited to:
 - a. Field Testing Agency Reports: Provide all documentation of work done by independent testing agencies required by the contract documents. These shall be provided prior to Acceptance Phase. Field Testing Agency Reports should be provided in pdf electronic format.

1.7 COORDINATION MANAGEMENT PROTOCOLS

- A. Coordination responsibilities and management protocols relative to Cx are initially defined in Section 019113 and the Commissioning Plan, but shall be refined and documented in the Construction Phase

Cx Kick-Off meeting. Contractor shall have input in the protocols and all Parties will commit to scheduling obligations. The CxA will record and distribute.

1.8 CONTRACTOR RESPONSIBILITIES

- A. Refer to Section 019113: Detailed Contractor responsibilities common to all Divisions are specified in Section 019113. The following are additional responsibilities or notable responsibilities specific to the electrical systems.
- B. Construction Phase:
 - 1. Coordinate the work of the Electrical Testing Agency and the Cx requirements, as required.
 - 2. Provide skilled technicians qualified to perform the work required.
 - 3. Provide factory-trained and authorized technicians where required by the Contract Documents.
 - 4. Prepare and submit required draft Start-Up Procedures and submit along with the manufacturer's application, installation and start-up information.
 - 5. Provide assistance to the CxA in preparation of the specific Functional Performance Test (FPT) procedures. Contractors, subcontractors and vendors shall review FPT procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
 - 6. Thoroughly complete and inspect installation of systems and equipment as detailed throughout Contract Documents, as required by reference or industry standards, and as specifically indicated elsewhere in this Section.
 - 7. Record Start-up Procedures on start-up procedure forms and certify that the systems and equipment have been started and or tested in accordance with the requirements specified above. Each task or item shall be indicated with the Party actually performing the task or procedure.
- C. Acceptance Phase:
 - 1. Assist CxA in functional performance testing. Assistance will generally include the following:
 - a. Manipulate systems and equipment to facilitate testing (as dictated in Section 019110 and the Cx Plan; in some cases this will entail only an initial sample).
- D. Warranty Phase:
 - 1. Maintain record documentation of any configurations, set ups, parameters etc, that change throughout the period.
 - a. Provide representative for off season testing as required by CxA.
 - b. Respond to Warranty issues as required by Division 1 and the General Conditions.

1.9 START-UP PROCEDURES AND DOCUMENTATION

- A. Refer to Section 019113 and as detailed in PART 3 - EXECUTION below.

1.10 INDEPENDENT ELECTRICAL TESTING AGENCY

- A. The Independent Electrical Testing Agency shall be provided under the construction specifications and therefore included with the bid. Many of the aspects of the start-up and functional performance testing indicated herein will be accomplished under the respective section and witnessed by the CxA at the indicated sample rate. CxA will include applicable test results in the functional performance testing record.

1.11 FUNCTIONAL PERFORMANCE TESTING

- A. For applicable systems and equipment, Contractor shall participate in the initial samples of Functional Performance Testing as stipulated in Section 019113 and the Commissioning Plan.

1.12 FPT ACCEPTANCE CRITERIA

- A. Acceptance criteria for tests are indicated in the specification Sections applicable to the systems being tested. Generally, unless indicated otherwise, the criteria for acceptance will be that specified with the individual system, equipment, component, or device, which in general conform to NFPA 70B and International Electrical Testing Association (NETA) testing specifications NETA ATS-2003.

1.13 TRAINING

- A. Contractors, subcontractor, vendors, and other applicable Parties shall prepare and conduct training sessions on the installed systems and equipment they are responsible for per the requirements of Section 019113 and the individual Specifications.

1.14 O&M MANUAL CONTENT - PREPARATION AND LOGISTICS

- A. Refer to Section 019113 and the individual Specifications.

PART 2 - PRODUCTS

2.1 INSTRUMENTATION

- A. All testing equipment used by any Party shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply: All equipment shall be calibrated according to the manufacturer's recommended intervals. Calibration tags shall be affixed or certificates readily available.
- B. Testing Instrumentation: Contractor shall provide all instrumentation necessary for tests for which they are responsible. CxA will provide standard instrumentation for measuring medium and low voltage electrical voltage, current, power factor, power, and THD. CxA will provide receptacle testers for normal and GFI receptacle tests. Contractor shall provide all other instrumentation required to accomplish the specified testing.
- C. Contractor shall provide infrared scanning equipment when required by the contract documents. Infrared scanning equipment shall be an AGA (or approved equal) thermovision set capable of viewing an entire bus or equipment assembly at one time and have a sensitivity of 0.2°C with a liquid nitrogen reference.
- D. Contractor shall provide Amprobe DM-III Multitest F power quality recorder/data logger or approved equal.

PART 3 - EXECUTION

3.1 START-UP PROCEDURES

- A. This Section outlines 'generic' or minimally acceptable Start-Up Procedures. These items shall provide a minimum or guideline for required Contractor development of Start-Up Procedures. Contractor shall synthesize these minimum requirements along with their own internal quality control practices, those of the manufacturer, and any applicable codes and standards to develop specific and itemized Start-Up Procedures specific to the equipment and systems installed on this project.

- B. Refer to NETA which is referenced in several Division 26 sections which outline electrical related testing required.
- C. The following start up verifications/procedures are common to all systems:
 - 1. Checkout shall proceed from devices to the components to the systems.
 - 2. Verify labeling is affixed per spec and visible.
 - 3. Verify prerequisite procedures are done.
 - 4. Inspect for damage and ensure none is present.
 - 5. Verify system is applied per the manufacturer's recommendations.
 - 6. Verify system has been started up per the manufacturer's recommendations.
 - 7. Verify that access is provided for inspection, operation and repair.
 - 8. Verify that access is provided for replacement of the equipment.
 - 9. Verify the record drawings, submittal data and O&M documentation accurately reflect the installed systems.
 - 10. Verify all gages and test reports are provided as required by contract documents and manufacturer's recommendations.
 - 11. Verify all recorded nameplate data is accurate.
 - 12. Installation is done to ensure safe operation and maintenance.
 - 13. Verify specified replacement material/attic stock has been provided as required by the Construction Documents.
 - 14. Verify all rotating parts are properly lubricated.
 - 15. Verify all monitoring and ensure all alarms are active and set per USPS requirements.

3.2 LIGHTING AND LIGHTING CONTROLS

- A. General: Refer to the quality control requirements listed in section 019113 - General Commissioning Requirements for additional checks and tests. These shall be included in the tests used for this project.
- B. Functional Testing. Lighting control devices and control systems shall be tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. When occupant sensors, time switches, programmable schedule controls, or photo sensors are installed, at a minimum, the following procedures shall be performed:
 - 1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance, lights turn off only after space is vacated and do not turn on unless space is occupied.
 - 2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
 - 3. Confirm that photosensor controls reduce electric light levels based on the amount of usable daylight in the space as specified.
 - 4. Check the lighting systems and ensure that the all luminaries and lamps are operational and fixtures are clean.
 - 5. Measure lighting levels after lamps have been 'burned in' for at least 100 hours. Check lighting levels to ensure compliance with the design requirements for the respective zones, if applicable.
 - 6. Check operational and override switches to ensure the proper operation of timing circuits.
 - 7. Check lighting schedules to ensure they are programmed per the documentation and in accordance with the required lighting zones, if applicable.
 - 8. Measure the connected loads in current and watts on each controlled circuit.
 - 9. Check full load current on all breakers serving controlled lighting to ensure that the breaker is properly sized.
 - 10. Verify the correct operation of all control devices (contactors, relays, time clocks, control interface relays, etc.).
 - 11. Check full load current on all control device contacts serving controlled lighting to ensure that the contact rating is properly sized.

END OF SECTION

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SECTION 262416

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Panelboards.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA AB 1 - Molded Case Circuit Breakers.
 - 2. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
 - 3. NEMA KS 1 - Enclosed Switches.
 - 4. NEMA PB 1 - Panelboards.
 - 5. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- C. Underwriters Laboratories (UL):
 - 1. UL 486 - Molded Case Circuit Breakers.
 - 2. UL 67 - Heat Rise Test for Panelboards.
 - 3. UL 50 - Steel Gauge Requirements for Cabinets and Enclosures.
 - 4. UL 1449 3rd Edition - Standard for Transient Voltage Surge Suppressors.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 - 1. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
 - 2. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
 - 3. Shall include UL 1449 Listing documentation verifying the following:
 - a. Short Circuit Current Rating (SCCR)
 - b. Voltage Protection Ratings (VPRs) for all modes
 - c. Maximum Continuous Operating Voltage Rating (MCOV)
 - d. I-nominal rating (I-n)
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
 - 1. Project Record Documents: Record actual locations of Products; indicate actual branch circuit arrangement.

2. Operation and Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.
3. Submit data showing compliance with UL 1449.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Qualifications:
 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

PART 2 - PRODUCTS

2.1 GENERAL CLASSIFICATION

- A. Manufacturers: General Electric Company (G.E.) Catalog numbers are used to identify type of equipment specified. Equivalent products by the following manufacturers are acceptable: Alternate substitutions not permitted.
 1. Siemens
 2. Square-D
 3. Eaton/Cutler Hammer
 - a. Branch Circuit Panels:
 - 1) 120/208V: G.E. Type AQ
 - b. Distribution Panels:
 - 1) Circuit breaker: G.E. Type CS or A

2.2 PANELBOARDS

- A. Cabinet: Construct cabinet with code gauge galvanized steel. Provide minimum 20 inch wide cabinets, and extra wiring space where incoming feed-through or parallel lines are required.
- B. Doors: Provide single door construction, made of cold-rolled steel. Door shall have concealed hinges, flush catch, and lock. (Tie bar handles not acceptable). Secure top and bottom of door to cabinet by slotted steel bolts. Release shall be by one-half turn with a screwdriver. All panels shall be keyed alike.
- C. Panels located adjacent to each other shall have identically sized enclosures and trims.
- D. Finish: Finish exposed parts with one coat of primer and one coat of light gray enamel suitable for overpainting in field if desired.
- E. Phase, neutral and ground bus bars shall be tin plated copper.
- F. Provide all hardware for future breakers, identified on drawings as SPACES, or for the full length of usable bus, whichever is longer.
- G. Provide ground bus with full complement of terminals in addition to insulated neutral bus.
- H. Circuit Breakers:
 1. Provide multi-pole units with common trip elements. Handle ties are not acceptable.
 2. Provide key-operated circuit breakers in the panelboards used for the Fire Alarm. Security and CCTV Systems. Circuit breakers shall be similar to square D type QO_K.

3. 120/208V branch circuit panelboards: Molded cast bolt-on type designed for 120/208V, three phase, four wire service with minimum 10,000 amperes rms short circuit rating.
 4. 277/480V branch circuit panelboards: Molded cast bolt-on type designed for 277/480V, three phase, four wire service with minimum 14,000 amperes rms short circuit rating.
- I. Main circuit breakers shall be individually mounted. The panelboard interior assembly shall be dead front with panelboard front removed. Main lugs or main breakers shall have barriers on five sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the main shall have barriers.
 - J. Provide all panelboards with lockout/tagout devices; Circuit-Safe type as manufactured by Stranco, Inc. or approved equal.
 - K. Nameplates: Provide screwed-on (no adhesives) engraved bakelite nameplate identification on outside of each panel showing panel designation, voltage and phase in minimum 1/4 inch high letters.
 - L. Circuit directories: Provide a metal-framed typewritten circuit directory on inside of inner door, with plastic protector.
 - M. Provide 2-3/4 inches and 1-1 inch spare empty conduits routed above into accessible ceiling space from all flush mounted panelboards.
 - N. Panels serving electronic equipment and/or other harmonic producing loads shall be equipped with double neutral bus bars.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 CLEARANCES

- A. Minimum code required clearances around panelboards must be maintained.

3.3 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1.
- B. Install panelboards plumb. Provide supports in accordance with Section 260500.
- C. Provide filler plates for unused spaces in panelboards.

3.4 MOUNTING HEIGHT

- A. Typically mount panel boards top at 6 ft. – 0 in. above finished floor but no more than 6 ft. – 6 in. above finished floor to top of circuit breaker handle.

3.5 MOUNTING HARDWARE

- A. Provide all necessary blocking, channels and other hardware for securing panelboards to wall, column, or other parts of building structure.

3.6 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Inspect and test panelboard installation and torque connections.
- C. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.
- D. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 5/10/2011

SECTION 262726

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wall Switches.
 - 2. Receptacles.
 - 3. Device Plates and Box Covers.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Device -- Dimensional Requirements.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Inc, Milford, CT (203) 882-4800.
 - 2. Leviton Manufacturing, Company, Inc., Little Neck, NY (800) 824-3005.
 - 3. Pass & Seymour, Syracuse, NY (800) 776-4035.

- 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide 20 Amp, 120/277V, specification grade, flush, single pole toggle switches with side and back wired screw terminals. All switches shall be equipped with grounding screws.
- C. Single Pole Switch:
 - 1. Leviton Cat. No. 1221-2.
 - 2. P&S Cat. No. PS20AC1I.
 - 3. Hubbell Cat. No. HBL1221.
- D. Double Pole Switch:
 - 1. Leviton Cat. No. 1222-2.
 - 2. P&S Cat. No. PS20AC2.
 - 3. Hubbell, Cat. No. HBL1222.
- E. Three-way Switch:
 - 1. Leviton, Cat. No. 1223-2.
 - 2. P&S Cat. No. PS20AC-3.
 - 3. Hubbell Cat. No. HBL1223.
- F. Color: Switches located within the Retail Area to be mounted in “blue” or “red” painted walls shall be black. All other switches shall be white unless indicated otherwise.

2.2 RECEPTACLES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Leviton Manufacturing, Company, Inc., Little Neck, NY (800) 824-3005.
 - 2. Pass & Seymour, Syracuse, NY (800) 776-4035.
 - 3. Hubbell, Inc, Milford, CT (203) 882-4800.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide duplex, specification grade, 20 Amp, 120 Volt, 2 pole, 3 wire receptacles with grounding screw.
- C. Duplex Convenience Receptacle:
 - 1. Leviton Cat. No. 5362.
 - 2. P&S Cat. No. 5362.
 - 3. Hubbell Cat. No. HBL5352.
- D. GFCI Receptacle (Side Wired Feed-Thru):
 - 1. Leviton Cat. No. 6599.
 - 2. P&S Cat. No. 2091-SHG.
 - 3. Hubbell Cat. No. HBLGF5362.
- E. Color: Receptacles located within the Retail Area to be mounted in “blue” or “red” painted walls shall be black. All other receptacles shall be white unless indicated otherwise.

2.3 WALL PLATES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. P&S Sierra.
 - 2. Hubbell.

3. Leviton.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Cover Plate: Cover plates to be installed within the Retail Areas on "blue" or "red" painted walls shall be black smooth thermoplastic. All other cover plates shall be white smooth thermoplastic unless otherwise noted.
1. Sierra TP8-W.
- C. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device.
1. Sierra 4510 cast aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
1. Verify that outlet boxes are installed at proper height.
 2. Verify that wall openings are neatly cut and will be completely covered by wall plates.
 3. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- F. Connect wiring devices by wrapping conductor 2/3 of screw diameter in clockwise direction around screw terminal. Tighten screw to 12 pound-inches. Do not use spring pressure devices for wire connections.
- G. Install coverplates on switch, receptacle, and blank outlets.

3.4 CONSTRUCTION

- A. Interface with other work:

1. Coordinate locations of outlet boxes provided under Section 260533 to obtain mounting heights indicated on Drawings.

3.5 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush, level and plumb with wall.

3.7 CLEANING

- A. Section 017300 Execution: Cleaning installed work.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

USPS Master Specifications issued: 10/1/2018
Last revised: 8/9/2016

SECTION 262816
ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fusible Switches.
 - 2. Nonfusible Switches.
 - 3. Fuses.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA KS 1 - Enclosed Switches.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 - 1. Product Data:
 - a. Switch ratings and enclosure dimensions.
 - b. Fuse data sheets showing electrical characteristics including time-current curves.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Record actual locations of enclosed switches and actual fuse sizes.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Perform Work in accordance with NECA SI.

1.5 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to USPS Project Manager.
 - 1. Three of each size and type fuse installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Switches: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - 1. Eaton/Cutler Hammer Corp., Pittsburg, PA (800) 525-2000.
 - 2. General Electric Company (800) 626-2000.
 - 3. Siemens Energy & Automation, Alpharetta, GA (800) 964-4114.
 - 4. Square D Company, Palatine, IL (800) 392-8781.
- B. Fuses: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Cooper Industries Incorporated, Waukesha, WI (414) 524-3300.
 - 2. General Electric Company (800) 626-2000.
 - 3. Gould Shawmut, Newburyport, MA (508) 462-6662.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 FUSIBLE ENCLOSED SWITCH ASSEMBLIES

- A. NEMA KS 1, Type HD heavy duty, 100,000 AIC load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Cover shall be equipped with a manual defeat to allow opening by authorized personnel while energized. Handle shall be lockable in ON or OFF position.
- B. Rating: 250 volts AC or 600 volts AC as indicated on Drawings.
- C. Fuse Clips: Designed to accommodate Class R fuses.
- D. Enclosures: NEMA KS 1.
 - 1. Interior Dry Locations: NEMA Type 1 or 12.
 - 2. Exterior Locations: NEMA Type 3R or 12.
- E. Provide factory grounding lug and neutral block if required.

2.3 NONFUSIBLE SWITCH ASSEMBLIES

- A. NEMA KS 1, Type GD, general duty load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Cover shall be equipped with a manual defeat to allow opening by authorized personnel while energized. Handle shall be lockable in ON or OFF position.
- B. Rating: 250 volts AC or 600 volts AC as indicated on Drawings.
- C. Enclosures: NEMA KS 1.

1. Interior Dry Locations: NEMA Type 1 or 12.
2. Exterior Locations: NEMA Type 3R or 12.

D. Provide factory grounding lug and neutral block if required.

2.4 FUSES

- A. NEMA FU 1, Class RK5, dual element, current limiting, time delay, 250 volt AC or 600 volt AC as indicated on Drawings.
- B. Interrupting Rating: 100,000 rms amperes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. Switches:
 1. Install in accordance with manufacturers published instructions and NECA SI.
 2. Install where indicated on Drawings, where required by equipment, and where required by NFPA 70.
 3. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.
- B. Fuses:
 1. Install fuses in fusible switches in accordance with manufacturer's published instructions, as indicated on Drawings, or as required by loading per NFPA 70.
 2. Install fuse with label oriented with manufacturer, type, and size easily read.

3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/4/2018

SECTION 264128

SURGE PROTECTIVE DEVICES (SPDS)

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes the materials and installation requirements for surge protective devices (SPD) for the protection of all power and communications circuits. Provide and install materials, labor and auxiliaries required to furnish and install complete surge suppression for the protection of building electrical and electronics systems from the effects of induced transient voltage surge and lightning discharge as indicated on drawings.
 - 1. Provide surge suppression devices for the following equipment:
 - a. Each main electrical service switchboard as indicated for on drawings.
 - b. Distribution and branch panels as indicated for on drawings.
 - c. All electronic communications equipment installed including but not limited to: fire alarm, intrusion, security, CCTV, and intercom systems.
- B. Related documents: The contract documents, as defined in Section 011000 - Summary of Work, apply to work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- C. Related sections:
 - 1. Section 260500 - Common Work Results for Electrical.
 - 2. Section 265600 - Exterior Lighting.
 - 3. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.
 - 4. Section 283100 - Fire Detection and Alarm.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. IEEE C62.41.1, IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits.
- C. IEEE C62.41.2, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
- D. IEEE C62.45, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits.
- E. NFPA 70; National Electrical Code: Article 285.
- F. UL 1283 - Electromagnetic Interference Filters.
- G. UL 1449, Third Edition, effective September 29, 2009 - Surge Protective Devices.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Section 013300 - Submittal Procedures: Procedures for submittals.

1. Shop Drawings: Indicate outline and support point dimensions, voltage, integrated short circuit ampere rating, and sizes.
 2. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
 3. Certification submitted SPDs are manufactured in the United States.
 4. Shall include UL 1449, 3rd edition Listing documentation verifying the following:
 - a. Short Circuit Current Rating (SCCR)
 - b. Voltage Protection Ratings (VPRs) for all modes
 - c. Maximum Continuous Operating Voltage rating (MCOV)
 - d. I-nominal rating (I-n)
 - e. Type 1 Device Listing:
 - 1) VPR, MCOV, I-n, and Type 1 information is posted at www.UL.com, under Certifications, searching using UL Category Code: VZCA. SCCR's are posted in manufacturer's UL docs.
 - 2) UL data and visual inspection takes precedence over manufacturer's published documentation.
- C. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
1. Project Record Documents: Record actual locations of Products.
 2. Operation and Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. SPDs must be manufactured in the United States.
- C. Manufacturer Qualifications: Engage a firm with at least ten (10) years experience in manufacturing transient voltage surge suppressors.
- D. Manufacturer shall be ISO 9001 or 9002 certified.
- E. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- F. The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Handle and store equipment in accordance with manufacturer's Installation and Maintenance Manuals. One (1) copy of this document to be provided with the equipment at time of shipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following.
 1. ASCO Power Technologies, Incorporated, Clearwater, FL (800) 237-4567.

2. Emerson/Liebert Corporation, Columbus, OH (800) 877-9222.
3. Atlantic Scientific Corporation, Melbourne, FL (800) 544-4737.
4. Current Technology Inc., Irving, TX (800) 238-5000.

B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 DISTRIBUTION SURGE PROTECTIVE DEVICES (SPDs)

- A. Models:
1. Basis of Design: Advanced Protection Technologies: "TEXDS" Series.
- B. Surge Protective Device Description: Non-modular type complying with UL 1283 and UL 1449 3rd Edition Listed. Provide unit with the following features and accessories:
1. LED indicator lights for power and protection status.
- C. Short Circuit Current Rating: SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
- D. SPD Type: SPD shall be UL labeled as Type 1 (verifiable at UL.com), intended for use without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- E. In Rating: SPD shall be UL labeled with 20kA Inominal (I-n) (verifiable at UL.com).
- F. SPD shall provide surge current diversion paths for all modes of protection; L-N, L-G, N-G, and L-L in WYE systems, and L-L, L-G in DELTA Systems.
- G. Minimum Single Impulse Surge Current Capability (single pulse rated) per phase shall be.
1. Single Impulse Surge Current Capacity is to be 150 kA.
- H. Connection Means: Permanently wired via internal or external disconnecting means.
- I. Protection modes and UL 1449 3rd Edition Voltage Protection Rating for grounded WYE circuits with voltages of 480Y/277, 3-phase, 4-wire shall be as follows:

<u>VOLTAGE</u>	<u>L-N</u>	<u>L-G</u>	<u>N-G</u>
208Y/120V	700V	700V	700V
480Y/277V	1500V	1500V	1500V

- J. Install devices as close as possible to distribution or branch panelboards.
- K. Test unit in accordance with manufacturer's written instructions.

2.3 FIRE ALARM AND SECURITY SYSTEM SURGE PROTECTIVE DEVICES (SPDs)

- A. Power Surge Protection:
1. SPD shall be listed or recognized in accordance with UL 1449 Third Edition verifiable by visiting UL.com.
 2. SPD shall provide surge current L-N or L-G mode of protection.
 3. SPD shall be chase.
 4. Every mode of protection, shall be protected by internal overcurrent and thermal overtemperature controls.
 5. SPD shall meet or exceed the following criteria:

- a. Minimum surge current capability (single pulse rated) per phase shall be:
 - 1) 120/240 Panel Application 50kA per phase.
 - b. UL 1449 3rd Edition listed Voltage Protection Ratings for shall not exceed the following:

<u>VOLTAGE</u>	<u>L-N/L-G</u>	<u>MCOV</u>
120V or 240/120V	600V	150V
6. SPD shall have a warranty for a period of two years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. The installation shall meet the following criteria:
 - 1. Install per manufacturer's recommendations and contract documents.
 - 2. Install units plumb, level and rigid without distortion.
 - 3. One primary lightning arrestor shall be installed external to the service entrance in accordance with manufacturer instructions.
 - 4. Service Entrance SPD shall be installed on the load side of the main service disconnect.
 - 5. Service Entrance SPD ground shall be bonded to the service entrance ground.
 - 6. At Service Entrance, a UL approved disconnecting means shall be provided as a means of servicing.
 - 7. One SPD shall be installed external to each designated distribution panelboard.
 - 8. At Distribution and Branch, SPD shall have an independent means of disconnect such that the protected panel remains energized. A 30A breaker (or larger) may serve this function.
 - 9. SPD shall be installed per manufacturer's installation instructions with lead lengths as short (less than 24") and straight as possible. Gently twist conductors together.
 - 10. Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers per NEC.

3.3 ADJUSTMENTS AND CLEANING

- A. Remove debris from SPD and wipe dust and dirt from all components.
- B. Repaint marred and scratched surfaces with touch up paint to match original finish.

3.4 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Check tightness of all accessible mechanical and electrical connections to assure they are torqued to the minimum acceptable manufacture's recommendations.
- C. Check all installed panels for proper grounding, fastening and alignment.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018

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SECTION 265100

INTERIOR LIGHTING (LED-SOLID STATE)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior luminaires and accessories.
 - 2. Emergency lighting units.
 - 3. Exit signs.
 - 4. Ballast/Light emitting diode (LED) drivers.
 - 5. Lamps.
 - 6. Luminaire accessories.
- B. Substitutions:
 - 1. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not allowed.
- C. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- D. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.
 - 2. Section 260623 - Lighting Controls.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Illuminating Engineering Society (IES):
 - 1. IES LM-79 - (2008) Electrical and Photometric Measurements of Solid-State Lighting Products.
 - 2. IES LM-80 - (2015) Measuring Lumen Maintenance of LED Light Sources.
 - 3. IES TM-21 - (2011; Addendum B 2015) Projecting Long Term Lumen Maintenance of LED Light Sources.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 101 - Life Safety Code.
 - 2. NFPA 70 - National Electrical Code.
- D. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA ANSI/ILG C78.377 - (2017) Electric Lamps Specifications for the Chromaticity of Solid State Lighting Products.
 - 2. NEMA SSL 1 - (2010) Electronic Drivers for Led Devices, Arrays, or Systems.
 - 3. NEMA SSL 3 - (2011) High-Power White LED Binning for General Illumination.
- E. Federal Communications Commission Parts 18.305, 18.307 (EMI RFI).
- F. American Society of Heating, Refrigerating and Air Conditioning, Inc.
 - 1. ANSI/ASHRAE/IES Standard 90.1.

- G. Underwriters Laboratories (UL):
1. UL 1472 - (2015) UL Standard for Safety Solid-State Dimming Controls.
 2. UL 1598 - (2008; Reprint Oct 2012) Luminaires.
 3. UL 844 - (2012; Reprint Mar 2016) UL Standard for Safety Luminaires for Use in Hazardous (Classified) Locations.
 4. UL 8750 - (2015; Reprint Feb 2018) UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products.
 5. UL 924 - (2016; Reprint Nov 2017) UL Standard for Safety Emergency Lighting and Power Equipment.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
1. Product Data: Submit catalog cuts, drawings, descriptive matter and lighting performance characteristics as required to completely define the materials and construction details employed, finishes applied, dimensions, hinging, latching and relamping provisions, and electrical characteristics.
 2. Assurance/Control Submittals:
 - a. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
1. Operation and Maintenance Data: Submit manufacturer's operation and maintenance instructions for each type of luminaire.

1.4 DEFINITIONS

- A. For LED luminaire light sources, "Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions. This is also known as 70 percent "Rated Lumen Maintenance Life" as defined in IES LM-80.
- B. For LED luminaires, "Luminaire Efficacy" (LE) is the appropriate measure of energy efficiency, measured in lumens/watt. This is gathered from LM-79 data for the luminaire, in which absolute photometry is used to measure the lumen output of the luminaire as one entity, not the source separately and then the source and housing together.
- C. Total harmonic distortion (THD) is the root mean square (RMS) of all the harmonic components divided by the total fundamental current.

1.5 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Products shall be tested, approved and labeled/listed by Underwriters Laboratories, Inc., or by a nationally recognized testing laboratory (NRTL).
- C. Electrical equipment and materials shall be new and within one year of manufacture, complying with the latest codes and standards. Re-built, refurbished and/or re-manufactured electrical equipment and materials shall not be furnished on this project.

1.6 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to the USPS Project Manager.
 - 1. Two of each luminaire lens type.
 - 2. Each component type: Provide quantity for each unique ballast/driver, relay, I/O module and lamp equal to 2 percent of luminaire total, but not less than two of each type.

PART 2 - PRODUCTS

2.1 LUMINAIRE MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Alphabet Lighting, Tustin, CA (714) 259-9959.
 - 2. Beghelli, Miramar, FL (954) 442-6600.
 - 3. Chloride Systems, Burgaw, NC (910) 259-1000.
 - 4. Columbia Lighting, Greenville, SC (864) 678-1000.
 - 5. Cooper Lighting (Halo, Invue, Lumark, Metalux, Portfolio, Sure-Lites), Peachtree City, GA (770) 486-4800.
 - 6. Compass Lighting Products, Greenville, SC (866) 313-3909.
 - 7. Day-Brite, Tupelo, MS (662) 842-7212.
 - 8. Dual-Lite, Cheshire, CT (203) 699-2000.
 - 9. Edison-Price Lighting, Long Island City, NY (718) 685-0700.
 - 10. Elcast Lighting, Addison, IL (630) 543-5390.
 - 11. Gardco Lighting, San Leandro, CA (800) 227-0758.
 - 12. GE Lighting Systems, Charlotte, NC (803) 462-2016.
 - 13. Gotham Lighting, Conyers, GA (800) 315-4982.
 - 14. Guth Lighting, St. Louis, MO (314) 533-3200.
 - 15. H.E. Williams, Carthage, MO (417) 358-4065.
 - 16. Holophane, Newark, OH (740) 345-9631.
 - 17. Hubbell Lighting, Inc., (Columbia, Spaulding, Sterner) Spartanburg, SC (864) 599-6000.
 - 18. Intense Lighting LLC, Anaheim, CA (800) 961-5321.
 - 19. Indy Lighting, Fishers, IN (817) 849-1233.
 - 20. Kenall Manufacturing, Gurnee, IL (847) 360-8200.
 - 21. Kirlin Lighting, Detroit, MI (313) 259-6400.
 - 22. Kramer Lighting, Sturtevant, WI (800) 236-6800.
 - 23. Kurt Versen Company, Westwood, NJ (201) 664-8200.
 - 24. Kurtzon Lighting, Chicago, IL (773) 277-2121.
 - 25. LightAlarms (Thomas & Betts) Montreal, ON (888) 552-6467.
 - 26. Lithonia Lighting, Conyers, GA (770) 922-9000.
 - 27. LSI Industries, Cincinnati, OH (513) 793-3200.
 - 28. Lumax Industries, Altoona, PA (814) 944-2537.
 - 29. Omega Lighting, Tupelo, MS (800) 234-1890.
 - 30. Phoenix Products, Milwaukee, WI (414) 438-1200.
 - 31. Prescolite Lighting, Spartanburg, SC (864) 599-6000.
 - 32. Prudential Lighting, Los Angeles, CA (213) 746-0360.
 - 33. Vista Lighting, Tupelo, MS (662) 690-4105.
 - 34. Zumtobel Staff, Highland, NY (800) 448-4131.

2.2 LUMINAIRE TYPES

- A. **Type A1** Lithonia #2BLT4-XXX-ADP-EZ1-LP840 Series.

1. Description: Recessed, 2' W x 4' L x 3" D LED type troffer with side reflectors and dropped acrylic center lens, non-air handling.
 2. Lens: High performance extruded acrylic diffuser with curved linear prisms.
 3. Housing:
 - a. 22 gauge steel body, flush steel door with mitered corners.
 - b. Frame and housing white baked enamel or powder coated finish.
 4. Ballast/Driver: LED high efficiency – 30W at 3000 Lumen, 34W at 4000 Lumen, 45W at 4800 Lumen or 53W at 6000 Lumen. Wattage based on lumen package selected.
 5. Mounting:
 - a. Recessed in Inverted T suspended ceiling.
 - b. Recessed in gypsum board ceiling; provide flanged frame-in kit.
 6. Lamps: 3000 Lumen, 4000 Lumen, 4800 Lumen or 6000 Lumen LED array; 4000K rated 60,000 hours at LLD = 0.8.
 7. Marking: luminaires are to be labeled on the interior side with lumen package used.
 8. Alternate Manufacturers:
 - a. Columbia #LCAT24-40-XXXX-G-ED-U.
 - b. Metalux #24RTC-XX-UNV-L840-CD-U.
 - c. As listed in paragraph 2.1A.
- B. Type A6** Lithonia #WL4-XXX-EZ1-LP840 Series.
1. Description: 5" W x 4' L x 3 7/8" D surface mounted LED luminaire, non-air handling.
 2. Refractor: Impact modified, linear – faceted refractor with diffusing film.
 3. Housing:
 - a. 20 gauge steel with die cast end caps.
 - b. White polyester powder coated finish.
 4. Ballast/Driver: LED high efficiency – 19W at 2000 Lumen, 28W at 3000 Lumen or 40W at 4000 Lumen. Wattage based on lumen package selected.
 5. Mounting: Surface ceiling mounted.
 6. Lamps: 2000 Lumen, 3000 Lumen or 4000 Lumen LED array; 4000K rated 60,000 hours at LLD = 0.9.
 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
 8. Alternate Manufacturers:
 - a. Metalux #4SWLED-LD4-XXXX-UNV-CD1-U.
 - b. Columbia #CWM4-40-XX-SM-FR-FA-ED-U.
 - c. As listed in paragraph 2.1A.
- C. Type CL1** Lithonia #ZLIN-L48-XXXX-FST-40K Series.
1. Description; 4 ft. long, LED strip luminaire with protective lens/diffuser.
 2. Lens: Snap on frosted, diffused lens.
 3. Housing:
 - a. 20 gauge cold rolled steel housing with punched knockouts for mounting.
 - b. End plates shall be die-formed heavy gauge rolled steel with punched knockouts for through wiring.
 - c. White baked enamel finish with a minimum 90 percent reflectance.
 4. Ballast/Driver: LED high efficiency – 25W at 3000 Lumen, 34W at 5000 Lumen or 52W at 7000 Lumen. Wattage based on lumen packages selected.
 5. Mounting:
 - a. Surface mounted to the underside of the ceiling. Attach luminaire to ceiling grid by means of a gripper hanger which attaches to any standard ceiling grid system.
 - b. For spaces without ceiling, suspend from structure with all-thread rods to required height.
 - c. Electrical Contractor to determine quantity of hangers required for either method.
 6. Lamps: 3000 Lumen, 5000 Lumen or 7000 Lumen LED arrays, 4000K rated 60,000 hours at LLD=0.7.
 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
 8. Alternate Manufacturers:
 - a. Lumax Industries #CNLED-XXL-4K-48-9-FAF.
 - b. Metalux #4SNLED-LD5-XXX-LW-UNV-L840-CD1-U.

- c. As listed in paragraph 2.1A.
- D. **Type P1** D.L. Manufacturing Versa-Light Model #450.
1. Description: Flexible/Rotatable, shock and vibration resistant "LED" dock light with protective lamp shield.
 2. Power Supply: Solid state, fan cooled, integral transformer with integral switch and cord connection.
 3. Housing and Arm: Welded steel housing with stainless steel flexible tube.
 4. Mounting: Wall mounted.
 5. Voltage: 120 volt with 15 Amp, 120 volt plug and cord.
 6. Lamps: 57 Watt, 3000K, 85,000 hrs LED array.
 7. Alternate Manufacturers:
 - a. Phoenix #DLP-FLEX-LED.
 - b. APS Resource - FT Ultra LED.
 - c. Substitutions permitted.
- E. **Type RK1** Lithonia #2VTL4RT-XXX-ADP-EZ1-LP840.
1. Description: LED relight retrofit kit for exiting fluorescent troffer.
 2. Lens: Volumetric with linear refracted cavity.
 3. Housing: Reuse existing.
 4. Ballast/Driver: High efficiency eldo LED.
 5. Mounting: Universal end bracket into existing housing.
 6. Lamps: LED.
 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
 8. Alternate Manufacturers:
 - a. As listed in paragraph 2.1A.
- F. **Type X1** Lithonia #LQM-S-W-3R-120/277-ELN-SD Series.
1. Description: Ceiling or wall mount, single face LED exit sign with canopy. Self Powered and with self diagnostics.
 2. Features: Red Letters, White Stencil, White Housing (verify colors with local jurisdiction). Injection molded UL94-5V rated polycarbonate frame and canopy.
 3. Mounting: Ceiling, back or end-mounted.
 4. Battery: Maintenance free sealed Nickel Cadmium with long life, full recharge time of 24 hours max.
 5. Voltage: 120.
 6. Lamps: LED lamp module.
 7. Alternate Manufacturers:
 - a. Sure-Lites #LPX7-X-SD.
 - b. Compass #CERSD.
 - c. As listed in paragraph 2.1A.
- G. **Type X2** Lithonia #LQM-S-W-3R-120/277-ELN-SD Series.
1. Description: Ceiling or end mount, double face LED exit sign with canopy.
 2. Features: Red Letters, White Stencil, White Housing (verify colors with local jurisdiction). Injection molded UL94-5V rated polycarbonate frame and canopy.
 3. Mounting: Ceiling or end-mount.
 4. Battery: Maintenance free sealed nickel-cadmium with long life, full recharge time of 24 hours maximum.
 5. Voltage: 120.
 6. Lamps: LED lamp module.
 7. Alternate Manufacturers:
 - a. Sure-Lites #LPX7-X-SD.
 - b. Compass #CERSD.
 - c. As listed in paragraph 2.1A.

2.3 LUMINAIRES

- A. Provide luminaires as indicated in luminaire schedule and details on project plans. Provide luminaires complete with light sources of quantity, type and wattage indicated. Provide all luminaires of the same type by the same manufacturer. Luminaires must be specifically designed for use with the driver or ballast and light source provided.
- B. LED Luminaires:
 - 1. Install ballast/drivers, LED arrays and specified accessories at the factory.
 - 2. Luminaires must have a minimum 5 year manufacturer's warranty.
 - 3. Luminaires must have a minimum L70 lumen maintenance value of 50,000 hours as calculated by IES TM-21, with data obtained per IES LM-80 requirements.
 - 4. Luminaire drive current value must be identical to that provided by test data for luminaire in question.
 - 5. Luminaires must be listed with the DesignLights Consortium 'Qualified Products List' when falling into category of "General Application" luminaires, i.e. Interior Directional, Display Case, Troffer, Linear Ambient, or Low/High Bay. Requirements are shown in the DesignLights Consortium "Technical Requirements Table" at <https://data.energystar.gov/dataset/EPA-Recognized-Laboratories-For-Lighting-Products/jgwf-7qrr>.
 - 6. Provide Department of Energy 'Lighting Facts' label for each luminaire.
- C. Luminaires for hazardous locations:
 - 1. In addition to requirements stated herein, provide LED luminaires for hazardous locations which conform to UL 844 or which have Factory Mutual certification for the class and division indicated.

2.4 LED DRIVERS

- A. NEMA SSL 1, UL 8750. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:
 - 1. Output power (watts) and luminous flux (lumens) as shown in luminaire schedule for each luminaire type to meet minimum luminaire efficacy (LE) value provided.
 - 2. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided.
 - 3. Current draw Total Harmonic Distortion (THD) of less than 20 percent.
 - 4. Class A sound rating.
 - 5. Operable at input voltage of 120-277 volts at 60 hertz.
 - 6. Minimum 5 year manufacturer's warranty.
 - 7. RoHS compliant.
 - 8. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.
 - 9. UL listed for dry or damp locations typical of interior installations.
 - 10. LED driver shall tolerate sustained open circuit and short circuit output conditions without damage.
 - 11. LED driver shall comply with the requirements of the FCC rules and regulations, Title 47 CFR Part 15 Non-Consumer (Class A).

2.5 LIGHT SOURCES

- A. NEMA ANSLG C78.377, NEMA SSL 3. Provide type and wattage as indicated in luminaire schedule on project plans.
- B. LED arrays shall have a correlated color temperature (CCT) of 4000K; minimum color rendering index (CRI) value of 80.

- C. High power, white light output utilizing phosphor conversion (PC) process or mixed system of colored LEDs, typically red, green and blue (RGB).
- D. Provide light source color consistency by utilizing a binning tolerance within a 4 step McAdam ellipse.
- E. Luminaire shall have door frame and lens compatible for use with LED arrays and integral airflow ventilation system.

2.6 LED EMERGENCY DRIVERS

- A. Provide LED emergency driver with automatic power failure detection, test switch and LED indicator (or combination switch/indicator) located on luminaire exterior and provide self-diagnostic function integral to emergency driver. Integral lead-calcium battery is required to supply a minimum of 90 minutes of emergency power at 1400 Lumens. Driver must be RoHS compliant, rated for installation in plenum-rated spaces and damp locations, and be warranted for a minimum of five years.

2.7 LUMINAIRE SUPPORT HARDWARE

- A. Wire:
 - 1. ASTM A641/A641M; Galvanized, soft tempered steel, minimum 0.11 inches in diameter, or galvanized, braided steel, minimum 0.08 inches in diameter.
- B. Threaded Rods:
 - 1. Threaded steel rods, 3/16 inch diameter, zinc or cadmium coated.
- C. Straps:
 - 1. Galvanized steel, one inch by 3/16 inch, conforming to ASTM A653/A653M, with a light commercial zinc coating or ASTM A1008/A1008M with an electrodeposited zinc coating conforming to ASTM B633, Type RS.

2.8 EQUIPMENT IDENTIFICATION

- A. Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
- B. Provide labeled luminaires in accordance with UL 1598 requirements. All luminaires must be clearly marked for operation of specific light sources and ballasts or drivers. Note the following light source characteristics in the format "Use Only _____":
 - 1. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.
 - 2. All markings related to light source type must be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when light sources are in place. Ballasts or drivers must have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

2.9 FACTORY APPLIED FINISH

- A. Provide all luminaires and lighting equipment with factory-applied painting system that as a minimum, meets requirements of NEMA 250 corrosion-resistance test.

2.10 RECESS- AND FLUSH-MOUNTED LUMINAIRES

- A. Provide access to lamp and ballast from bottom of luminaire. Provide trim and lenses for the exposed surface of flush-mounted luminaires as indicated on project drawings and specifications.

2.11 SUSPENDED LUMINAIRES

- A. Provide hangers capable of supporting twice the combined weight of luminaires supported by hangers. Provide with swivel hangers to ensure a plumb installation. Provide cadmium-plated steel with a swivel-ball tapped for the conduit size indicated. Hangers must allow fixtures to swing within an angle of 45 degrees. Brace pendants 4 feet or longer to limit swinging. Single-unit suspended luminaires must have twin-stem hangers. Multiple-unit or continuous row luminaires must have a tubing or stem for wiring at one point and a tubing or rod suspension provided for each unit length of chassis, including one at each end. Provide rods in minimum 0.25 inch diameter.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. Electrical installations must conform to IEEE C2, NFPA 70, and to the requirements specified herein. Install luminaires to meet the requirements of ASHRAE 90.1 and ASHRAE 189.1. To encourage consistency and uniformity, install luminaires of the same manufacture and model number when residing in the same facility or building.
- B. Luminaires:
 - 1. Set luminaires plumb, square, and level with ceiling and walls, in alignment with adjacent luminaires and secure in accordance with manufacturers' directions and approved drawings. Installation must meet requirements of NFPA 70. Obtain approval of the exact mounting height on the job before commencing installation and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed.
 - 2. Recessed and semi-recessed luminaires must be independently supported from the building structure by a minimum of four wires, straps or rods per luminaire and located near each corner of the luminaire. Ceiling grid clips are not allowed as an alternative to independently supported luminaires.
 - 3. Round luminaires or luminaires smaller in size than the ceiling grid must be independently supported from the building structure by a minimum of two wires, straps or rods per luminaire, spaced approximately equidistant around. Do not support luminaires by acoustical tile ceiling panels.
 - a. Where luminaires of sizes less than the ceiling grid are indicated to be centered in the acoustical panel, support each independently and provide at least two 3/4 inch metal channels spanning, and secured to, the ceiling tees for centering and aligning the luminaire. Provide wires, straps, or rods for luminaire support in this section.
- C. Suspended Luminaires:
 - 1. Provide suspended luminaires with swivel hangers so that they hang plumb and level. The stem, canopy and luminaire must be capable of 45 degree swing. Pendants, rods, or chains, 4 feet or longer excluding luminaire, must be braced to prevent swaying using three cables at 120 degree separation.

2. Suspended luminaires in continuous rows must have internal wireway systems for end to end wiring and must be properly aligned to provide a straight and continuous row without bends, gaps, light leaks or filler pieces.
 3. Match supporting pendants with supported luminaire. Aircraft cable must be stainless steel. Canopies must be finished to match the ceiling and must be low profile unless otherwise shown.
 4. Maximum distance between suspension points must be 10 feet or as recommended by the manufacturer, whichever is less.
- D. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
 - E. Install surface mounted luminaires and exit luminaire signs plumb and adjust to align with building lines and with each other. Secure to prevent movement. Mount exit signs to outlet box mounted flush in wall or ceilings. Outlet box for ceiling mounted exit signs: Connect to rigid conduit system.
 - F. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating. In fire rated ceilings recessed luminaires must carry 1 hour UL fire rating classification.
 - G. Install earthquake clips to secure recessed grid-supported luminaires in place.
 - H. Install wall mounted luminaires, emergency lighting units and exit luminaire signs at height as scheduled.
 - I. Install accessories furnished with each luminaire.
 - J. Bond products and metal accessories to branch circuit equipment grounding conductor.
 - K. Install specified light sources in each emergency lighting unit, exit luminaire sign, and luminaire.
 - L. Wire exit signs and emergency lighting units ahead of the local switch, to the normal lighting circuit located in the same room or area.
 - M. Luminaire whips shall be steel or aluminum. M/C cable shall be permissible for luminaire whips/connections. Luminaire whips/connections shall be made with a minimum of #12 AWG copper conductors. Equipment grounding conductors shall be provided in all luminaire whips and/or connections.
 1. All luminaire whips shall be supported to luminaire support wire/cable with an approved fastener equal to an Erico "KX" flexible conduit hanger or other UL listed supports and fasteners.
 - N. Luminaires are not to be used as a raceway unless stamped for use as raceway by manufacturer. Single luminaire in lay-in ceilings shall not be used for raceway and shall be connected to an outlet box located within six feet (6') of fixture with flexible conduit or luminaire whips.

3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.
- C. Final acceptance will be based on measurement of initial lighting levels after required hours of burn in as specified in USPS Customer Service Facilities Design Criteria, not maintained lighting levels.

3.4 WARRANTY

- A. Provide a written 5 year on-site replacement warranty for material, luminaire finish, and workmanship. On-site replacement includes transportation, removal, and installation of new products.
 - 1. Include finish warranty to include failure and substantial deterioration such as blistering, cracking, peeling, chalking, or fading.
 - 2. Material warranty must include:
 - a. All drivers.
 - b. Replacement when more than 10 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.
- B. Warranty period must begin on date of beneficial occupancy. Provide the USPS Project Manager with signed warranty certificates prior to final payment.

3.5 ADJUSTING

- A. Aim and adjust luminaires as directed by the USPS Project Manager.
- B. Position exit luminaire sign directional arrows as indicated.

3.6 CLEANING

- A. Conform to Section 017300 - Execution: Cleaning installed work.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/4/2018

SECTION 265600
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior luminaires and accessories.
 - 2. Poles.
 - 3. Ballast/Drivers.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.
 - 2. Section 033000 - Cast-in-Place Concrete.
 - 3. Section 260623 - Lighting Controls.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Illuminating Engineering Society North America (IESNA):
 - 1. IESNA RP-8 - Recommended Practice for Roadway Lighting.
 - 2. IESNA RP-20 - Recommended Practice for Lighting for Parking Facilities.
 - 3. IESNA RP-33 - Recommended Practice for Lighting for Exterior Environments.
- C. Federal Communications Commission Parts 18.305, 18.307 (EMI RFI).
- D. American Society of Heating, Refrigerating and Air Conditioning, Inc.
 - 1. ANSI/ ASHRAE/ IES Standard 90.1.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 - 1. Product Data:
 - a. Luminaire dimensions, ratings, and performance data.
 - b. Complete computer data printout of illumination levels based on a 5 ft. by 5 ft. grid pattern.
 - 2. Shop Drawings:
 - a. Indicate dimensions and components for each luminaire which is not a standard Product of the manufacturer.
 - b. Indicate illumination levels in accordance with layout and scheduled luminaires indicated on Drawings.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Material and Equipment: Transport, Handle, Store, and Protect Products.

1.6 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training. Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to the USPS Project Manager.
 - 1. Each component type: Provide quantity for each unique ballast/driver, surge protector and LED array equal to two (2) percent of luminaire total, but not less than two of each type.

PART 2 - PRODUCTS

2.1 LUMINAIRE MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Alphabet Lighting, Tustin, CA (714) 259-9959.
 - 2. Architectural Landscape Lighting, Santa Ana, CA 92704 (714) 668-1107.
 - 3. Barron Lighting Group (Trace-Lite), Phoenix, AZ 85027 (888) 533-3948.
 - 4. Bronzelite Commercial Landscape Lighting, (800) 273-1569.
 - 5. CGF Design Inc., Morton Grove, IL (847) 815-5079.
 - 6. Cooper Lighting (Halo, Invue, Lumark, Lumiere, McGraw-Edison, Portfolio), Peachtree City, GA (770) 486-4800.
 - 7. Deco Lighting, Commerce, CA (800) 613-3326.
 - 8. Gardco/Philips Lighting, San Leandro, CA (800) 227-0758.
 - 9. Gotham Lighting, Conyers, GA (800) 315-4982.
 - 10. H.E. Williams, Carthage, MO (417) 358-4065.
 - 11. Holophane, Newark, OH (740) 345-9631.
 - 12. Hubbell Lighting, Inc., (Kim, Spaulding, Sterner) Spartanburg, SC (864) 599-6000.
 - 13. Hydrel Architectural and Landscape Products, Sylmar, CA 91342 (818) 362-9465.
 - 14. Intense Lighting, Anaheim, CA (800) 961-5322.
 - 15. Kenall Manufacturing, Gurnee, IL (847) 360-8200.
 - 16. Kim Lighting, City of Industry, CA (626) 968-5666.
 - 17. Kirlin Lighting, Detroit, MI (313) 259-6400.
 - 18. Ligman Lighting USA, Hillsboro, OR (503) 645-0500.
 - 19. Lithonia Lighting, Conyers, GA (770) 922-9000.
 - 20. LSI Industries, Cincinnati, OH (513) 793-3200.
 - 21. McPhilben Lighting, San Leandro, CA (510) 357-6900.
 - 22. Neptun Light Inc., Lake Bluff, IL (888) 735-8330.
 - 23. Pathway Lighting, Old Saybrook, CT (800) 342-0592.
 - 24. Quality Lighting, Franklin Park, IL (847) 451-0090.
 - 25. Visionaire Lighting, Rancho Dominguez, CA (310) 512-6480.
 - 26. Wide-Lite, San Marcos, TX (512) 392-5821.
- B. Substitutions:
 - 1. Section 016000 - Product Requirements: Product options and substitutions, substitutions not permitted.

2.2 LUMINAIRE TYPES

- A. **Type MH3** (exterior) Lithonia #MRWLED-XX-40K-SRX Series.
1. Description: 18 inch dia. half cylinder wall mounted full cut-off, solid state, LED luminaire. Lens door is fully gasketed with one-piece solid silicone and UL listed for wet locations.
 2. Lens: Precision molded acrylic.
 3. Housing: Die-cast single piece aluminum housing. Finish by the USPS Project Manager.
 4. Ballast/Driver: 20W @ 2200 Lumen, 29W @ 3000 Lumen, 40W @ 4500 Lumen or 61W @ 6000 Lumen. Wattage based on lumen packaged selected.
 5. Mounting: Surface wall.
 6. Voltage: [277] [120].
 7. Lamp: 2200 Lumen, 3000 Lumen, 4500 Lumen or 6000 Lumen LED array; 4000K, 60,000 hours @ LLC = 0.9.
 8. Label: UL listed for wet locations; IP65 rated.
 9. Warranty: Full five (5) year factory replacement warranty (internal components).
 10. Alternate Manufacturers:
 - a. Gardco/Philips: 104LED/55LA Series.
 - b. Hubbell: RDI-50L8.
 - c. Lithonia: WSRLED-XX-40K-SRX.
 - d. McGraw Edison: ISC-C02-LED-E1-BL3.
 - e. Barron Trace-Lite TLED111P Series.
 - f. Deco Lighting #D440-LED-XX-40-UNV-D-XX Series.
 - g. As listed in paragraph 2.1A.
- B. **Type PL1** (exterior) Lithonia #DSXSLED-XXX-1000-40K-T5M-MVOLT-SRM-DWH-XD.
1. Description: Low profile, square, full cut-off canopy light U.L. listed for wet locations.
 2. Housing/Lens: Die-cast aluminum housing with tempered, flat glass lens and pressure stabilizing vent.
 3. Ballast/Driver: 37W @ 3800 Lumen thru 107W @ 11,000 Lumen. Wattage based on lumen package selected.
 4. Mounting: [Surface or wall mounted with recessed outlet box.][Surface mounted with surface box.]
 5. Lamp: 3800 Lumen thru 11,000 Lumen LED array; 4000K, 60,000 hours; LLD=0.85.
 6. Voltage: 120.
 7. Label: U.L. listed for wet locations; IP66 rated with 5-year factory warranty.
 8. Alternate manufacturers:
 - a. Philips/Gardco # M3L-48G2 Series.
 - b. LSI #XSL2 Series (recessed only).
 - c. Deco Lighting #D533-LED-XX-40-UNV Series.
 - d. McGraw-Edison #CNC-XXX-LED-E1-XX Series.
 - e. McGraw Edison #LRC-B-XX-7-LED-E1-XXX Series (recessed only).
 - f. As listed in paragraph 2.1A.
- C. **Type SF1** LSI #XIGB-LED-19-350-NW-UE-SP10-SVG-XXX Series.
1. Description: Round, direct burial spotlight to illuminate flagpole (3 required).
 2. Reflector: 10 degree beam pattern, specular aluminum spun reflector.
 3. Housing: Single piece, compression-molded, composite housing with integral junction box and brass trim ring.
 4. External Lens: ¼ inch thick, slip-resistant walk-over, clear high-impact tempered glass lens with cast aluminum directional shield.
 5. Internal Lens and Gasket: Clear, high-impact, tempered glass lens with silicone gasket.
 6. Ballast/Driver: 22W @ 2159 Lumen, 350 mA, LED array.
 7. Mounting: Direct burial mounting. Provide [6 inch deep gravel bed] [cast in-place rough-in housing].
 8. Voltage: 120.
 9. Lamp: 2159 Lumen LED array; 4000K, 60,000 hours at LLD = 0.7.
 10. Label: UL listed for wet locations; 5-year factory warranty.
 11. Alternate Manufacturers:
 - a. Kim #LTV8IFF-NF-36L-4K-UV-SR Series.
 - b. Ligman Lighting #UKI60781-31WLED-N-W40-UNV-A61312.

- c. As listed in paragraph 2.1A.
- D. **Type SP1** Lithonia #DSX1LED-40C-1000-40K-TXX-MVOLT Series.
 - 1. Description: Rectilinear architectural arm-mounted sharp cut-off, solid state, LED luminaire.
 - 2. Reflector: Anodized segmented reflectors. Beam distribution as required.
 - 3. Housing: Rugged aluminum rectilinear housing with all seams continuously welded for integrity. Corrosion-resistant polyester powder coat. Finish by the USPS Project Manager.
 - 4. Ballast/Driver: 138W @ 12,000+ Lumen, 1000 mA.
 - 5. Mounting: 20 – 25 ft. high straight square aluminum pole.
 - 6. Voltage: 120.
 - 7. Lamp: 12,000+ Lumen LED array; 4000K, 60,000 hours @ LLD = 0.7.
 - 8. Quantity of luminaires per pole as shown on the design drawings.
 - 9. Label: UL listed for wet locations.
 - 10. Warranty: Full five (5) year factory replacement warranty (internal components).
 - 11. Alternate Manufacturers:
 - a. Gardco/Philips #ECF-S-48L-1A-NW-G2-AR Series.
 - b. Deco #D824-LED-120-40-UNV-LP-XX-PM Series.
 - c. McGraw-Edison #GLEON-AF-02-LED-E1-XXX-XX Series.
 - d. As listed in paragraph 2.1A.

2.3 LUMINAIRES

- A. Provide luminaires as indicated in luminaire schedule and details on project plans. Provide luminaires complete with light sources of quantity, type and wattage indicated. Provide all luminaires of the same type by the same manufacturer. Luminaires must be specifically designed for use with the driver or ballast and light source provided.
- B. LED Luminaires:
 - 1. Install ballast/drivers, LED arrays and specified accessories at the factory.
 - 2. Luminaires must have a minimum 5 year manufacturer's warranty.
 - 3. Luminaires must have a minimum L70 lumen maintenance value of 50,000 hours as calculated by IES TM-21, with data obtained per IES LM-80 requirements.
 - 4. All luminaires shall be fused. Locate fuses within handhole of pole for pole mounted luminaires.
 - 5. Voltage: 120.

2.4 LED DRIVERS

- A. NEMA SSL 1, UL 8750. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:
 - 1. Output power (watts) and luminous flux (lumens) as shown in luminaire schedule for each luminaire type to meet minimum luminaire efficacy (LE) value provided.
 - 2. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided.
 - 3. Current draw Total Harmonic Distortion (THD) of less than 20 percent.
 - 4. Class A sound rating.
 - 5. Operable at input voltage of 120-277 volts at 60 hertz.
 - 6. Minimum 5-year manufacturer's warranty.
 - 7. RoHS compliant.
 - 8. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.
 - 9. UL listed for wet locations typical of exterior installations.
 - 10. LED driver shall tolerate sustained open circuit and short circuit output conditions without damage.
 - 11. LED driver shall comply with the requirements of the FCC rules and regulations, Title 47 CFR Part 15 Non-Consumer (Class A).

2.5 LIGHT SOURCES

- A. NEMA ANSLG C78.377, NEMA SSL 3. Provide type and wattage as indicated in luminaire schedule on project plans.
- B. LED arrays shall have a correlated color temperature (CCT) of 4000K; minimum color rendering index (CRI) value of 70.
- C. High power, white light output utilizing phosphor conversion (PC) process or mixed system of colored LEDs, typically red, green and blue (RGB).
- D. Provide light source color consistency by utilizing a binning tolerance within a 4 step McAdam ellipse.
- E. Luminaire shall have door frame and lens compatible for use with LED arrays and integral airflow ventilation system.

2.6 EQUIPMENT IDENTIFICATION

- A. Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
- B. Provide labeled luminaires in accordance with UL 1598 requirements. All luminaires must be clearly marked for operation of specific light sources and ballasts or drivers. Note the following light source characteristics in the format "Use Only _____":
 - 1. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.
 - 2. All markings related to light source type must be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when light sources are in place. Drivers must have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

2.7 POLES

- A. Manufacturers:
 - 1. As listed in paragraph 2.1A.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Material and Finish: Aluminum. Finish by the USPS Project Manager.
- C. Section Shape and Dimensions: Straight Square.
- D. Height: 20 feet.
- E. Base: Nonbreakaway.
- F. Accessories:
 - 1. Handhole.
 - 2. Anchor bolts.
 - 3. Base Cover.
 - 4. Bolt covers.
 - 5. Ground rod and conductor.
- G. Approximate Loading Capacity Ratings:

1. Luminaire Weight: 27 pounds.
2. Luminaire and Bracket Effective Projected Area: 1.01 square feet.
3. Steady Wind: 110 miles per hour minimum, with gust factor of 1.3.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. Provide 3000 PSI minimum concrete for lighting pole bases at locations indicated, in accordance with Section 033000 and details shown on drawings.
- B. Install poles plumb and provide double nuts to adjust plumb. Grout around each base and provide bolt covers.
- C. Bond luminaires, metal accessories and metal poles to branch circuit equipment grounding conductor. Provide supplementary 3/4 inch x 10 foot copper clad rod with #2/AWG copper grounding electrode at each pole.

3.3 FIELD QUALITY CONTROL

- A. As specified Section 260500 - Common Work Results for Electrical.
- B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.
- C. Measure illumination levels to verify conformance with layout and performance requirements.
- D. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.4 ADJUSTING

- A. Aim and adjust luminaires to provide illumination levels and distribution as directed.

3.5 CLEANING

- A. Conform to Section 017300 - Execution: Cleaning installed work.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure, pole and base.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

3.6 PROTECTION OF FINISHED WORK

- A. Conform to Section 017300 - Execution: Protecting installed work.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 8/31/2018

SECTION 270500

COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured cabling system provisions:
 - 1. Pre-Construction Design Review/Monthly Status Meetings.
 - 2. Pre-Work Submittals.
 - 3. Contractor RCDD/Installer Requirements.
 - 4. Labeling.
 - 5. Post Work Close-Out Submittals.
- B. Related Documents:
 - 1. The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section.
 - 2. USPS LAN Infrastructure Best Practices, 01 October 2018.
 - 3. USPS Requirements for Entrance Facilities and DEMARC - October 1, 2017.
 - 4. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 078400 - Fire stopping: Fire stopping sealant at penetrations of fire-rated assemblies.
 - 2. Section 260500 - Common Work Results for Electrical.
 - 3. Section 260533 - Raceway and Boxes for Electrical Systems.
 - 4. Section 271100 - Communications Equipment Room Fittings.
 - 5. Section 271300 - Communications Backbone Cabling.
 - 6. Section 271500 - Communications Horizontal Cabling.
 - 7. Section 275116 - IP Integrated, Public Address Zone Paging System.
 - 8. Section 281600 - Intrusion Detection.
 - 9. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.

1.2 REFERENCES

- A. Telecommunication Industry Association (TIA) Series (refer to current Edition):
 - 1. TIA-568.0-D - Generic Telecommunications Cabling for Customer Premises.
 - 2. TIA-568.1-D - Commercial Building Telecommunications Infrastructure Standard.
 - 3. TIA-568-C.2 - Twisted Pair Copper Cabling and Components.
 - 4. TIA-568.3-D - Optical Fiber Cabling and Components.
 - 5. TIA-568-C.4 - Broadband Coaxial Cabling and Components.
 - 6. TIA-569 - Telecommunications Pathway and Spaces.
 - 7. TIA-570 - Residential Telecommunications Infrastructure Standard.
 - 8. TIA-598 - Fiber Optic Color Codes.
 - 9. TIA-607 - Generic Telecommunications; Bonding and Grounding (Earthing) for Customer Premises.
 - 10. TIA-758 - Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
 - 11. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.
 - 12. TIA-426-14 - Optical Power Loss of Installed Multimode Fiber Cable Plant.
 - 13. BICSI Telecommunications Distribution Methods Manual (Latest Edition including all addendums.)
- B. National Electrical Manufacturer's Association (NEMA):
 - 1. NEMA WC 26 - Wire and Cable Packaging.

- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code. (current version).
- D. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Products: Listed and classified by Underwriter's Laboratories Incorporated as suitable for the purpose specified and indicated.
 - 3. Perform Work that interfaces with Telephone Utility Company in accordance with Telephone Utility Company rules and regulations.
 - 4. Conform to current TIA standards and current BICSI TDMM for telecommunications installation.
- E. Fire Stopping:
 - 1. Fire stop penetrations of fire-resistive rated assemblies as specified in Section 078400 - Fire Stopping.
 - a. Installed Fire Stopping system shall be a complete UL Fire Stopping System. Installer must provide UL letter describing the suitability of installed UL Fire Stopping System prior to installation. S.T.I. "EZ-Path" Fire Stopping is preferred firestopping U.L. system.

1.3 PRE-CONSTRUCTION DESIGN REVIEW/MONTHLY STATUS MEETINGS

- A. Pre-Construction Design Review Meetings:
 - 1. Convene 30% Design Review meeting with Raleigh IT Service Center representative.
 - 2. Convene 70% Design Review meeting with Raleigh IT Service Center representative.
 - 3. Convene 95% Design Review meeting with Raleigh IT Services Center representative.
 - 4. Convene Issued for Construction (IFC) Design Review meeting with Raleigh IT Service Center representative.
 - 5. Require attendance of parties directly affecting Work of this Section. The USPS telecommunications system representative for Customer Service Facilities projects will be the Raleigh Information Technology Support Center (RITSC) Subject Matter Expert, Area Maintenance Representative, Local Maintenance Manager, and the District IS Manager or his representative.
 - 6. Review conditions of operations, procedures and coordination with related Work.
 - 7. Agenda:
 - a. Tour, inspect, and discuss building conditions relating to communications cabling and equipment.
 - b. Coordination with Telephone Utility Company (LEC) and the USPS telecommunications system representative will be by the Raleigh Service Center IT SME through the USPS Project Manager.
 - c. Review exact location of each network related item within building construction, casework, and fixtures and their requirements.
 - d. Review/Approve required Pre-Work Submittals.
 - e. Review Drawings and Specifications.
 - f. Review and finalize construction schedule related to voice and data installation, verify availability of materials, personnel, equipment and facilities needed to complete project and avoid delays.
 - g. Review required labeling process, inspections and testing.
 - h. Review cable routing and support.
- B. Convene re-occurring Monthly Status Meetings at the construction site with Local Maintenance Manager, Raleigh IT Service Center SME representative and District IS Mgr.

1.4 PRE-WORK SUBMITTALS

- A. All of the following are required to be submitted immediately after contract award to General Contractor/Low Voltage installer who will then submit to the Raleigh IT SME for approval. No work can proceed or materials ordered without Raleigh IT Service Center representative approving all submittals.
- B. Low Voltage company performing the cabling installation shall provide the following:
 - 1. Name of full time BICSI RCDD on staff and copy of RCDD certification which can be verified at BICSI.
 - 2. Name of full time BICSI TECH on staff and copy of TECH certification for the Lead Installer on this project. The BICSI certification should be verified with BICSI. This Lead Installer will be onsite the entire project, 5 days a week minimum.
 - 3. Name of full time BICSI Installers (INST1 minimum certified). At least 50% of onsite installers are required to be BICSI INST1 certified within the last 3 years.
- C. Lead Low Voltage installer name and install certifications.
- D. Low Voltage installer names with installer certifications for system being installed (50% of installers need current certification within 3 year period).
- E. Product Data: Provide detailed data sheet clearly showing manufacturer Unit Price, Total Price, Model Number, Part Number, color, length, quantity for each material or equipment item specified. Backbone copper, horizontal copper, patch panels, Bonding busbars, wire baskets, ladder trays, wire managers (horizontal and vertical), equipment racks, patch cords, fiber interconnect panels, UPS's, rack mounted power strips, etc. are products requiring mandatory Submittals. Every different type of material being used for the project must have an approved Submittal submitted to the RITSC SME.

1.5 LOW VOLTAGE CONTRACTOR COMPANY/RCDD/LOW VOLTAGE INSTALLER REQUIREMENTS

- A. Qualifications:
 - 1. Low Voltage Contractor Company - Contractor shall have a minimum of one BICSI certified Technician on the job site at all times with documented formal training in the installation of Category 6, Category 6A and LOMF fiber optic cabling systems. 50% of onsite Installers shall possess a certification for a total systems solution being installed from the manufacturer of the cabling and terminating hardware. The contractor must present these certifications to the Raleigh IT SME before beginning work.
 - 2. RCDD - General Contractor or Low Voltage Installer company must have a full time BICSI RCDD with current credentialing on staff.
 - 3. Installer: Company specializing in the installation of Category 6, Category 6A and Laser Optimized Multi-Mode (LOMF) fiber optic Structured Cabling Systems with minimum 5 years documented experience. Installation certification – 50% of Low voltage installers must be trained by the manufacturer and currently certified to install manufactures product line of copper/fiber wiring. Low voltage company must provide current installer certifications before doing any copper or fiber installations. This certification is part of the 15 year warranty.
 - 4. Lead installer must have a minimum of BICSI Technician Certification.
 - 5. Warranty: Total Systems Solution required providing minimum 15 year warranty from both manufacturer of cabling as well as connecting hardware when installed together according to predetermined manufacturers' specifications. Installer shall possess certifications from manufacturers of the components installed as a total systems solution and must present said certifications to the contracting officer through the USPS Project Manager in advance of beginning the Work.

1.6 LABELING

- A. Common Work Results for Electrical; furnish and install machine generated labels.
 - 1. Patch Panels and Outlet Faceplates: Display outlet or cable identification number in uppercase lettering on permanent machine generated adhesive label stock. Each individual port requires a

- port number label. The faceplate cannot be labeled as a range and expect the end user to know which port is which.
2. Label the Telecommunications Equipment Room as ER and TR's as 01, 02, 03, etc.
 3. Label all copper patch panel ports in a horizontal fashion left to right in numerical sequence. Example: If there are three 48 port copper patch panels in a rack, the ports are numbered consecutively from port 1 all the way through 144.
 4. Label Copper Patch Panel ports in the order the cables were terminated beginning with all T/O terminations in the order of Six-plexes, Quads and Triplexes.
 5. Label telecommunications outlet faceplate in the same manner as the patch panel.
 6. Display cable identification number in black uppercase lettering on machine generated permanent adhesive self-laminating label of contrasting color from cable sheath.
 7. Place labels on each end of cable, maximum 6 inches from cable termination.

1.7 POST-WORK SUBMITTALS

- A. Assurance/Control Submittals:
 1. Test Reports: Submit the following reports directly to Raleigh Service Center IT SME through the USPS Project Manager from Testing Laboratory, with copy to General Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.
 - a. End-to-end tests.
 2. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 3. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals. Deliver prior to Final Acceptance.
- C. Certification: Comprehensive test results for Category 6, Category 6A and fiber optic certification of cable plant per specifications of TIA/EIA-568-C, and all addendums. Immediately following new Category 6/6A copper and laser optimized multi-mode fiber installation, submit raw test results via e-mail to the Raleigh IT Service Center representative who will be performing copper and fiber site acceptance. All testing must be performed using an industry standard compliant test device. Test results must be furnished in format used by testing device. Vender generated spreadsheets or PDF's will not be accepted. No paper test results are ever acceptable. There is a USPS 10MB attachment limit. There should never be test results over 10MB. USPS cannot access DropBox.
- D. Project Record Documents: Accurately record the following:
 1. Cable pulling schedules, in printed form on CD-ROM.
 2. Cable routings (as-built drawings) shall be provided with cable plant depicted on floor plans prior to acceptance. The drawings must identify location of all T/Os (Telecommunications Outlets), TR/TE's (Telecommunication Rooms / Enclosures), Consolidated Computer Room (CCR) and any other installed component of the cabling solution. The actual routing of the cable bundles (pathways) and backbone cables on the floor plans shall also be shown. Provide master overall set plus one set for each TR/TE which will detail T/O's and CP's served by that TR/TE. As-built drawings will be provided to USPS IT by the installing Contractor electronically in a USPS compatible version of AutoCAD on a CD-ROM.
 - a. Labeling shall conform to the USPS labeling guidelines. For simplicity, all 48 port Copper Patch Panels in the CCR, TR's or TE's shall be labeled 1 thru the end port number. For any questions, contact RITSC SME for clarification.
 - b. A detailed cable termination record will be provided in sufficient detail, so that:
 - 1) Telephone Utility Company or telephone interconnect company can install cross connects.
 - 2) Postal Service users can install and maintain patch cords at patch panel fields.
 - 3) The location and size of the service entrance conduits are known.

- E. Operations and Maintenance Data: Data including wiring diagrams, parts lists, shop drawings, product data, manufacturer's instructions for cables and equipment and certifications identified above shall be provided.
- F. Manufacturers 15 year warranty for Fiber and Copper and all termination components.

PART 2 - PRODUCTS

2.1 CONDUITS, BOXES AND TRAYS

- A. Specified in Section 260533 - Raceway and Boxes for Electrical Systems.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

3.2 INSTALLATION GUIDELINES

- A. Special Requirements for Cable Routing and Installation:
 - 1. The majority of the structured cabling system wiring in this building will be installed above ceilings without conduit. All cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed.
 - 2. Sealing of openings between floors, through rated fire and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the contractor. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.
- B. Support cables installed in ceiling spaces with Category 6/6A compliant, wide-base J-hooks suspension devices, anchored to building structural steel (red iron).
 - 1. Minimum and Maximum spacing between supports: 4 feet.
 - 2. Maximum Number of 4 Pair Cables per Support: 25.
 - 3. Furnish and install additional supports as required.
 - 4. Install complete cable support device system before starting installation of cable.
 - a. Installation of cable before completion of support system not permitted.
 - b. Unsupported cable shall not be permitted.
 - 5. Organize and group cables. Install cable group as single run through ceiling spaces following column and building lines. Do not install cable group runs diagonally across center of building.
 - 6. Install armored fiber optic cabling in cable tray or approved support solution.
 - 7. Cabling shall not be suspended from any electrical conduits, HVAC ducts, sprinkler systems, gas, or water pipes, etc.
 - 8. Cabling shall not be attached to suspended ceiling grid system.
 - 9. Cabling system shall be installed in approved suspension devices for telecommunications cabling.
 - 10. Vertical runs of backbone and horizontal cables (e.g.: cables exiting thru-wall penetrations) shall be equipped with factory manufactured cable drop out fittings and kellums cord grips to properly support the cables at the vertical bends.

- C. Cable trays shall be required for areas of heavy cable concentration including but not limited to the “ER” and TRs.
1. Maximum spacing between each cable tray support: Specified by manufacturer of cable tray.
 2. Maximum number of cables supported by cable tray: Specified by manufacturer of cable tray not-to-exceed 40% fill ratio.
 3. Install complete cable tray system before starting installation of cable.
 - a. Installation of cable before completion of tray system not permitted.
 - b. Cabling shall not be bundled within cable tray.
 - c. Provide factory manufactured cable drop-out fittings for transportation of cabling entering or exiting the cable tray.
 4. Cable/Ladder trays, wire mesh tray or solid bottom cable tray shall be provided as specified in USPS CSF specification section 260533, paragraph 2.12.
- D. Cabling routed underground, exterior of the building, through inaccessible ceilings or less than 10'-0" A.F.F. in the workroom shall be contained in conduit. Provide flush boxes within finished areas and surface mounted, cast aluminum, “FS” factory boxes in unfinished areas. Provide 1" conduit risers with 90 degree bend and bushing for all T/O's.
1. Conduit/EMT, cable tray or wire basket shall be used in the ceiling of the work room floor or wherever a suspended ceiling system is not present.
 2. All conduit stubs must have a plastic bushing/collar installed at each end.
 3. All conduit runs require an accessible pull-string in each conduit.
 4. Interior conduits shall be a minimum of 1" diameter. Conduits shall adhere to the 40% fill ratio.
 5. No conduit is to be buried in the slab.
 6. There shall be no more than 180 degrees of bend in a conduit longer than 30 feet. All conduits that are comprised of more than two (2) ninety degree bends or a reverse bend shall have a properly installed pull box. Pull boxes shall be 12" x 12" x 6" for up to 1" EMT, 18" x 18" x 8" for up to 1-1/2" EMT. Ninety degree bends in fiber runs shall be installed using dual forty-five degree bends.
 7. Under no circumstances shall a pull box be used to change direction of a conduit. All conduits shall be installed in a manner so that cabling passes directly through the pull box without changing direction.
 8. Underground service and interbuilding conduits shall be a minimum of 4 inch diameter, buried minimum of 24" BFG, equipped with heavy wall rigid galvanized steel conduit elbows and risers and marked with red magnetic warning tape, refer to Module 1, 5-2.7.2. Conduits shall adhere to the 40 per cent fill ratio and shall be provided with mesh innerduct and individual pull strings.
- E. Route cable for T/O (telecommunications outlets) as follows:
1. Wall Mounted: Through ceiling spaces to conduit stub-ups or junction boxes. Include drag lines.
 2. Furniture System Cable Raceway: Point of entry to outlet.
 3. Floor Outlet Box: Through under floor conduit to box. (This method is highly discouraged and requires approval from Raleigh IT SME.)
 4. Column Mounted-Workroom Floor: Through surface mount conduit stubs to junction box or cable tray.
 5. Telecommunications Equipment Room: Along ladder rack from rack to locations to be run in ladder tray / basket tray.
- F. Separate communications cables from other cables and fixtures minimum distance as follows:
1. Non-Shielded Electrical Cables: 12 inches.
 2. Fluorescent Light Fixtures: 12 inches.
- G. Cross electrical cables with communications cables at 90 degrees only. Data cables shall not run parallel with electrical cables, unless separated by 12 inch minimum.
- H. Comply with cable manufacturers minimum bend radius requirements. For Category 6/6A, minimum bend radius shall be no less than 4 times diameter of outer sheath of cable. For Fiber Optic cabling, minimum bend radius shall be no less than 10 times diameter of outer sheath of cable.
1. Do not stretch, stress, tightly coil, bend or crimp cables.

2. Replace cables that are severely stressed during installation at no additional cost to United States Postal Service.
 3. Any armored cable that has had its armor sheathing broken shall be replaced in its entirety, end to end at no additional cost to USPS.
- I. Cabling installed in plenum or non-plenum air returns.
1. **Plenum Environments:** If the majority of the area for the cabling installation is deemed to be a return air plenum, all components of the installation in those areas shall be rated for the plenum environment in which they are installed. There shall be no installation of any non-plenum component of this cabling system in the plenum environment unless those components are enclosed in such a manner as to maintain the integrity of the plenum environment. If the area beneath a raised floor is considered a plenum environment, there shall be no installation of any components of the cabling system that are not rated for a plenum environment unless they are completely enclosed in such a manner as to maintain the integrity of the plenum environment. This includes, outlets, jacks, patch cords, copper or fiber cabling or any other component that are not rated for installation in a plenum environment.
 2. **Non-Plenum Environments:** The work room floor is considered a non-plenum environment and all components of the Structured Cabling System shall be rated for installation in non-plenum area. If, at any point, the non-plenum cabling enters or passes through a plenum area, the cabling shall be encased in a continuous EMT conduit pathway throughout the entire plenum area.
- J. Cable Run Lengths: Route cables so that cable run length does not exceed recommended maximum distance.
1. UTP cabling from the back of the patch to the Telecommunications Outlet (T/O) is limited to a maximum total run of 90m (295 feet).
 2. Cable conductors shall be continuous ("Homerun") from originating termination equipment to destination termination equipment.
- K. Cables: Furnish and install communications cables as specified, in accordance with Cable Pulling Schedules, manufacturer's published instructions, TIA-568-C including all addendums and as indicated on Drawings.
1. Dress cable to final location, remove sheath to point allowing splaying of conductor, and terminate. Make each termination uniform and precise. Hook and Loop "velcro" cable ties shall be used for bundling and dressing all cabling. No nylon zip ties shall be used for cable bundling or attachment. No wire managers will be used/substituted for Strain Relief Bars.
 2. Maintain sheath integrity. Remove minimum amount of sheath required for termination up to a maximum of 1 inch.
 3. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify, or add to manufacturer's twisting of cable. Do not untwist more than ½ inch of the stripped cable.
 4. Label each end with a machine generated, self laminating label.
 5. Mechanical couplers or splices not permitted in copper cabling.
 6. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 3 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturer's instructions.
 7. When installing Armored Fiber Optic cabling, proper telecom bonding techniques to bond the metallic member of the Armored Fiber Optic Cable must be maintained. Armored fiber will be bonded on the ER/TR end only to the "PBB" or "SBB".

END OF SECTION

SECTION 271100

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured wiring system components:
 - 1. Table of Contents.
 - a. Open Relay/Equipment Racks for ER/TR's.
 - b. Cat6 / Cat6A (Wireless) 110 Style Copper Patch Panels.
 - c. Wire Management Panels.
 - d. PPB for TEF/ER.
 - e. SBB for TR.
 - 2. Telecommunications Equipment Room (ER).
 - 3. Telecommunications Room (TR).
- B. Related Documents:
 - 1. Specified in Section 270500 - Common Work Results for Communications.
- C. Related Sections
 - 1. Sections 096536 - Static Control Resilient Flooring.

1.2 REFERENCES

- A. Specified in Section 270500 - Common Work Results for Communications.

1.3 SUBMITTALS

- A. Specified in Section 270500 - Common Work Results for Communications.

1.4 QUALITY ASSURANCE

- A. Specified in Section 270500 - Common Work Results for Communications.

PART 2 - PRODUCTS

2.1 OPEN EQUIPMENT / RELAY RACKS WITH VERTICAL WIRE MANAGERS FOR ER/TRs

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Chatsworth Products, Inc.
 - 2. CommScope Uniprise
 - 3. Hoffman
 - 4. Ortronics (Legrand)
 - 5. Panduit
 - 6. Rittal
 - 7. Product options and substitutions. Substitutions: Not permitted.

- B. Constructed of aluminum extrusion framework. Dimensions: 84 inch high x 3 inch deep x 19 inch wide. Double sided, 12/24 tapped holes with universal EIA rack unit spacing. Black or Aluminum finish.
 - 1. Each equipment rack shall have two double depth vertical cable managers: Dimensions: No less than: 6 inch x 6 inch x 78 11/16 inch for the front side of the relay rack and no less than 6 inch x 6 inch x 78 11/16 inch for the back side of the relay rack. Black or aluminum finish. Attach to sides of relay racks. Must be able to cover and conceal patch cabling. Each end rack will have outside double depth vertical wire managers attached to each outside end.
 - 2. Each equipment rack shall be connected to the overhead cable tray/wire basket system for added rigidity. Equipment racks shall be properly supported to avoid wobbling.
 - 3. Vertical and horizontal wire managers shall be equipped with opaque covers to completely conceal the patch cords.

2.2 CATEGORY 6/6A, 8-PIN MODULAR IDC "110" STYLE PATCH PANELS FOR ER/TRs

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. CommScope Uniprise
 - 2. Hubbell, Inc.
 - 3. Ortronics (Legrand)
 - 4. Panduit
 - 5. Product options and substitutions. Substitutions: Not permitted.
- B. 48-port/24-port (Wireless) Copper Patch Panels:
 - 1. Rack mounted 48 port 8-pin modular, Category 6/6A (Wireless), non-keyed.
 - 2. Complies with ANSI/TIA/EIA-568-C "T568A" pinning configuration.
 - 3. Install manufacturer supplied strain relief bar assemblies for every 24 and 48 port rear copper terminations. Secure Cat. 6/6A cable with Velcro straps. Plastic tie wraps are not acceptable.

2.3 WIRE MANAGEMENT PANELS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Chatsworth Products, Inc.
 - 2. CommScope Uniprise
 - 3. Leviton
 - 4. Ortronics (Legrand)
 - 5. Panduit
 - 6. Product options and substitutions. Substitutions: Not permitted.
- B. Cable Management Panels: Rack mounted horizontally and vertically. USPS has final say on how each equipment rack is laid out. Ensure Raleigh IT contact approves of all Rack Elevations well before Issued for Construction (IFC) drawings are distributed. See latest USPS Best Practices document (located on most current BDS DVD – folder F) for guidelines on rack layouts.
 - 1. Horizontal management panel for use at top of each ER equipment rack will be Quantity (1) one 2RU panel along the top of each equipment rack. See USPS Best Practices Diagram – Latest Version.
 - 2. Horizontal management panels for use at top of TR equipment racks will be one (1) 2RU panel along the top of each equipment rack. See USPS Best Practices Diagram – Latest Version. Note that this management panel is not required for single equipment rack installations.
 - 3. Each vertical wire management panel will be at least 6" x 12" deep on the front side and at least 6" x 12" deep on the back side of the equipment rack to form a Full Height Double-depth Vertical Wire Management system. No exceptions.

2.4 PRIMARY BONDING BUSBAR - PBB for TEF/ER (REFER TO TIA-607-C)

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Harger. P/N GBI14412TMGB
 - 2. Chatsworth – P/N 40158-012
 - 3. Legrand
 - 4. Product options and substitutions. Substitutions: Not Permitted.
- B. Provide and install one PBB at the Telecom Entrance Facility (TEF) below ceiling acoustic tile with all bonding leads clearly labeled by machine labeler. All bonding leads are 2 hole compression lugs. This PBB shall be bonded to the building grounding electrode system using minimum #2/AWG/CU conductor. Size according to number/size of Telecom Bonding Backbone (TBB) leads being attached to the PBB. Minimum size will be 4"H x 0.25"W x 12"L. The PBB shall be mounted as close as possible to the building grounding electrode system busbar to keep the Telecom Bonding Conductor (TBC) as straight and as short as possible.
 - 1. Typically the TEF is located adjacent to the MC rack(s) within the ER of a "CSF". Therefore the Primary Bonding Busbar (PBB) located at the TEF can be utilized for bonding of the ER in this application.
- C. Each (2) lug compression connector shall have anti-oxidant coating applied to lug and busbar prior to attachment.
- D. The maximum value of resistance between any point in the Telecommunications bonding system and the building electrical grounding electrode system shall be (1) ohm. This resistance value shall be tested and certified, in the presence of the Raleigh IT SME, by an independent 3rd party testing agency, prior to applying power to any telecommunications equipment.

2.5 SECONDARY BONDING BUSBAR – SBB FOR ER, TR's (REFER TO TIA-607-C)

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Harger – P/N GBI/14212
 - 2. Chatsworth – P/N CPI 13622
 - 3. Legrand – P/N OR-GB2X12TGB
 - 4. Product options and substitutions. Substitutions: Not Permitted.
- B. Provide and install one SBB in the ER and in every TR below ceiling acoustic tile with all bonding leads clearly labeled by machine labeler. All bonding leads shall be 2 hole compression lugs. This SBB will connect to the PBB using minimum of #6/AWG/CU via Telecom Bonding Backbone (TBB). Size accordingly to number/size of ground leads being attached to SBB. Minimum size will be 2"H x 0.25"W x 12"L.
 - 1. Provide Secondary Bonding Busbar (SBB) within the ER, if the ER and the Telephone Entrance Facility (TEF) are located remote from each other. The SBB shall be bonded to the PBB using a minimum #6/AWG/CU bond conductor. The SBB shall be utilized for all bonding needs within the ER.
- C. Each (2) lug compression connector shall have anti-oxidant coating applied to lug and busbar prior to attachment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. ER (Telecommunications Equipment Room):

1. Furnish, install, and bond, floor mounted, 84 inch high x 3 inch deep x 19 inch wide relay racks shoulder-to-shoulder separated by 6 inch wide, double depth, full height, vertical wire managers perpendicular to wall housing plywood backboards.
 - a. Mount relay racks in a "side by side" fashion with one double-depth vertical wire management channel between each rack, and one double-depth wire management channel on outside side rail of both end racks.
 - 1) Place one 2RU horizontal wire manager at the top of each rack, if more than one rack is required.
 - 2) Supply four (4) 1RU wire managers for each rack containing 48 port patch panels for USPS use. These (4) 1RU wire managers are in addition to the 2RU wire managers placed between the patch panels and at the top of each rack.
 - b. Sections of 12 inch wide ladder or basket tray shall be mounted to top of relay rack(s) and extend to plywood backboard or other ladder or basket tray for each relay rack installed. This tray serves as additional support for relay racks as well as cable routing from relay rack to backboard.
 - c. Each rack will receive a separate #6 AWG bond wire homerun to the SBB or PBB in the ER.
 - d. Each rack shall be equipped with a factory manufactured power strip equipped with (12) NEMA5-15R receptacles. Rack mount each power strip in the middle of each equipment rack. Preferred rack mounted power strip: Tripp-Lite #RS-1215-RA.
 - e. Each rack shall be provided with an installation kit and isolation pads for securing and isolating the rack to and from the floor.
2. Furnish and install three (3) 4 ft. x 8 ft. plywood backboard(s) along walls behind and perpendicular to ER rack(s).
 - a. Plywood: 48-inch x 96-inch x 3/4-inch A/C rated (A = smooth side; C = slight blemishes against wall), fire rated, void-free, smooth side out. Absolutely no knot holes or voids shall be visible on outer face of plywood, anywhere.
 - b. Install plywood with long dimension in vertical orientation with bottom of sheet 8 inches AFF.
 - c. Field paint with white or gray enamel fire resistant paint prior to installation of equipment.
 - d. Furnish and install an industry approved Secondary Bonding Busbar SBB (per 2.4 B.1 and 2.5 B.1) and attach minimum #6 AWG bonding conductors using 2 hole compression type fittings for all bonding needs within the ER. All bonding cable connections shall be clearly labeled on the SBB indicating where the connection is coming from/going to via machine made labels. All metallic components of ER shall be bonded to install Secondary Bonding Busbar SBB. Interconnect the SBB to the PBB utilizing minimum #2/AWG/CU bonding conductor.
3. Install 12 inch wide ladder rack/basket tray with 2 inch side bars the entire width of plywood back boards at 7'-6" to 8 feet AFF (Racks are 84 inches high).
 - a. Furnish and install 12 inch wide ladder rack/basket tray with 2 inch side bars at 7'-6" to 8 feet AFF between plywood backboards and relay racks (racks are 84 inches high). All sections of ladder rack and or basket tray shall be joined with manufacturer approved devices. No sections of ladder rack or basket tray shall be zip tied together. All sections of ladder rack and/or basket tray will be grounded or bonded. All wall connections will be made with factory wall mounts. No homemade connectors are permitted.
 - b. Provide (2) factory manufactured cable "drop out" fittings at each rack within the "ER".
4. Install number of Category 6 48-port patch panels in relay rack(s) that the 4-pair cables serving only the ER are to be terminated.
5. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 10 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturers' instructions.

6. All metallic ladder tray, basket tray, equipment racks and enclosures shall be bonded using a #6 AWG stranded bond wire with green insulation using 2 hole compression type fittings approved for basket tray installation. All painted surfaces shall be fully burnished for paint removal to achieve maximum bond connection. Provide all UL documentation on how the support system should be bonded to form a system.
7. All bonding in ER shall be made at the SBB installed by the contractor. This SBB shall be below the acoustic ceiling if one is installed and all bond wires will be on two lug compression fitting with full machine made labeling clearly showing where the bond originates.
8. Contractor shall provide enough 12/24 mounting screws or screws/square cage nuts for (32) connections per equipment rack in the ER and each TR rack for installation of USPS PFE active electronic components. Example: If 8 new relay racks are installed, provide (256) 12/24 pitch screws or 256 square cage nuts.

B. Telecommunications Room (TR):

1. Furnish and install appropriate number of 4-pair Category 6 UTP cables from each office area and workroom column mounted T/O (Telecommunications Outlets) to Telecommunications Room (TR) as indicated on drawings.
2. Furnish and install two (2) each 4-pair Category 6A UTP cables from each Wireless Access Point (WAP) to Telecommunications Rooms as indicated on drawings to 24 port Category 6A copper patch panels.
3. Provide a minimum 20 foot service loop in a figure eight coil, in the ceiling/wire basket for all copper cables terminated in TR's.
4. Furnish, install, and bond, floor mounted, 84 inch high x 3 inch deep x 19 inch wide relay racks shoulder-to-shoulder, separated by double-depth vertical wire managers, perpendicular to wall housing plywood backboards with double-depth vertical wire managers on each outer end of equipment racks.
 - a. Rack will be used to house fiber/copper wiring and PFE.
 - b. Allow minimum (16) empty rack units per rack for PFE data equipment.
 - c. Provide (1) factory manufactured cable drop out fitting at each rack within the "TR".
 - d. Each rack shall be equipped with a rack mounted power strip equipped with (12) NEMA5-15R receptacles. Mount power strip below last 48 port copper patch panel. Preferred; Tripp-Lite #RS-1215-RA.
 - e. Each rack shall be provided with an installation kit and isolation pads for securing and isolating the rack to and from the floor.
5. Furnish and install one 2RU rack mounted wire manager at top of rack.
6. Furnish and install one rack mounted, 24 strand fiber optic interconnect center below 2RU wire manager.
7. Furnish and install one 1RU rack mounted, 24 pair Cat3 or Cat5e Copper Patch Panel for Analog Voice connections below the fiber optic interconnect panel.
8. Furnish and install needed 48-port Copper Patch Panels separated by 2RU Wire Managers.
9. Furnish and install one (1) plywood backboard on one wall of Telecommunications Room.
 - a. Plywood: 48-inch x 96-inch x 3/4-inch A/C rated (A = smooth side; C = slight blemishes against wall), fire rated, void-free, smooth side out. Absolutely no knot holes or voids shall be visible on outer face of plywood, anywhere.
 - b. Field paint with white or gray enamel fire resistant paint prior to installation of equipment.
 - c. Install plywood with long dimension in vertical orientation with bottom of sheet 8 inches AFF.
 - d. Each rack shall be equipped with separate #6 AWG bond conductor homerun to the Secondary Bonding Busbar (SBB).in that ER.
 - e. Furnish and install an industry approved Secondary Bonding Busbar (SBB) and attach minimum #6 AWG bonding conductors using 2 hole compression type fittings for all bonding needs with the TR. All bonding cable connections shall be clearly labeled on the SBB indicating where the connection is coming from/going to via machine made labels. All metallic components of the "ER" shall be bonded to the installed Secondary Bonding Busbar (SBB). Interconnect the SBB to the PBB utilizing minimum #6/AWG/CU bonding conductor.

10. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 10 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturers' instructions.
 11. Provide a minimum of one 3KVA (120V – input/output) uninterruptible rack mounted power supply with 30 minute battery reserve rack mounted in each TR. Mount on the lowest RU of the right-most open relay rack and ensure power plug is wired as NEMA 5-30P, 3 wire.
 12. Contractor shall provide enough 12/24 screws or screws/square cage nuts for 32 connections per rack for the installation of USPS PFE active electronic components. Example: If 2 new relay racks are installed, provide 64 12/24 pitch screws or (64) square cage nuts/screws.
- C. Patch Panels: Install 24-port and 48-port, 8-pin module Category 6/6A patch panels at main cross-connect and horizontal cross-connect for termination of cables installed as part of Work of this Section.
1. Install patch panels on floor mounted 19 inch wide by 84 inch high open relay racks at ER and TR room locations only.
 2. Furnish and install wire management panel (2RU) on rack or cabinet mounting rails above and below each patch panel for all locations.
 3. Furnish 6 additional 1RU wire managers to be used in between PFE.
 4. Furnish manufacturers strain relieved bars sufficient to maintain UTP bend radius at rear of panels.
 5. Terminate all 4 pairs of each horizontal 4 pair cable to each 8 pin ("T568A") patch panel port.

3.2 CONSTRUCTION

- A. Specified in 270500 - Common Work Results for Communications.

3.3 FIELD QUALITY CONTROL

- A. Specified in 270500 - Common Work Results for Communications.

END OF SECTION

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Last revised: 8/2/2018

SECTION 271300

COMMUNICATIONS BACKBONE CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured wiring system components:
 - 1. Communication cable.
 - 2. Termination equipment.
 - 3. Patching equipment.
 - 4. Fiber optic cabling.
- B. Related Documents:
 - 1. Specified in Section 270500 - Common Work Results for Communications.
- C. Related Sections:
 - 1. Specified in Section 270500 - Common Work Results for Communications.

1.2 REFERENCES

- A. Specified in Section 270500 - Common Work Results for Communications.

1.3 SUBMITTALS

- A. Specified in Section 270500 - Common Work Results for Communications.

1.4 QUALITY ASSURANCE

- A. Specified in Section 270500 - Common Work Results for Communications.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver in accordance with NEMA WC 26.

PART 2 - PRODUCTS

2.1 CONDUITS, BOXES AND CABLE TRAYS

- A. Specified in Section 260533 - Raceway and Boxes for Electrical Systems.

2.2 OM4 ARMORED BACKBONE LOMF

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Belden
 2. Berk-Tek
 3. CommScope Uniprise
 4. Corning Cable Systems - Preferred
 5. General Cable
 6. Leviton
 7. Optical Cable Corp.
 8. Ortronics (Legrand)
 9. Superior Essex
 10. Product options and substitutions. Substitutions: NOT permitted.
- B. Conductors: 24 / 48 strand.
1. Terminate fiber strands onto "SC" ports, vertically mount, ports 1 through 12, left to right. No deviation allowed.
 2. Fiber strands are required to be installed on (1) one 1RU Fiber Optic Interconnection panel, ports 1-12, no exceptions.
 3. The same port layout orientation must be preserved on the far end strand terminations. All ports must be installed vertically. No horizontal orientation allowed. No exceptions.
 4. All individual Armored Fiber runs are required to be bonded on the ER end only, connected to the SBB in the ER and clearly labeled with machine labels.
 5. All backbone fiber strands shall be installed using reverse-pair positioning which allows the use of A-B fiber patch cords. Refer to ANSI-TIA-568.3.D, Annex C.
 6. Provide individually insulated plenum rated strands under common plenum rated sheath unless entire cable is contained within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
 7. Complies with individual characteristics established in TIA-568-C including all addendums for fiber optic cable performance specification.
 8. All underground fiber cable shall be indoor/outdoor rated. Loose tube fiber cable, if utilized, shall be equipped with furcation kits.

2.3 FIBER OPTIC RACK MOUNT INTERCONNECT CENTER

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. CommScope Uniprise
 2. Corning Cable Systems - Preferred
 3. Ortronics (Legrand)
 4. Panduit
 5. Product options and substitutions. Substitutions: Not permitted.
- B. Enclosure connector and adapter panels:
1. SC type laser optimized connectors
 2. 12 port coupler panels with SC connectors; 18 port panels are not acceptable.
 3. Each rack mount enclosure used in ER/TR will be 1.75 inches (1 Rack Unit) with (1) 12-port SC/SC style laser optimized coupler panels to house the backbone fiber. The "ER" and each individual TR will receive a dedicated rack mount enclosure.
 4. Complies with TIA-568-C specification.

2.4 OM4, OS1, OS2 FIBER OPTIC PATCH CORDS: 2 STRAND, TIGHT BUFFERED

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Belden

2. Berk-Tek
3. CommScope Uniprise
4. Corning Cable Systems – Preferred
5. General Cable
6. Leviton
7. Optical Cable Corp.
8. Ortronics (Legrand)
9. Superior Essex
10. Product options and substitutions. Substitutions: Not permitted.
11. Fiber cord manufacturer shall be the same manufacturer furnishing the backbone fiber. Mixing of manufacturers is not acceptable.

B. Fiber optic duplex patch cords.

1. USPS to specify connector type and length for patch cords based on the total number of fiber ports being installed. Connectors could be SC/LC, SC/SC or LC/LC.
2. Complies with individual characteristics established in TIA-568-C including all addendums for fiber optic patch cable performance specification.
3. Patch cords shall be factory made and factory tested individually, and factory wrapped within non-clear plastic bags. The plastic bag shall clearly identify the manufacturer/testing agency with silk screen on the outside and shall contain the cable test results. Plastic bags shall have perforated or zip-lock top for easy removal of cord. Clear plastic, unlabeled bags are not permitted.
4. Contractor shall provide fiber patch cords for 75 percent of the total fiber ports installed. Example: (50) Duplex fiber ports (100 strands) installed, provide (75) Duplex fiber patch cords. All fiber patch cord colors, lengths and quantities shall be determined by Raleigh IT SME.
5. Fiber optic patch cord connector types, lengths, and quantities shall be specified by U.S. Postal Service personnel prior to procurement.
6. Match performance characteristics of installed fiber optic backbone.

2.5 CATEGORY 3/5e BACKBONE (RISER) CABLING (FOR TR CABLE APPLICATIONS ONLY)

A. Manufacturers:

1. Belden
2. Berk-Tek, Inc.
3. CommScope Uniprise
4. General Cable
5. Mohawk/CDT
6. NORDX/CDT
7. Superior Essex
8. Tyco Electronics AMP NETCONNECT
9. Product options and substitutions. Substitutions: NOT permitted.

B. Conductors: 25 pair twisted – 24 AWG, solid copper.

1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is contained with conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
2. Complies with individual characteristics established in TIA-568-B for Category 3/5e cable performance specification.
3. Nominal Impedance: 100 ohms plus or minus 15 percent.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Specified in Section 270500 - Common Work Results for Communications.

- B. Identification:
1. See Section 270500 - Common Work Results for Communications for additional requirements.
 2. Fiber Optic Interconnect Centers: Display ER/TR and cable strand identification numbers in uppercase lettering, or numbers on permanent adhesive label stock.

3.2 FIBER OPTIC TESTING

- A. 10Gb 50/125 micron OM4 Laser Optimized Multi-Mode Fiber (LOMF) Optic Cable Testing.
1. Fluke testers are the only allowed fiber tester manufacturer. Tester must be Encircled Flux Compliant.
 2. Test Reference Cords (TRC's) must be used. Test Reference Cord verification must be shown in the final test result submission.
 3. Tier 1, Tier Method B (one jumper) and Tier 2 OTDR testing is required. The Tier 2 OTDR requires bi-directional testing.
 4. The installer shall Set a Reference based on Method B (Single Jumper) which includes both mated connector losses and the loss of the link under test.
 5. The installer shall perform Tier 1 Testing with Optical Loss Test Set (OLTS) that includes testing for length.
 6. The installer shall perform Tier 2 testing with OTDR to show all splices.
 7. The supplier shall perform Bi-directional testing on all installed fiber optic cabling. Supplier test equipment shall perform testing of fiber in accordance with the fiber type being tested, 10Gb 50/125 micron laser optimized multi-mode using the procedures outlined in TIA-568-C.0 and TIA-526-14-A, Method B for Multimode fiber (One Jumper/Two Adapters), TIA-526-7 for Single mode fiber.
 8. The fiber testers and test heads shall have passed calibration within one year of actual test date. Any calibration in excess of one year is not acceptable. Each test set and fiber head must have the recent calibration paper printout from the calibration lab for inspection by USPS, prior to testing. The calibration printout must show actual serial numbers of test sets (main and remote and each fiber tested).
 - a. The current calibration for the main and remote fiber units MUST be supplied to Raleigh IT SME PRIOR to any testing.
 - b. USPS RITSC representative will determine test labeling format inside the fiber tester prior to actual testing. The Main Unit must be in the ER or "MC".
Example for fiber strand test: ER to TR 1-01 14 (for strand 14), or MC to HC 1-01 14 (for strand 14). All fiber strands will be tested bi-directionally. Any fiber test results that only show testing in one direction will be rejected.
 9. Multimode fiber optic cable shall be tested bi-directionally at wavelengths of 850nm and 1300nm.
 10. Cable tester test parameter shall be set to correct values for:
 - a. Actual manufacturer of fiber being installed. Tester cannot be a generic 10Gb fiber type and must be specific to the manufacturer's model of fiber cable being tested.
 - b. Index of Refraction based on manufacturer specifications for cable type being tested.
 - c. Quantity of adapters (typically 2). Test Method B. One Jumper, 2 adapters.
 - d. Fiber Type.
 - e. Test to Tier 1 as mandated by TIA-568-C.0.
 - f. Preferred tester is Fluke Versiv series with Encircled Flux.
 11. The Low Voltage Installer shall provide all Fiber tests in one, single file. No multiple files will be accepted.
 12. The Supplier shall review test settings with the USPS technical representative. Supplier shall have cable specifications on site for USPS technical review to verify settings are correct on test equipment.
 13. Fiber optic cables shall pass all attenuation tests referenced to formulas presented in the listed standards.
 14. Perform end-to-end tests of each fiber optic backbone cable as follows (applies to ER and TR applications only):
 - a. Tier 1 Test: Light Source Power meter tests per TIA-568-C specification.

- b. Optical Time Domain Reflectometer (OTDR) tests per TIA-568-C specification including all addendums.
 - c. Both the Tier 1 test and the Tier 2 OTDR test results must be uploaded to the "Link Ware Live" cloud based repository for USPS RITSC access.
 - d. Performing one test and not the other does not satisfy a complete fiber test. Both tests must be submitted in one file, all at the same time.
 - e. Measured effective cable run length.
- 15. Optical photographs of each fiber end shall be submitted for documentation and warranty purposes.

3.3 CONSTRUCTION

- A. Specified in Section 270500 - Common Work Results for Communications.

3.4 FIELD QUALITY CONTROL

- A. Specified in Section 270500 - Common Work Results for Communications.

END OF SECTION

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SECTION 271500

COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured wiring system components:
 - 1. CAT 6/6A copper communication cable.
 - 2. Termination equipment.
 - 3. Patching equipment.
 - 4. CAT 6/6A copper testing.
- B. Related Documents:
 - 1. Specified in Section 270500 - Common Work Results for Communications.
- C. Related Sections:
 - 1. Specified in Section 270500 - Common Work Results for Communications.

1.2 REFERENCES

- A. Specified in Section 270500 - Common Work Results for Communications.

1.3 SUBMITTALS

- A. Specified in Section 270500 - Common Work Results for Communications.

1.4 QUALITY ASSURANCE

- A. Specified in Section 270500 - Common Work Results for Communications.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver in accordance with NEMA WC 26.

PART 2 - PRODUCTS

2.1 CATEGORY 6/6A (CATEGORY 6A IS FOR WIRELESS USE ONLY) HORIZONTAL CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Belden
 - 2. Berk-Tek
 - 3. CommScope Uniprise
 - 4. General Cable

5. Leviton
6. Ortronics (Legrand) - Preferred
7. Panduit
8. Product options and substitutions. Substitutions: Not permitted.

- B. Conductors: 4 twisted pair -minimum 24 AWG, solid copper.
1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
 2. Complies with individual characteristics established in TIA-568-C and all addendums for Category 6/6A cable performance specification.
 3. Nominal Impedance: 100 ohms plus or minus 15 percent.
 4. Certified and capable of performing to a minimum of 250 MHz.

2.2 CATEGORY 6/6A / (CATEGORY 6A WIRELESS USE ONLY), COPPER PATCH CORDS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Belden
 2. Berk-Tek
 3. CommScope Uniprise
 4. General Cable
 5. Leviton
 6. Ortronics (Legrand) - Preferred
 7. Panduit
 8. Product options and substitutions. Substitutions: Not permitted.
- B. Conductors: Straight through type 4 twisted pair minimum 24 AWG, stranded copper.
1. Terminated with male 8-pin modular plugs.
 2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6/6A cable performance specification.
 3. Nominal Impedance: 100 ohms plus or minus 15 per cent. Certified and capable of performing to a minimum of 250 MHz.
 4. Match performance and impedance characteristics of the installed horizontal unshielded twisted pair cable.
 5. Contractor shall provide Category 6/6A copper patch cord for 75 percent of the total copper ports installed. Example: (96) copper ports installed, provide (72) Category 6/6A copper patch cords. Contractor shall provide manufacturer terminated patch cables. All copper patch cord colors and lengths shall be determined by Raleigh IT Service Center SME.
 6. Each patch cord shall have a plastic arch for ease of removal of the connector (rubber boots are not acceptable). Preferred Copper Patch type: Ortronics (Legrand) #OR-MC615-06.
 7. Patch cords shall be factory made, tested and individually factory wrapped within non-clear plastic bags. The plastic bag shall clearly identify the manufacturer/testing agency with silk screen on the outside and shall contain the cable test results. Plastic bags shall have perforated or zip-lock top for easy removal of cord.
 8. All Category 6A wireless patch cords will be white in color. All WAP Category 6A patch cords will be 3 ft. on the WAP end.
- C. Connector:
1. 8-pin modular, Category 6/6A, non-keyed.
 2. Complies with TIA-568-C "T568A" pinning configuration.
 3. Color: Clear.

2.3 OUTLET FACEPLATES/MOUNTING FRAMES

- A. Wall mounted, or raceway mounted outlet faceplates or mounting frames, suitable for the following:
 - 1. Mounting required number of 8-pin modular connectors.
 - 2. Use with approved 8-pin modular connectors.
 - 3. Installation over single gang junction box, double gang junction box, or raceway knockout as indicated on Drawings.
- B. Color: White with Machine manufactured permanent labeling with Black lettering.

2.4 CONDUITS, BOXES AND CABLE TRAYS

- A. Specified in Section 260533 - Raceway and Boxes for Electrical Systems.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Specified in 270500 - Common Work Results for Communications.

3.2 INSTALLATION

- A. Cables: Furnish and install communications cables as specified, in accordance with Cable Pulling Schedules, manufacturer's published instructions, TIA-568-C including all addendums and as indicated on Drawings.
 - 1. Dress cable to final location, remove sheath to point allowing splaying of conductors, and terminate. Make each termination uniform and precise. Hook and Loop "Velcro" cable ties shall be used for bundling and dressing all cabling. No nylon zip ties shall be used for cable bundling or attachment.
 - 2. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify, or add to manufacturer's twisting of cable. Do not untwist more than ½ inch of the stripped cable.
 - 3. Label each end with a machine generated, self laminating label.
 - 4. Mechanical couplers or splices not permitted.
 - 5. Cable conductors shall be continuous from originating termination equipment to destination termination equipment.
- B. Telecommunications Outlet: Furnish and install appropriate number of female 8-pin modular jack connectors on one face plate at each T/O (telecommunications outlet) as indicated on Drawings.
 - 1. Install faceplate over single duplex outlet box, double duplex outlet box, or raceway knockout, level and in alignment with adjacent faceplates.
 - 2. Provide a minimum of a 20-foot service loop in the ceiling at the end of the conduit/EMT riser before the cable enters the outlet box.
 - 3. Coordinate color with Raleigh IT Service Center POC.

3.3 CAT6/6A COPPER TESTING

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Testing and Certification Overview:
 - 1. The Contractor shall provide Fluke Copper/Fiber equipment and materials for the testing of all installed copper and fiber transmission media. For Category 6 copper, the supplier shall employ Level III compliant test equipment that stores the test results in internal memory and produces test result reports. For Category 6A, the supplier shall employ Level IV compliant test equipment that

stores the test results in internal memory and produces test result reports. The supplier shall provide the USPS, test results in test equipment format (raw electronic). Supplier prepared spread sheets and PDF files are NOT ACCEPTABLE. There is a USPS 10MB attachment limit. There should never be test results over 10MB. USPS cannot access DropBox.

- a. The USPS technical representative may conduct random tests of copper and fiber cable with USPS test equipment as part of the final inspection. The Contractor shall re-terminate and retest any cable found to be defective.
- b. The Contractor shall provide all equipment and services necessary to secure and provide the USPS a system warranty. Inspect installation of cables and equipment during and at completion of installation.
- c. Test results indicating "Pass*(Star)" or "Fail" shall not be accepted and must be repaired/retested with 2nd set of test results submitted to Raleigh IT SME.
- d. Test results must be uploaded to the "Link Ware Live" cloud based repository for USPS RITSC access.

C. Copper Cable Testing:

1. Test parameters include, but are not limited to:
 - a. Wire Map
 - b. Length
 - c. Propagation Delay
 - d. Delay Skew
 - e. DC Loop Resistance
 - f. Insertion Loss (Attenuation)
 - g. Return Loss (RL), RL @ Remote
 - h. NEXT, NEXT @ Remote
 - i. Attenuation-to-crosstalk Ratio (ACR-N), ACR-N @ Remote
 - j. ACR-F (ELFEXT), ACR-F @ Remote
 - k. Power Sum ACR-F (ELFEXT), PS ACR-F @ Remote
 - l. Power Sum NEXT, PS NEXT @ Remote
 - m. Power Sum ACR-N, PS ACR-N @ Remote
 - n. Power Sum Alien Near End Xtalk (PS ANEXT)
 - o. Power Sum Alien Attenuation Xtalk Ratio Far End (PS AACR-F)
 - p. Alien Cross-talk
2. Cable test parameters shall be set to the manufacturer's values for NVP and Test Limit (TIA-568-C, Category 6/6A, Permanent Link). If the NVP is not set correctly, test results will be rejected.
3. Perform end-to-end tests of each 4-pair cable as follows:
 - a. Pair/conductor for proper pinouts and continuity.
 - b. Ground fault.
 - c. Proper termination, shorts, and crossed pairs.
 - d. Channel attenuation per TIA-568-C, including all addendums.
 - e. Channel bi-directional worst case near end cross talk (NEXT) at frequencies up to 250 MHz, per TIA-568-C, including all addendums.
 - f. Measured effective cable run length.

3.4 INSTALLATION - COMPONENTS

- A. Specified in Section 270500 - Common Work Results for Communications.

3.5 CONSTRUCTION

- A. Specified in Section 270500 - Common Work Results for Communications.

3.6 FIELD QUALITY CONTROL

A. Specified in Section 270500 - Common Work Results for Communications.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 8/25/2017

SECTION 272133

DATA COMMUNICATIONS – WIRELESS ACCESS POINTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following:
 - 1. This section specifies requirements for the design/layout, and installation of Telecommunications outlets (T/Os) that are to serve IEEE 802.11 wireless access points (WAPs).
- B. Related Documents:
 - 1. The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section.
 - 2. USPS LAN Infrastructure Best Practices, 01 October 2018.
 - 3. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 078400 - Fire Stopping.
 - 2. Section 270500 - Common Work Results for Communications.
 - 3. Section 271100 - Communications Equipment Room Fittings.
 - 4. Section 271300 - Communications Backbone Cabling.
 - 5. Section 271500 - Communications Horizontal Cabling.

1.2 REFERENCES

- A. Specified in Section 270500 - Common Work Results for Communications.

1.3 DESIGN REQUIREMENTS

- A. Coverage areas
 - 1. The entire building shall have full area coverage for currently supported Wi-Fi standards. This includes 802.11a/g/n/ac.
 - 2. Coordinate with Raleigh Telecom Service Wireless Team during design for indoor and outdoor locations.
- B. Identification on drawing floor plans
 - 1. Duplex telecommunications outlets (T/Os) for WAPs shall have a distinct symbol on the drawings; preferably a number 30 orange dot.
- C. Cabling infrastructure
 - 1. Each Telecommunications outlet (T/O) for a WAP is to be served by two (2) category 6A cable terminated with an 8P8C connector onto a 24 port Cat6A Copper Patch Panel.
 - 2. Cable locations/mounting will be designed in the Admin areas for below ceiling and flush mounted WAPs. Any exceptions, such as high-density locations, shall be approved by Raleigh IT.
- D. Power requirements: All USPS WAP's utilize PoE (Power over Ethernet). No power outlets (120 Volt) are required to support wireless access points.

1.4 SUBMITTALS

- A. The following submittals are due at the Pre-Construction Phase, in accordance with submittal requirements in Section 270500 - Common Work Results for Communications.
 - 1. Shop Drawings:
 - a. Provide scaled drawings (not less than 1/8" = 1'-0") indicating location of Cat6A telecommunications outlets (T/O's) for the WAPs and locations of all pull points. These locations shall be coordinated with all other trades.
- B. The following submittals are due Post-Construction, in accordance with the submittal requirements in Section 270500 - Common Work Results for Communications:
 - 1. Record Drawings.
 - a. Provide scaled AutoCAD and PDF drawings (not less than 1/8" = 1'-0") indicating actual location of communications outlets for the WAPs, as well as the actual installed routing of cable, conduits, and locations of all pull points. Design or shop drawings with field notes will not be accepted.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Raleigh Telecom Services Wireless Team will provide the WAPs and related equipment (PoE switches, patch cables, controllers) for the scope of the project, and can provide the architects specifications for aesthetic concerns.
- B. Typically used WAP models are 802.11ac capable and operate on a 5 GHz radio frequency operating mode.
- C. Exposed structure mounting:
 - 1. The General Contractor shall provide fire-resistant wooden mounting base, dedicated duplex CAT 6A, telecommunication outlet and satellite arm with "L" shaped adapter.
 - a. The satellite mounting arm shall be provided by the Contractor; "L-com", universal tube mount #HGX-UMOUNT.
 - b. The "L"-shaped bracket adapter shall be provided by the Contractor; "L-com" 60-degree tilt and swivel mount kit #HGX-PMT06.
 - c. The plywood and appropriate mounting channels are to be provided by the Contractor.
 - d. The "WAP" is factory equipped with a low profile, mounting bracket (Cisco #AIR-AP-BRACKET-1).
- D. Acoustic ceiling tile grid mounting:
 - 1. The mounting bracket and ceiling grid clip assembly for ceiling tile grid mounted WAP's are factory furnished as part of the WAP.
 - a. WAP's to be installed in acoustic ceiling tile grids require a dedicated duplex, CAT 6A, telecommunications outlet.
 - b. The "WAP" is factory equipped with a universal, mounting bracket and ceiling grid clip assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.

- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

3.2 GENERAL

- A. Exposed structure mounting:
 - 1. Contractor shall provide fire-resistant wooden mounting base. Mount duplex telecommunication outlet on wooden base, attach satellite arm and "L" shaped adapter to wooden base, and mount attached WAPs at 12' AFF on the Work Room Floor via uni-strut mounted from the structure above. No column mounts are acceptable with the exception of the mounting for the monitor WAP's. If Satellite arm is mounted in a Vertical orientation, ensure the arm rests against the stop without a need for a securing bolt.
 - a. WAP's are normally mounted at 12 ft. A.F.F. within the workroom, except immediately around FSS machines where the WAP's are mounted no lower than 16 ft. A.F.F.
 - b. WAP shall be secured to its mount using locking key and tie-wrap fastened through the security hasp.
- B. Acoustic ceiling tile grid mounting:
 - 1. WAP's to be installed in acoustic ceiling tile grids require a duplex, CAT 6A, telecommunications outlet securely mounted above the accessible ceiling located within 2 ft. of the WAP.
 - 2. WAP shall be secured to its mount using locking key and tie-wrap fastened through the security hasp.
- C. Utilize a 3 ft. long white colored, copper patch cord. Patch the WAP into the first port of the duplex T/O and into the ethernet port (not console port) of the WAP. Contractor shall fill out all needed spreadsheet documentation and submit to Raleigh IT POC. This includes MAC address, Workroom floor location, duplex port WAP is patched to, (the first of the two data ports) ER/TR connected to, etc.
- D. All WAP's shall be mounted with the ethernet and console ports oriented as close as possible to the "true north" direction for optimal GPS map reading.
- E. WAP's are furnished by Raleigh Telecom Services Wireless Team and installed by the Contractor. The Contractor shall install and complete the necessary mounting assemblies prior to the attachment of the WAP's.
- F. Wireless Spectrum Survey shall be performed by the Raleigh Wireless Team after installation to validate the wireless design.

END OF SECTION

USPS CSF Specifications issued: 10/01/2018
Last revised: 09/6/2018

SECTION 275116

IP INTEGRATED, PUBLIC ADDRESS ZONE PAGING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. IP Integrated Public Address Zone Paging System.
- B. Related Documents:
 - 1. The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section.
 - 2. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.
 - 2. Section 270500 - Common Work Results for Communications.

1.2 REFERENCES

- A. As specified in section 260500 - Common Work Results for Electrical.
- B. As specified in section 270500 - Common Work Results for Communications.

1.3 GENERAL

- A. The Contractor shall deliver a complete and working system, fully tested, that meet the requirements of this specification. The zone paging system shall seamlessly integrate with the USPS BroadWorks VoIP equipment. All systems shall be completed and ready for immediate use.
- B. The Contractor shall review specifications and prints sufficient to become familiar with the interface requirements for this project. The Contractor shall provide any items not included, but required, to make this a complete and working system.
- C. Cabling plant consists of an Equipment Room or Consolidated Computer Room (ER or CCR) (which shall mean the same as Main Cross-Connect (MDF or MC or MXC)) and multiple Telecommunication Rooms (TRs) (which shall mean the same as Intermediate Cross-Connects (IDF or HCs or IXC)). All cable, which interconnects the MC or HC's to the end point devices, shall be provided.

1.4 SCOPE OF WORK

- A. Provide an IP integrated, multicast, zone paging communications system to include the sub-systems as required in Part 2, Products, of this specification.
- B. The Contractor shall provide coordination services with the Owner's telephone installer (throughout the warranty period) in order to achieve a functional interface between the two systems.
- C. The intent is to utilize the facility LAN (and USPS WAN). The Contractor shall provide any cross connects or hardware requirements (excluding USPS furnished LAN switches) to provide a complete

and working paging system. The Contractor shall be responsible for providing and installing the equipment and connections for an integrated and operational system and coordination of the programming with the Raleigh IT Group.

1.5 ZONE PAGING FUNCTIONAL DESCRIPTION

- A. Provide fully-operational IP platform for zone paging communications system incorporating safety notifications and general communications. The paging system shall consist of software and IP addressable hardware that shall reside in MC or HC equipment racks (provided and configured by the SCS Integrator).
- B. The platform shall provide communications employing state-of-the-art IP technology including the following minimum functions:
 - 1. IP paging.
 - 2. Emergency announcement that shall override any pre-programmed zones assuring that Emergency/Lockdown etc. are heard at every speaker location utilizing pre-recorded audio - tones, music and voice or live voice paging.
 - 3. Capability of pre-recording emergency announcements.
 - 4. Utilization of computers and telephones throughout the facility for zone paging function.
 - 5. System software to synchronize time with network timeserver or web-based time server.
 - 6. Capability for paging configurability ranging from Plant-wide to individual end-point.
 - 7. The solution must be capable of sending synchronized pages to all BroadWorks Phone types used in the facility.
 - 8. The Contractor's solution must be recommended by and supported as integrated partner with the "BroadWorks" Cloud PBX and Unified Communications IT Management Platform utilized in the facility.
 - 9. System software shall interface with the facilities Motorola Mobile Radio System using analog DTMF connection and dialer.

1.6 SUBMITTALS

- A. Submit electronic copy of required information prior to proceeding with the work.
 - 1. Provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, location of each field connection, and a complete schedule of all equipment and materials with associated manufacturer's product information n which are to be used.
 - 2. Indicate that the rack space and power requirements for equipment are adequate.
 - 3. Provide a Visio, or simpler diagram, describing IP addressing and proposed VLAN scheme and multicast containment.
 - 4. Submit termination schedule (matrix) of PoE ports utilized for proposed IP speakers, and zone adapters (immediately after award of contract) to the USPS. The quantity of ports will determine the number of USPS furnished PoE network switches required. Termination schedule shall include:
 - a. Speaker or zone adapter identification.
 - b. Cable identification number.
 - c. Room location.
 - d. Patch panel identification number.
 - e. Patch panel port identification number.
 - 5. Provide UPS consumption power chart and product specifications.
 - 6. Indicate quantities of patch panels and port counts.
 - 7. Indicate patch cords count.
 - 8. Provide wiring diagrams. Each diagram shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project as well as System Installation Company's name in the title block.

9. Provide details and descriptions of any other aspect of the system, which would differ from the contract documents due to field conditions or equipment furnished.
- B. Review and approval of shop drawings by the Engineer does not supersede the requirement to provide a complete and functioning system in compliance with the Contract Documents.

1.7 CONTRACTOR QUALIFICATIONS

- A. The Paging System Contractor shall have successfully completed installations of similar network equipment and project magnitude to that specified herein within the last three years of the bid submittal.
 1. The Contractor (installing the IP paging system herein specified) shall be an experienced IP PAGING SYSTEM CONTRACTOR and bondable. "Experienced" shall mean that the Contractor is an authorized representative of the equipment manufacturer and can demonstrate they have personnel that have experience in the design, installation, testing, and maintenance of IP paging systems.
 2. The Contractor shall have experience as an IP TELEPHONY CONTRACTOR. "Experienced" shall mean that the Contractor has been certified in the installation of IP Phone systems to be deployed in conjunction with the IP paging system.
 3. If requested, the Contractor shall submit to the Owner or A/E, before work begins, certificates of successfully completed manufacturers' training classes, specifically related to the equipment being installed.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.

1.9 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Algo Communications Products, LTD, Burnaby BC, Canada (604) 454-3792.
- B. Alternate manufactures compatible with "BroadWorks" IP Telephony may be considered for prior approval.

2.2 ACCEPTABLE ZONED PAGING SYSTEM MANUFACTURERS

- A. The zoned paging system software and hardware shall seamlessly integrate with the "BroadWorks" Cloud PBX and Unified Communications IT Management Platform utilized by the facility.
- B. Basis of Design: Algo SIP Endpoints, Algo Communication Products, Ltd.

2.3 PAGING ZONES

- A. Provide configuration for the zones, as directed by the Owner. System shall not limit the number of zones.

2.4 ACCEPTABLE SYSTEMS MUST MEET THE FOLLOWING MINIMUM FUNCTIONS

- A. Paging system shall function with the facilities BroadWorks VOIP equipment and shall leverage multicast technology on the network to efficiently send messages to all devices without flooding the network. SIP communications are acceptable for devices initiating a page or for non-page device communication messages. Actual pages must be via multicast to ensure synchronization and illuminate echo effect as well as unneeded network traffic.
- B. Paging system shall be able to reach all designated IP endpoints, IP phones, overhead speakers, email, SMS, and integrate with outbound dialers from one send event.
- C. Paging software shall override the physical volume setting on the phones.
- D. Paging software shall send site-based page to all phones, speakers, and/or zones synchronously to ensure audio clarity when multiple phones are near each other.
- E. System shall be able to monitor all telephones and trigger a page to a distribution list when specified number, such as 911, is dialed. When 911 is dialed, the system shall automatically derive the origination point of the call from the Call Manager appliance and inform the recipients of the message and of that location. This functionality or call awareness must be seamless from the phone system to the paging system and correctly identify the source of the call.
- F. The system shall have the ability to interface with "BroadWorks" to send instant messages to all users or have screen popups available that do not take excessive system resources.
- G. System shall include the ability to pre-record and auto-trigger a notification (i.e., pre-recorded message, text alert, email, etc.). System shall provide hands free, two way intercom between all phones.

2.5 ZONE PAGING EQUIPMENT AND MATERIAL

- A. Server Software/Hardware:
 - 1. Contractor shall accept server (provided by Owner). Contractor shall install in Owner's rack and coordinate to provide software programming, as needed, to complete the system. Server shall be installed within the "MC" rack or location, as designated by Owner.
 - 2. Facility shall have a locally-survivable solution for IP paging and local emergency notification, such as lockdowns.
 - 3. System shall be configured to provide local live paging and additional scheduling, as determined by Owner.
 - 4. Additional configuration shall be provided to include system configuration to broadcast pre-recorded emergency notifications triggered by calling a specified extension on a local IP phone; sending an all clear broadcast to notifications triggered by calling a specified extension; and sending a pre-recorded all-clear page following a fire alarm drill.
 - 5. Reports on feature usage, system activity, etc. shall be provided via web-based interface.
 - 6. Configuration of system and initiation of system features shall be provided via web-based interface.
 - 7. System shall sync the time to the facility's network time server or network-based time server.
 - 8. Web-browser shall be provided to deliver facility-wide emergency paging and pre-recorded messages from any authorized user in the Plant. The software shall be capable of automatically notifying facility personnel via pre-recorded page, text, and or email over available LAN/WAN network.

9. Provide and install an IP speaker and RJ45 jack and install Owner-provided telephone, at the main server location, to be zoned and used for web-interface to test source material or microphone inputs.
10. Initially, Contractor shall set volume through software and provide documentation to the facility staff for further adjustments. IP speakers shall not use manual or in-room volume attenuation.
11. The Contractor shall connect system to the facility-provided IP telephone network. See integration and configuration steps below.
12. System shall support a flexible numbering plan allowing two, three, four, five, or six digit extensions to activate various paging activities, according to facility's dial plan.
13. Server shall not need direct connection to any speaker via home run or distributed wiring. The intent is to communicate solely through the IP LAN network.
14. Server shall store all Plant specific messages, schedules etc. The server shall have a backup and restore capability accessible via web interface.
15. System's Voice Interface shall provide:
 - a. Live audio paging access from any IP telephone to any IP endpoint. This shall include all zone controllers or any combination of IP endpoints.
 - b. Triggering of pre-recorded notifications, emergency and non-emergency, from any IP telephone to any IP endpoint. This shall include all zone adapters or any combination of IP endpoints registered to the server.
16. System shall utilize a web-browser and audio input device (like a USB microphone) to deliver facility-wide, live emergency paging, pre-recorded messages, and tones from any authorized computer in the facility.
17. System shall be capable of automatically broadcasting page emergency instructions throughout the entire facility when an alarm (i.e., lockdown, lockout, security, fire, etc.) is tripped or manually activated. The emergency instructions shall be pre-programmed and shall require no user intervention. The system shall provide redundant, alarm annunciation over the paging speakers and shall not be meant to replace primary fire alarm or security systems.

B. IP Addressable Endpoints:

1. IP Speakers shall interface to each facility's data network.
 - a. Provide the ability to belong to one or more independent zones for zone paging, program distribution, and tone reception. This assignment shall be a programmable function. Each IP speaker location or common zone shall be programmed in software and shall be able to belong to any combination of software defined zones.
 - b. Basis of design for the IP speakers shall be non-plenum rated. However, Contractor shall supply plenum-rated, where required. Contractor may propose an all plenum-rated solution.
 - c. Provide a contact that shall detect a closed/open switch activity that may be programmed to trigger a function such as strobe, panic, or other urgent message.
2. SIP Audio Alerter (interior wall mount) – Provide high efficiency integrated amplifier and tuned high quality loudspeaker with polycarbonate enclosure suitable for surface wall mounting and the following features:
 - a. Networked Managed SIP Endpoint.
 - b. Voice Paging with talk back capability.
 - c. Multicast receive or broadcast capability.
 - d. Outputs for external speaker and slave Amp.
 - e. Power Input: 48V PoE, 12 Watts (max).
 - f. SPL: 106 dBA at 1m internal speaker.
 - g. Speaker Output: 8 Watts rms, 8 ohm.
 - h. Configuration: TFTP, FTP, HTTP.
 - i. Dimensions: 7"H x 4"W x 2.6"D.
 - j. Basis of Design: Algo Communications Products #8180.
3. SIP Ceiling Speaker (interior, recess ceiling mount) – Provide high efficiency integrated amplifier and tuned high quality, 8-inch round loudspeaker with 2 ft. x 2 ft. drop-in ceiling panel suitable for recess mounting within an acoustical dropped ceiling and the following features:
 - a. Networked Managed SIP Endpoint.
 - b. Voice Paging with talk back capability.

- c. Multicast receive or broadcast capability.
- d. Outputs for external speaker and slave Amp.
- e. Power Input: 48 V PoE IEEE 802.3af Class 0 (Max 12.95 W - Idle nominal 2W).
- f. Dimensions:
 - 1) 8" Diameter without trim ring.
 - 2) 9.8" Diameter with trim ring.
 - 3) Total height 7.0".
- g. Weight: 6 lb.
- h. Speaker: 6.5" Coaxial with PEI Dome Tweeter Mica filled outdoor rated polypropylene cone
- i. SPL: 102 dBA at 1m (1 kHz tone).
- j. Frequency Response: 55 - 18,000 Hz (+/- 10 dB).
- k. Microphone: Electret omnidirectional wideband.
- l. Audio Delay: 10 to 1000 ms selectable for synchronization.
- m. Audio Memory: 1 GByte available.
- n. Relay Output: Normally open, activated when 8188 is in use; Max 30 V 50 mA.
- o. Relay Input: Normally open or normally closed dry contact.
- p. Configuration: TFTP, FTP, HTTP.
- q. Environmental: 32 to 104 deg F, 10-95% RH non-condensing. Dry indoor locations only.
- r. Basis of Design: Algo Communication Products #8188/#8188T2X2.
- 4. SIP Ceiling Speaker (interior, surface ceiling mount) – Provide high efficiency integrated amplifier and tuned high quality, 8" round loudspeaker with 12" square polycarbonate enclosure suitable for surface mounting to a hard ceiling and the following features:
 - a. Networked Managed SIP Endpoint.
 - b. Voice Paging with talk back capability.
 - c. Multicast receive or broadcast capability.
 - d. Outputs for external speaker and slave Amp.
 - e. Power Input: 48 V PoE IEEE 802.3af Class 0 (Max 12.95 W - Idle nominal 2W).
 - f. Dimensions:
 - 1) 12" square.
 - 2) Total height 7.0".
 - g. Weight: 6 lb.
 - h. Speaker: 6.5" Coaxial with PEI Dome Tweeter Mica filled outdoor rated polypropylene cone
 - i. SPL: 102 dBA at 1m (1 kHz tone).
 - j. Frequency Response: 55 - 18,000 Hz (+/- 10 dB).
 - k. Microphone: Electret omnidirectional wideband.
 - l. Audio Delay: 10 to 1000 ms selectable for synchronization.
 - m. Audio Memory: 1 GByte available.
 - n. Relay Output: Normally open, activated when 8188 is in use; Max 30 V 50 mA.
 - o. Relay Input: Normally open or normally closed dry contact.
 - p. Configuration: TFTP, FTP, HTTP.
 - q. Environmental: 32 to 104 deg F, 10-95% RH non-condensing. Dry indoor locations only.
 - r. Basis of Design: Algo Communication Products #8189 with recessed backbox.
- 5. SIP Horn Speaker (indoor/outdoor, wall or ceiling mount) – Provide high efficiency integrated amplifier and tuned high quality, double re-entrant, rectangular horn speaker with UV stabilized plastic weatherproof housing and the following features:
 - a. Networked Managed SIP Endpoint.
 - b. Voice Paging with talk back capability.
 - c. Multicast receive or broadcast capability.
 - d. Outputs for external speaker and slave Amp.
 - e. Power Input: 48 V PoE IEEE 802.3af Class 0 (Max 12.95 W - Idle nominal 2W).
 - f. Dimensions: 11.8" x 6.6" x 10.2".
 - g. Weight: 6 lb.
 - h. SPL: 116 dBA at 1m (1 kHz tone).
 - i. Frequency Response: 350 - 9,000 Hz (+/- 10 dB).
 - j. Microphone: Electret omnidirectional wideband.
 - k. Audio Delay: 1 to 1000 ms selectable for synchronization.
 - l. Audio Memory: 1 GByte available.

- m. Relay Output: Normally open or normally closed; Max 30 V 50 mA.
 - n. Relay Input: Normally open or normally closed dry contact.
 - o. Configuration: TFTP, FTP, HTTP, HTTPS.
 - p. Environmental: -40 to 122 deg F, suitable for wet locations.
 - q. Basis of Design: Algo Communication Products #8186.
6. IP-Addressable Zone Paging Adapter:
- a. Provide PoE IP Paging Adapters for integrating analog speakers and amplifiers into a Unified Communication Environment as a third party SIP endpoint. Paging adapters shall support all page, zone paging, audio events, and emergency notifications and shall meet the following specifications:
 - 1) SIP: 50 page extensions; 10 Alerting Extensions.
 - 2) Multicast: Receive or transmit.
 - 3) Code Support: G.711 A-law, G.711 u-law, G.722, Polycom Group Page.
 - 4) Processor: Linux OS ARM Cortex-A8 32-Bit RISC Processor.
 - 5) AUX Input: 3.5mm jack for analog music input.
 - 6) AUX Output: 3.5mm jack for headset or PC speakers.
 - 7) Line Input:
 - a) Female mini-XLR 10 kOhm balanced maximum level +4 dBu.
 - b) Transformer isolated internally.
 - 8) Line Output:
 - a) Low impedance balanced output.
 - b) Line level – 10 dBm / 0 dBm / +4 dBu.
 - c) Transformer isolated internally.
 - d) Male mini XLR connector and pluggable terminal block.
 - e) Frequency response 100-7000 Hz +/- 3dB.
 - 9) Audio Memory: 1 GByte.
 - 10) Relay Output: Normally open or normally closed; Max 30 V 50 mA.
 - 11) Relay Input: Normally open or normally closed dry contact supervision.
 - 12) Configuration: Web interface (HTTP or HTTPS).
 - 13) Power Requirements: PoE IEEE 802.3af Class 0 Nominal 2W Maximum 3.9W.
 - 14) Environmental: +32 to +122 deg F.
 - 15) Dimensions: 6.5" x 4.3" x 1.3" (16.5 cm x 10.9 cm x 3.3 cm).
 - 16) Basis of Design: Algo Communication Products #8301.
 - 7. Shall be end user configurable (with respect to accepting a Dynamic or Static IP address) must provide support for variable length subnet masks according to the facility's IP addressing scheme and allow an interface to manually set the zone controller to a static IP.
 - 8. Basis of Design: Algo Communication Products #8301.
- C. IP Paging Administrative Computer (PC):
- 1. Contractor shall accept an Owner-supplied Windows 10 PC. This PC shall be configured with shortcuts to access the paging software and provide full functionality including recording messages and live paging. This PC is intended to serve as the primary access tool for managing the paging system. Vendor specific hardware shall not be acceptable.
 - 2. Provide audio paging access from any PC to any zone (i.e., group) of paging speakers or all speakers/paging horns throughout the entire facility. Access controlled by User ID and/or password.
- D. Audio Paging Components:
- 1. Category 6 cable and cabling from IP Endpoints to the Owner-furnished PoE network switches shall be provided. Total cable length shall not exceed 295 ft. Refer to spec sections 270500 and 271500 for applicable requirements.
 - 2. Contractors shall accept Owner-pre-configured PoE network switches. Contractor shall install in rack, power and cable the switches with Contractor-supplied cables.
 - 3. Contractor shall coordinate testing switches' connectivity with USPS Raleigh IT network staff.
 - 4. Provide a line-interactive UPS unit adequate to operate the system for a period of 30 minutes during a power outage. Tripp-Lite, APC or prior approved equal.

2.6 IP PHONE INTEGRATION

- A. Contractor shall coordinate with the facility to integrate with IP Phone hardware supplier and software supplier.
- B. Telco Interface and Cutover – Contractor shall coordinate testing and eventual cutover of pre-determined numbers to new SIP service. Configure and support testing of new SIP service with Raleigh Information Telecommunications Support Center (RITSC) Subject Matter Expert and the District IS Manager.

2.7 CATEGORY 6 HORIZONTAL CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Belden
 - 2. Berk-Tek
 - 3. CommScope Uniprise
 - 4. General Cable
 - 5. Leviton
 - 6. Ortronics (Legrand) - Preferred
 - 7. Panduit
 - 8. Product options and substitutions. Substitutions: Not permitted.
- B. Conductors: 4 twisted pair, minimum 24 AWG, solid copper.
 - 1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
 - 2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6 cable performance specification.
 - 3. Nominal Impedance: 100 ohms plus or minus 15 percent.
 - 4. Certified and capable of performing to a minimum of 250 MHz.
- C. Connector:
 - 1. 8-pin modular, Category 6/6A, non-keyed.
 - 2. Complies with TIA-568-C "T568A" pinning configuration.
 - 3. Color: Clear.
- D. Cable Testing: Provide Category 6 copper testing as outlined in Section 271500 – Communications Horizontal Cabling.

2.8 CATEGORY 6 COPPER PATCH CORDS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Belden
 - 2. Berk-Tek
 - 3. CommScope Uniprise
 - 4. General Cable
 - 5. Leviton
 - 6. Ortronics (Legrand) - Preferred
 - 7. Panduit
 - 8. Product options and substitutions. Substitutions: Not permitted.
- B. Conductors: Straight through type 4 twisted pair minimum 24 AWG, stranded copper.
 - 1. Terminated with male 8-pin modular plugs.

2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6 cable performance specification.
 3. Nominal Impedance: 100 ohms plus or minus 15 per cent. Certified and capable of performing to a minimum of 250 MHz.
 4. Match performance and impedance characteristics of the installed horizontal unshielded twisted pair cable.
 5. Each patch cord shall have a plastic arch for ease of removal of the connector (rubber boots are not acceptable). Preferred Copper Patch type: Ortronics (Legrand) #OR-MC615-06.
 6. Patch cords shall be factory made, tested and individually factory wrapped within non-clear plastic bags. The plastic bag shall clearly identify the manufacturer/testing agency with silk screen on the outside and shall contain the cable test results. Plastic bags shall have perforated or zip-lock top for easy removal of cord.
- C. Connector:
1. 8-pin modular, Category 6/6A, non-keyed.
 2. Complies with TIA-568-C "T568A" pinning configuration.
 3. Color: Clear.

2.9 MISCELLANEOUS

- A. Contractor shall cooperate in the integration and programming of telephone and paging system to create the functions specified in this bid. Paging system and telephone system shall be individually tested but acceptance of the service shall only occur when a fully integrated system is delivered. This shall include testing of all notification features and calls that are to be configured.
- B. Special Requirements for Cable Routing and Installation:
1. The majority of paging system wiring in this building will be installed above ceilings without conduit. All communications cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed.
 2. Sealing of openings between floors, through rated fire and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the contractor. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.
 3. Cabling routed underground, exterior of the building, through inaccessible ceilings or less than 10'-0" A.F.F. in the workroom shall be contained in conduit. Provide flush boxes within finished areas and factory boxes in unfinished areas. Provide 3/4" conduit risers with 90 degree bend and bushing for all wall mounted devices.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.
- B. Furnish and install all material, devices, components and equipment for a complete operational system.

- C. Install exposed cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings so designed and installed to avoid damage to cables. Secure cable at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, or fittings.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Use lacing bars in cabinets.
- E. Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.
- F. Separation of Wires: Separate speaker, telephone, line-level and power wiring runs. Where exposed or in same enclosure, separate conductors at least 12 inches (30 cm) for speaker microphones and adjacent parallel power and voice wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.
- G. The Contractor shall provide necessary transient protection as recommended by the equipment supplier and referenced to earth ground.
- H. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
- I. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables to identify media in coordination with system wiring diagrams.
- J. Conductor Sizing: Unless otherwise indicated, size speaker circuit conductors from racks to loudspeaker outlets not smaller than number 14 AWG and conductors from microphone to amplifiers not smaller than number 20 AWG.
- K. Weatherproof Equipment: Install units that are mounted outdoors, in damp locations, or where exposed to weather consistent with requirements of weatherproof rating. Provide surge protection where required.

3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Section 014000 - Quality Requirements: Field testing and inspection.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installations, including connections. Report results in writing.
- D. Inspection: Make observations to verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
- E. Testing: Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Contractor's expense. Verify, by the system test, that the total system meets the Specifications and complies with applicable standards.

3.4 ADJUST AND CLEAN

- A. Adjust equipment for proper operation.
- B. Prior to final acceptance, this Contractor shall vacuum and clean all system components and protect them from damage and deterioration.

3.5 FINAL ACCEPTANCE TESTING

- A. The Final Acceptance Testing shall be provided to the Owner or the Owner's designated representative only. Final acceptance testing to any other trade or service provider for the project does not comply with the requirements of this section.
- B. The Contractor shall provide a Final Acceptance Test record document signed by both the Contractor and the Owner or designated Owner's Representative establishing the "In Warranty" date. The warranty period shall not commence until the Final Acceptance Test is completed.
- C. This Contractor shall be prepared to verify the performance of any portion of the installation by demonstration, listening and viewing test, and instrumented measurements. This Contractor shall make additional adjustments within the scope of work and which are deemed necessary by the Owner because of the acceptance test.

3.6 PROJECT SUBMITTALS PRIOR TO ACCEPTANCE

- A. Installer Certificates: Signed by Contractor certifying that installers complied with requirements.
- B. Acceptance Documents (include record of final settings and measurements certified by Installer).
- C. Electronic documentation of method to load music, to create and edit zones, to adjust volume, etc.
- D. Maintenance Data: For equipment to be included in maintenance manuals.
 - 1. Record of Owner's equipment-programming option decisions.
 - 2. All instructions necessary for proper operation and manufacturer's instructions (three hard copies and one electronic copy).
 - 3. Manufacturer's maintenance information (document with updated and accurate web links).
 - 4. Electronic copies of software programs and system information on all programmable features of the installed platform.

3.7 IN-SERVICE TRAINING

- A. The facility shall provide a space for the training sessions. This Contractor shall provide everything else, including copies of instructional materials, trainer(s), etc.
- B. Provide videotaped training: one for maintenance session and one for each plant's staff training session. Submit to USPS's Project Manager.
- C. Maintenance Personnel: The Contractor shall provide on-site training for the Owner's maintenance personnel in the procedures involved in operating, troubleshooting, servicing, and preventative maintenance of the system. Over a 14 day period, the Contractor shall schedule, with facility maintenance personnel, two complete sessions to accommodate personnel's schedules. The two sessions are intended to accommodate facility staff being trained prior to system being actively used in the facility.
 - 1. In addition to the Training Materials provided, the Contractor shall furnish Operators Manuals and User's Guides at the time of this training via electronic or online media.
 - 2. Schedule training with Owner (through the Owner or the Owner's Designated Representative) with at least seven days advance notice.
- D. Facility Staff: This Contractor shall provide and implement a complete and comprehensive, on-site, facility staff training program. This mandatory training program shall provide facility staff a complete understanding of how to utilize and properly operate the system functions. The intent is to provide two sessions, one session would be provided upon production activation of the phone and paging system.

The second session, timing as requested by the facility, shall be provided within six months of the first session. Additional training is outside the scope of this bid and would be procured separately.

1. The training program shall be implemented by a staff member/trainer employed by this Contractor. The trainer must be qualified to provide training on their product.
2. All staff development training is to be coordinated through the Owner's Designated Representative with at least seven days advance notice. The trainer shall provide the facility's staff a document listing all of the staff members who attended, received, and completed the training program.

3.8 AS-BUILT/RECORD DRAWINGS

- A. Prior to final acceptance, provide three sets of drawings and one AutoCAD disc (Release 2014 or later) and a pdf file indicating all cable numbers and construction details in accordance with the actual system installation before final payment shall be issued. Revise all shop drawings to represent actual installation conditions. These Record Drawings shall be used during "Final Acceptance Testing."

3.9 WARRANTY

- A. Provide a 3 year warranty on all of the Contractor-supplied equipment against defects in material and workmanship. This warranty shall cover all electronic equipment, as well as speakers. If any defects are found within the warranty period, this Contractor shall replace the defective equipment at no cost to the Owner (i.e., to include equipment and labor).
- B. If the equipment cannot be repaired within 24 hours of service visit, the Contractor shall provide "loaner" equipment to the facility at no additional charge.
- C. If requested, Contractor shall provide a quote for a service contract offering continuing factory authorized service of the system after the warranty period.
- D. Any software updates, during the warranty period, shall be provided to the facility as part of this contract (i.e., no additional charge). This effort shall include travel to the site for installation and configuration of the updates.

3.10 EMERGENCY SERVICE

- A. This Contractor shall maintain sales and service presence in the area of adequate size and quality to assure the Owner rapid response to emergency service requests. Rapid emergency service response shall mean arrival of service personnel at trouble site within four hours of notice during normal business hours (i.e., 8:00 AM to 6:00 PM) and within 24 hours of said notice during all other hours on a 7-day per week basis. Service personnel shall arrive on site within 48 hours of receiving a request for routine or non-emergency service.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 8/10/2018

SECTION 275123
CALL BELL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Doorbell Call System:
 - a. Employee personnel door.
 - b. Retail wicket door.
 - c. Entry into BMEU.
 - 2. Assistance Buzzer System:
 - a. Full service counter.
 - b. BMEU workstation.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Location of devices and components.
 - b. Actual routing and sizes of conduit, boxes and conductors.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Products: Listed and classified by Underwriter's Laboratories Incorporated as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with Project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Broan – Nutone, LLC. Hartford WI (800) 558-1711.
 - 2. Carlon/Thomas & Betts, Cleveland OH (216) 464-3400.
 - 3. Edwards Signaling and Security Systems, Plainville, CT (800) 336-4206.
 - 4. EZ Tone, Hermatage TN (800) 366-7235.
 - 5. Federal Signal Corp., University Park, IL (800) 548-7229.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 DOORBELL CALL SYSTEM

- A. Description: Commercial two tone chime type door bell, pushbuttons, power transformer, conduits, chimes, and wiring as required for complete system.
- B. Materials:
 - 1. System with pushbutton, power transformer, conduits, and wiring as required for complete system.
 - 2. Provide chimes with audibly different and distinct sound from sound made by assistance buzzer.
 - 3. Color/finishes of pushbutton and faceplate to match other electrical devices.
- C. Transformer: 12 volts AC rated.
- D. Location:
 - 1. Wicket Door (set to two tone chime).
 - 2. Personnel Door (set to single chime).
 - 3. BMEU.

2.3 ASSISTANCE BUZZER

- A. Description: Commercial buzzer type doorbell, pushbuttons, power transformer, conduits, buzzer, and wiring as required for complete system.
- B. Materials:
 - 1. System with pushbutton, power transformer, conduits, and wiring.
 - 2. Provide buzzer with audibly different and distinct sound from sound made by doorbell chimes.
 - 3. Color/finishes of pushbutton and faceplate to match other electrical devices.
- C. Transformer: 12 volts AC rated.
- D. Location:
 - 1. Full service counter.
 - 2. BMEU workstation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. The call bell system(s) shall be installed and wired completely as shown on the plans by the contractor, who shall make all necessary wiring connections to devices and equipment.
- B. Install system transformer at outlet box locate above within accessible ceiling.
- C. Install low voltage wiring in conduit.
- D. Flush mount wall outlets for buzzers at 6 inches below ceiling unless otherwise noted on Drawings.

3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Perform operational testing on call bell system(s) to verify proper operation and field wiring connections.

END OF SECTION

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SECTION 281600

INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Intrusion Detection Devices.
 - 2. Alarm Control Panel.
 - 3. Signaling Devices.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.
 - 2. Section 264128 - Surge Protective Devices (SPDs).
 - 3. Section 270500 - Common Work Results for Communications.
 - 4. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Underwriters Laboratories Incorporated (UL):
 - 1. UL 609 - Local Burglar Alarm Units.
 - 2. UL 634 - Connectors and Switches for Use with Burglar-Alarm Systems.
 - 3. UL 639 - Intrusion Detection Devices.
 - 4. UL 681 - Installation and Classification of Mercantile and Bank Burglar-Alarm Systems.
 - 5. UL 1023 - Household Burglar-Alarm Systems.
 - 6. UL 1076 - Proprietary Burglar Alarm Units and Systems.
 - 7. UL 1449; 3rd Edition - Transient Voltage Surge Suppressors.

1.3 DEFINITIONS

- A. Hard-Wired System: Alarm, supervisory, and detection devices directly connected, through individual dedicated conductors, to central control panel.
- B. Multiplex System: Communications link using signaling method characterized by simultaneous or sequential transmission, or both, and reception of multiple signals in a communication channel, including means for positively identifying each signal.
- C. Zone: A single initiating device or combination of devices connected to a single point/zone on the Intrusion Detection Device panel. Circuit showing the display of alarms point/zone.
- D. Dial-Up System: Communication link utilizing voice line which connects alarm to central station through dial-up circuit.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

1. System: Central microprocessor, remote intrusion sensors and detection devices, and a communications link to perform monitoring and alarm functions. System physically and electronically modular with provision for field expansion. System self-monitoring and self-diagnostic.
2. Communication Link: Voice grade dial-up line and dedicated to intrusion detection, alarm service, and control of security related functions.
3. Environmental: Design to withstand the following environmental conditions without mechanical or electrical damage or degradation of operating capability.
 - a. Altitude: Sea level to 4000 feet.
 - b. Ambient Temperature for Interior Elements: 0 degrees C to plus 40 degrees C.
 - c. Relative Humidity for Interior Elements: 5 to 95 percent, noncondensing.
 - d. Ambient Temperature for Exterior Elements: Minus 25 degrees C to plus 50 degrees C.
 - e. Relative Humidity for Exterior Elements: 0 to 100 percent.

B. Performance Requirements:

1. Intrusion Detection: Performed by indicated intrusion detection devices. Devices are assigned to detection of points/zones as indicated.
2. Alarm Indication: Audible signal sounds and alphanumeric display at the alarm keypad identifying the zone originating an alarm. An alarm displayed at the keypad will annunciate with an audible tone. Alarm keypad provides alpha text as to the location of the alarm zone.
3. When alarm signal is unable to be sent by telephone; a local 110 decibel horn is to sound for 5 minutes after the last sensor activation. The horn is to be located in the workroom.

1.5 SUBMITTALS

A. As specified in Section 260500 - Common Work Results for Electrical.

B. Section 013300 - Submittal Procedures: Procedures for submittals.

1. Product Data: Data for system components, including UL listing data and list of materials, dimensioned plans, sections, and elevations showing minimum clearances, mounting arrangements, and installed features and devices.
2. Shop Drawings: Wiring diagrams for system, including devices, components, and auxiliary equipment. System diagram is unique to the Project system; manufacturer's generic system diagram not permitted. Diagrams differentiate between manufacturer-installed and field-installed wiring. Include diagrams for equipment and for system with all terminals and interconnections identified.
3. Assurance/Control Submittals:
 - a. Design Data: System operation description indicating method of operation and supervision of each component and each type of circuit, and sequence of operations for all manually and automatically initiated system inputs for this specific Project. Manufacturer's standard descriptions for generic systems not permitted.
 - b. Test Reports: Submit the following reports directly to USPS Project Manager from Manufacturer's Quality Control Inspector with, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
 - 1) Pre-test.
 - 2) Acceptance test.
 - c. Certificates: Manufacturer's certificate certifying that components and Products meet or exceed specified requirements.
 - d. Qualification Documentation: Submit documentation of manufacturer and installer experience indicating compliance with specified qualification requirements. Include lists of completed projects with project names and addresses, names of Engineers and Owners.

- e. Manufacturer's Field Reports: Submit the following reports directly to USPS Project Manager from Manufacturer's Quality Control Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:

- 1) Preparatory inspection.
- 2) Initial inspection.
- 3) Follow-up inspection.
- 4) Final inspection.

- C. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operation and Maintenance Data: Include data for each type product, including features and operating sequences, both automatic and manual. Include user's software data and recommendations for spare parts to be stocked at the site. Provide names, addresses, and telephone numbers of service organizations that stock repair parts for the system.
 - 2. Project Record Documents: Record actual locations of equipment and devices, and routing of alarm wiring.

1.6 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Manufacturer Qualifications: Firms experienced in manufacturing equipment of the types and capacities indicated that have record of successful in-service performance with minimum 5 years documented experience. Prime system manufacturer and manufacturers of major system components required to qualify separately.
 - 1. Service Center: Prime system manufacturer maintains a service center capable of providing training, parts, and emergency maintenance and repairs for overall system at Project site within 8 hour maximum response time.
- C. Installer Qualifications: Experience with systems of the type and scope indicated and certified as authorized service representative of the prime system manufacturer with minimum 5 years documented experience.
 - 1. System shall be installed by a single contractor that assumes responsibility for system components and their compatibility.
 - 2. Only manufacturer's certified installer shall be utilized.
 - 3. Installer shall be NFBAA/SIA technical level #1 certified.
 - 4. Installer shall be licensed where required by state or county.
 - 5. Installer shall require a security clearance if the installation is accomplished after the facility starts processing the mail.
- D. Regulatory Requirements:
 - 1. Coordination and verification of standards and requirements with Postal Inspection Service through USPS Project Manager is required throughout planning, design, construction phases, and final approval of alarm security system.
 - 2. Postal Inspection Service has sole responsibility for evaluating the need for any security related equipment.
- E. Comply with UL Standard 609, 1023, and 1076.
- F. FM Compliance: Provide FM-approved intrusion detection systems and components.

1.7 OWNER'S INSTRUCTION

- A. Postal Inspection Service will provide training to end user.
- B. Postal Inspection Service will provide final programming.

1.8 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Extra Materials: Furnish extra materials described below that match products installed, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 2. Intrusion Detection Devices: Furnish quantity equal to 5 percent of the number of units of each type installed, but not less than 1 of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified Products which may be incorporated in the Work include the following:
 - 1. Bosch Security, Fairport, NY (800) 289-0096 (alarm & keypad).
 - 2. Visonic, Inc., Bloomfield, CT (800) 223-0020.
- B. Section 016000 - Product Requirements: Product options and substitutions.
 - 1. Conflicts, deviations, or change requests shall be submitted in writing to Postal Inspection Service through Contracting Officer with supporting documentation. Include written justification, designs, manufacturer's specifications, cost benefits, and any special circumstances dictated by local conditions. Documentation package shall be submitted in sufficient time to minimize any adverse effects of the proposed changes to the project construction schedule. Postal Inspection Service through Contracting Officer reserves the right to reject substitute and other systems.
 - 2. Substitutions are not permitted for control panel, expansion boards and control stations.
- C. Specified Products:
 - 1. Door Switches: Sentrol: Magnetic Contacts, #1078CW with 1K ohm resistor.
 - 2. Dual-Technology Devices, Passive Infrared and Ultrasonic:
 - a. Wall Mounted:
 - 1) Bosch #ISC-CDLI-W15G.
 - 2) Visonic DUO 220AM.
 - b. Ceiling Mounted:
 - 1) Bosch DS9360.
 - 2) Visonic DUO 240.
 - 3. Control Panel: Bosch: #G7412GV4-USA Control/Communicator.
 - 4. Expansion Boards: Bosch: #D8128D OctoPOPIT.
 - 5. Control Stations (Keypad): Bosch: #D1255 Command Center.

2.2 INTRUSION DETECTION EQUIPMENT

- A. Surge Protection: Comply with minimum requirements of UL Standard 1449, 3rd Edition, for each component using solid-state devices and having line voltage power source connection or exterior underground signal connection.
- B. Interference Resistance: Systems and equipment and their operation not affected by radiated radio frequency interference and electrical induction of 15 V/m over 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 INTRUSION DETECTION DEVICES

- A. Types, features, accessories, and mounting conditions of individual devices are as indicated.

- B. Alarm Contact Arrangement: Contact-making intrusion detection devices are single-pole, double-throw type.

2.4 DOOR SWITCHES

- A. Comply with UL Standard 634.
- B. All door contacts will have 1 K resistors added or 1 K resistor built in.
- C. Balanced magnetic type. Magnet part designed for installation in door; magnetically operated switch installed in door frame. Unit uses bias magnet and sensitive read switch to resist compromise by introduction of foreign magnetic fields.
 - 1. Flush-Mounted Units: Flush with surface of door frame and door.

2.5 SPACE INTRUSION DETECTION DEVICES

- A. Comply with UL Standard 639 and the following general requirements:
 - 1. Configuration: Devices consist of single component or two or more separately mounted components as indicated or as required to perform functions. Single-component devices may not be used where multiple-component devices are indicated.
 - 2. Power Source Characteristics: Devices are supplied by one or more dedicated 120 V 60 Hz supply circuits from alarm control panel.
 - 3. Detection Indicator: LED in unit housing, latching-type where indicated.
 - 4. Sensitivity: Units detect presence of an intruder within their specified detection patterns and are insensitive to influences outside the pattern.
 - 5. Self-Testing Capability: Devices indicated to have this feature automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Test failure is signaled to control panel by a trouble signal.
 - 6. Anti-Masking Capability: Devices indicated to have this feature automatically check operation continuously or at intervals of a minute or less and use signal-processing logic to detect blocking, masking, jamming, tampering, or other operational dysfunction. Such detection is signaled to the control panel as an alarm signal.
 - 7. Addressability: Indicated devices include communication transmitter and receiver with unique identification and status-reporting capability to system control panel.
 - 8. Remote Controllability: Indicated devices are individually monitored at system control panel for calibration, sensitivity, and alarm condition and are individually adjustable for sensitivity from panel.
- B. Dual-Technology Devices, Passive Infrared and Ultrasonic: Combine the two detection modes described above into a single housing.
 - 1. Detection by both methods results in an alarm signal.

2.6 CONTROL PANEL

- A. Comply with UL Standard 1076.
- B. Cabinet: Lockable steel enclosure. Arrange panel so operations required for testing or for normal operation and maintenance are performed from front of enclosure. If more than single unit is required to form complete control panel, provide exact matching, keyed alike panels. Accommodate components and allow ample gutter space for interconnection of panels and field wiring. Identify each enclosure by engraved, laminated, phenolic resin nameplate. Lettering on enclosure nameplate shall not be less than 1 inch (25 mm) high. Identify individual components and modules within cabinets with permanent labels.

- C. Systems: Alarm and supervisory systems are separate and independent in control panel. Alarm-initiating zone boards in panel consist of plug-in cards. Arrangement requiring removal of field wiring for module replacement not permitted. Use Bosch D7412GV4-USA (complete) package containing the G7412GV4-USA control panel. The manufacturer has verified that the control panel will be produced for U.S. Postal Service Projects. **THE CONTRACTOR IS REQUIRED TO INFORM THE MANUFACTURER THAT THE CONTROL PANEL IS FOR A U.S. POSTAL SERVICE PROJECT**
- D. Control Modules: Types and capacities as required to perform functions of system. Visible and audible signals in control panel indicate alarm, supervisory, and trouble conditions for each zone. Each type of audible alarm has distinct sound.
- E. Expansion Boards: Provide and install as many expansion boards (D8128D OCTOPOPITS) as necessary to connect all door contacts and motion sensors. All expansion boards shall be installed in the control panel cabinet OR in a like cabinet immediately adjacent to the control panel cabinet. All unused points shall have EOL resistors installed. Popits are not allowed.
- F. Zones: Quantity of alarm and supervisory zones and zone assignment numbers as indicated. Provide expansion boards with capacity for expanding number of zones by minimum of 25 percent.
- G. Power Supply Circuits: Panel provides power for remote power-consuming detection devices. Provide adequate circuit capacity for at least a 25 percent increase in load. Transformer near the panel, minimum 18AWG copper wire. Earth ground, use #10AWG solid copper wire.
- H. Command center (keypad): Individual annunciation for each zone. Blue fluorescent vacuum. Alphanumeric display for each control panel section/area display devices on the keypad. Manual toggle test-switches or push test-buttons do not require key to operate. Alarm and supervisory signals displays for the associated zone.
 - 1. The alarm keypad panel shall not display or annunciate the status of any IDS components (i.e., motion sensor, entry delay tone, etc.) associated with the Criminal Investigative Office.
- I. Resetting: Controls permit silencing audible signals for individual zones but prevent the resetting of alarm, supervisory, or trouble signals while condition still exists.
- J. Alphanumeric Display and System Controls: Arrange for basic interface between human operator at control panel and system components, including annunciation and supervision. A display with minimum of 18 characters displays alarm, supervisory, and component status messages. Arrange keypad to enter and execute control commands.

2.7 SECURE-ACCESS CONTROL STATIONS

- A. Keypad and display module is arranged for entering and executing commands for system-status changes and for displaying system status and command-related data.

2.8 HORN

- A. 110 decibel horn powered by control panel with battery backup.

2.9 WIRE AND CABLE

- A. Stranded copper. Size conductors as indicated but not less than recommended by system manufacturer.
- B. Comply with Section 260519, except as indicated.

- C. Cable for Low-Voltage Control and Signal Circuits: All sensors and keypads will have wiring concealed inside walls. Provide flush outlet boxes with 3/4 inch conduit risers. All sensors and keypad shall have dedicated homerun wires to the D7412GV4-USA panel. Wire will be category 2, unshielded, four-pair twisted 22 AWG stranded wire (conductors), except where manufacturer recommends shielded cable. Use wire colors red, green, black, orange, yellow, blue, brown, and white.

2.10 SPECIAL REQUIREMENTS FOR CABLE ROUTING AND INSTALLATION

- A. The majority of IDS wiring in this building will be installed above ceilings without conduit. All communications cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed.
- B. Sealing of openings between floors, through fire rated and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the contractor. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.
- C. Support cables installed in ceiling spaces with wide-base canvas loop suspension devices such as the Erico Caddy #425 Loop anchored to building structural steel (red iron).
 - 1. Minimum and Maximum Spacing Between Supports: 4 - 5 feet.
 - 2. Furnish and install additional supports as required.
 - 3. Install complete cable support device system before starting installation of cable.
 - a. Installation of cable before completion of support system not permitted.
 - b. Unsupported cable shall not be permitted.
 - 4. Organize and group cables. Install cable group as single run through ceiling spaces following column and building lines. Do not install cable group runs diagonally across center of building.
 - 5. Cabling shall not be suspended from any electrical conduits, sprinkler systems, gas, or water pipes, etc.
 - 6. Cabling shall not be attached to suspended ceiling grid system.
 - 7. No element of the building structure (i.e. webbing of trusses) shall be used to support any telecommunications cabling.
- D. Cabling routed underground, exterior of the building, through inaccessible ceilings or less than 10'-0" A.F.F. in the workroom shall be contained in conduit. Provide flush boxes within finished areas and surface mounted factory boxes in unfinished areas. Provide 3/4 inch conduit risers with 90 degree bend and bushing for all wall mounted devices.

2.11 POWER REQUIREMENTS

- A. Normal System Power Supply: 120 V 60 Hz from locked disconnect device. System components are supplied with power through system control panel.
- B. Power Source Transfer: When normal power is interrupted, system is automatically switched to backup supply without degradation of critical system function or loss of signals or status data.
 - 1. Backup Source: Batteries in power supplies of individual system components. Such batteries are an integral part of power supplies of components. When system is in "Alarm" mode, power source shall provide a minimum of 4 hours of battery backup, with 8 to 12 hours in "Normal" mode.
 - 2. Annunciation: Switching of system or any system component to backup power is indicated on system control panel as a change in system condition.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. Install system according to NFPA 70, applicable codes, and manufacturer's published instructions.
- B. Comply with UL Standard 681.
- C. Installer to be Bosch Security Certified. Installer will meter test the system to insure proper wiring and function. Do not leave installer lock code in panel. Lock code should be the Bosch Security default code. Alarm monitoring is done by the National Law Enforcement Control Center (NLECC), Tel: 1-877-MYNLECC or 1-877-696-5322, Fax: 1-651-306-6700. Postal Management must complete Burglary Alarm Information Form (BAIF) and send to NLECC. This needs to be done at least one week prior to the installer requesting programming. Leave all installation and operating instruction books inside cabinet.
 - 1. Questions regarding alarm monitoring at USPS sites should be directed to the following specialist:
 - a. Leonardo V. Martinez, Sr. Physical Security Specialist, Technical Services Division – NLECC, Dulles, Virginia, LVMartinez@uspis.gov .
- D. Connection and Programming Protocol:
 - 1. The Contractor shall connect the panel to a voice line using a RJ31x wired for line seizure.
 - 2. The Contractor shall call 877-696-5322 Mon - Fri between 8am and 8pm (Eastern Time) and request to speak with a USPIS Alarm Technician.
 - 3. The Contractor shall provide descriptive text for each point (zone) covered, and the point it was landed to on the Alarm Panel.
 - 4. The Contractor shall advise USPIS which points need a delay for Entry/Exit.
 - 5. The Contractor shall have all keypads addressed individually. (USPIS can provide support for this).
 - 6. The Contractor shall advise USPIS if any special code is needed to dial out on the Alarm Panel's phone line (9, 8, etc).
 - 7. The Contractor shall provide USPIS with all system information necessary for the completion of the programming template by USPIS. Upon completion of the template, USPIS will transmit program to the panel for final testing.
 - 8. Contractor will adjust the sensitivity of all sensors, adjust and mask if necessary to prevent false activations.
 - 9. Sensors will not be mounted in close proximity to air handling vents, as this will cause false activations.
 - 10. No panic, smoke, sprinkler flow control or fire alarm monitoring will be supervised at the intrusion panel. Panic system interface will not be permitted without advance special approval by HQ Security Group.
- E. Wiring Within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Provide and use lacing bars and distribution spools.
- F. Number of Conductors: As recommended by system manufacturer for functions indicated.
- G. Tighten connections to comply with tightening torques specified in UL Standard 486A.
- H. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so media are identified and coordinated with system wiring diagrams as specified in Section 260500.

- I. Install power supplies and other auxiliary components for detection devices at alarm control panel or at a data-gathering panel except as otherwise indicated. Do not install such items in vicinity of devices they serve.
- J. Install panel and keypad at locations indicated on Drawings and verified by Postal Inspection Service through USPS Project Manager.
- K. Grounding: 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.
- L. All IDS system wiring shall be homerun from each individual device back to IDS control panel.
- M. At IDS control panel consolidate individual cable runs at a junction box located above ceiling near the IDS control panel with a single conduit down to the IDS control panel. Splicing within any cable run is not acceptable.

3.3 CONSTRUCTION

- A. Interface with Other Work: Interface installation of intrusion detection system with closed circuit television system.

3.4 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Inspection:
 - 1. Inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
 - 2. Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.
- C. Pretesting: Align and adjust system and perform pretesting of components, wiring, and functions to verify conformance with specified requirements. Correct deficiencies by replacing malfunctioning or damaged items with new items. Retest until satisfactory performance and conditions are achieved.
- D. Acceptance Operational Tests:
 - 1. Perform operational system tests to verify conformance with specifications. Test modes of system operation and intrusion detection. Methodically test for false alarms in each zone of space intrusion detection devices by simulating activities outside indicated detection patterns.
 - 2. Provide minimum 10 days notice of acceptance test performance schedule to USPS Project Manager who will coordinate with Postal Inspection Service.
- E. Retesting: Correct deficiencies and retest until total system meets the requirements of Specifications and complies with applicable standards.

3.5 ADJUSTING

- A. Occupancy Adjustments: When requested within 1 year of date of Final Acceptance, provide on-site assistance in adjusting and reprogramming to suit actual occupied conditions. Provide up to 2 visits to site for this purpose at no additional cost to United States Postal Service.

END OF SECTION

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SECTION 282305

INTEGRATED SECURITY AND INVESTIGATIVE PLATFORM (ISIP) CCTV SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provide and install a complete IP Video System including, but not limited to:
 - a. IP Video Surveillance Cameras, housings, power supplies, cabling, and related equipment.
 - b. Video management software.
 - c. Video monitoring and recording equipment.
 - d. Equipment enclosures.
 - e. Network equipment including routers and switches.

B. Direct Vendor:

1. All equipment including the servers, monitors, network switch, etc. are to be procured directly from the Direct Vendor (Securitas Electronic Security) utilizing the pass through pricing process.
2. The cameras, servers, monitors and associated equipment shall be supplied and installed by Securitas Electronic Security, Inc the sole approved USPS CCTV Direct Vendor. The Direct Vendor is to provide a Bill of Materials, pricing, and installation costs. The General Contractor is responsible for power, conduit, cable tray, cable and cable pulling. For assistance contact the Direct Vendor at:
Securitas Electronic Security, Inc.
Michael Tracey, USPS Account Manager
3 Westchester Plaza
Elmsford, NY 10523
Cell: 571-451-7629
email: michael.tracey@Securitates.com
3. Contract to Securitas should be addressed to:
Securitas Electronic Security, Inc.
1790 Graybill Road, Suite 100
Uniontown, OH 44685
4. NEW SES Installation Number: 844-SES-6100 (844-737-6100)
 - For SES Installation inquiries.
 - Project installation and scheduling.
5. SES Account Management & Sales Number: 855-331-0359
 - For SES Account Management & Sales.
 - The current number will remain the same.
 - For add-ons, upgrades, new systems, new services, new locations and other account management related items.

C. General Contractor:

1. Responsible for providing power, conduit, cable tray, cable, and cable pulling and NEMA Enclosures to be used as part of the installation.
2. Provide AutoCAD electronic copies of the final camera placement drawings and camera schedules (from the project issued for construction drawings produced and provided by the design A/E) to the Direct Vendor and any requested documentation. This will include head end location and any monitors requested.
3. Verify customer location has 56 network available for installation of system via USPS site project manager or USPS IT.

- D. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents including:
 - 1. System Installation Manuals (provided by the Direct Vendor) shall be left on-site during the final acceptance. Manuals will not be provided prior to installation completion.
 - 2. USPS Security Standards Booklet (prepared by Securitas) – 08/31/2018.
- E. Prompt Payments. In accordance with the Contractor Certification on Postal Service Form 4211B, "Project Contract Payment Authorization", the contractor certifies that prompt payment, (within 30 days) to the subcontractor (Direct Vendor) will be made.
- F. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.
 - 2. Section 260533 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.
 - 2. ANSI / TIA / EIA 568-C Commercial Building Telecommunications Cabling Standard (2009).
 - 3. ANSI / TIA / EIA 569-B Commercial Building Standard for Telecommunications Pathways.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: IP video system between points of surveillance indicated on Drawings and the central monitoring station consists of video IP cameras, camera outlets, camera controls, monitors, control stations, distribution components, video servers, Network Connections and accessories.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures:
 - 1. Product Data: Manufacturer's specification sheets for each component shall not be required for all products provided as part of this Direct Vendor agreement.
 - 2. Due to USPS security requirements, submittals will be limited to one electronic copy of the block diagram and one copy of the shop drawings to be provided to the General Contractor.
 - 3. Final As-Built Drawings, Operation and Installations Manual, will be supplied directly to USPS and stored within the rack per USPS Project Manager.
- B. Shop Drawings:
 - 1. The Direct Vendor will provide a Standard Drawing Package that shall be utilized for the installation of the CCTV system. This package shall include:
 - a. Block Diagram: System block diagrams noting major system components and interrelationships of each component.
 - b. Console and Equipment Racks: Rack elevation drawings showing console/equipment arrangement.
 - c. The shop drawings shall include camera placement (camera placements shall be provided by the project specific design entity).
- C. Sequence and Scheduling Plan: Direct Vendor shall provide installation scheduling plan for review and approval. Coordinate scheduling of software and revisions with the USPS.
- D. Section 017704 - Closeout Procedures and Training:

1. Operation and Maintenance Data: Include data for each type of product, including features and operating sequences, both automatic and manual. This information shall be supplied directly to the USPS by the Direct Vendor.
2. Product Quick Reference cards for the operation of all key system components.
3. Project Record Documents: Direct vendor shall provide field-accurate drawings that reflect actual locations of cameras and, indicating cable identifiers, layout, location and numbering of system devices to reflect as-built conditions. The General Contractor shall provide routing of cabling information.
4. Provide a final materials list of equipment installed and spare parts on hand. Materials list shall include model number, serial number, and date installed.
5. Project Completion Certification: Document signed by the Direct Vendor and a Postal Service representative indicating that the project is fully complete with all punch-listed items resolved. In new construction, the General Contractor will sign the project completion certification.
6. Operating Instruction:
 - a. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance that is required to ensure normal operation. Authorized USPS (USPIS & USPS OIG) Representatives will receive this training.
 - b. Provide one complete set of equipment operating, installation.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Keep devices and equipment in manufacturer's packaging in a secured location until system is ready for installation.
- C. Comply with Direct Vendor requirements. Coordinate storage location with the Postal Service.
- D. The equipment delivered must be insured at the contractor's expense through acceptance.

1.6 DIRECT VENDOR WARRANTY/SERVICE/TECHNICAL SUPPORT PLAN

- A. Warranty:
 1. Direct Vendor to include manufacturer warranty for three (3) years after facility acceptance and project completion certification for materials and labor.
 - a. Service plan shall include all parts and labor, the cost of utilizing a lift truck (if required) and shall include return shipping. Failed equipment shall be repaired or replaced at no charge to the Postal Service during the Direct Vendor warranty period.
 - b. USPS shall not be required to process any paperwork in order to be entitled to service plan coverage. It is the Direct Vendor's sole responsibility to monitor and comply with warranty eligibility.
 - c. Where operational performance is substantially affected, all software and firmware shall be upgraded to the latest version supported by the purchased hardware platform throughout the service plan period and be provided at no cost to USPS. Such upgrades shall be covered under the warranty/service plan and are at the discretion of the USPS Project Manager.
 - d. Any software bugs identified by the USPS and mutually agreed upon as 'level one' bugs (impacting operation with no work-around) shall be rectified within two (2) weeks of their being reported.
 - e. Any software bugs identified by the USPS and mutually agreed upon as 'level two' bugs (impacting operation but with a work-around) shall be rectified within 90 days of their being reported.
 - f. Turnaround time for all repairs (warranty and out-of-warranty) shall not exceed 72 hours.

- g. The semi-annual "PM" service performed by the Direct Vendor shall include testing and exercising of the PTZ cameras. Direct Vendor shall provide semi-annual service test results to USPIS/OIG.
- B. Technical Support:
 - 1. Direct Vendor shall provide toll-free 24/7 technical support at no charge throughout the warranty period.
 - 2. Direct Vendor shall provide on-site installation support for systems with more than 40 total cameras. These visits shall include pre-construction site survey and project review, punch-list generation, and final inspection and system certification.
 - 3. Data Recovery — Direct Vendor shall provide a service to assist the USPS in recovering data from digital recording system hard drives and removable storage media in the event of a failure.
 - a. Turnaround time for data recovery shall be less than seven (7) days from receipt of hard drives at Direct Vendor's data recovery center.

1.7 MAINTENANCE STOCK SUBMITTALS

- A. At the completion of the installation, furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. These extra materials shall be stored within the Investigative Office.
 - 1. Indoor/Outdoor fixed camera: Two cameras.
 - 2. Indoor/Outdoor PTZ camera: Two cameras.
 - 3. Video encode: One encoder.
 - 4. Video decoder: One decoder.
 - 5. 22" monitor: One monitor.
 - 6. Fiber optic transmitter/receiver: Two of each type.
 - 7. Camera power supply transformer: Two power supplies.
 - 8. Ethernet cable extender: Two midspans.
- B. These extra materials are to be used as advanced replacement parts in cases where USPS operational issues require immediate replacement and procurement of the material is delayed due to inavailability from the manufacturer. The spare parts utilized are to be replenished upon completion of the replacement or repair. Installation of the replacement units shall only be performed by an authorized representative of the Direct Vendor.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Selected Direct Vendor:

Securitas Electronic Security, Inc.
Michael Tracey, USPS Account Manager
3 Westchester Plaza
Elmsford, NY 10523
Cell: 571-451-7629
email: michael.tracey@Securitases.com
- B. Section 016000 - Product Requirements:
 - 1. Product options and substitutions are not permitted without a written and USPS approved deviation.
 - 2. All equipment to be supplied under this specification shall be new and the current model of the Direct Vendor listed above.
 - 3. Systems and components shall have been thoroughly tested and proven in actual use.

2.2 VIDEO SERVER AND STORAGE

- A. Based on the Construction Documents, the General Contractor shall purchase all equipment from the Direct Vendor.
- B. Server:
 - 1. Server/Storage Requirements: Server storage, processor, and RAM requirements will be based off a mathematical formula from the information obtained during the site survey process. Once the number, type and classification of cameras are approved by all parties, it will calculate the required server(s) fit for the site. These servers are all HP Servers that contain USPS IT ACE images. These are approved CLINS and Assets by USPS.
 - a. Storage for 30 Days of Video with 30% Expansion Capability. Depending on size of system storage may be either internal to the server or external iSCSI attached NAS device.
 - b. Dual Network Interface Cards on board and 4 additional GB NIC ports via PCIe card per USPS requirements. The system also contains HP's integrated Lights Out management cards. This requires 1 connection on the USPS network per server. Thus each server will have (at minimum) 2 USPS 56 Network connections.
 - c. UPS Power Supplies for Server and Storage.
 - d. Input Power: 120VAC, 60Hz (a power adaptor may be used to provide this voltage).
 - e. Operating Temperature: Range shall be equal to or greater than 10 to 40 degrees Celsius.
 - f. Humidity: Withstand a minimum of 10% to 80% humidity.
 - g. Current Build of IpConfigure Network Video Recording Software.
 - h. Laptop computer.
 - i. All items rack mounted.

2.3 IP VIDEO SWITCH

- A. Cisco Network Switch (IP Video):
 - 1. Based on the Construction Documents, the CISCO Switch is to be procured by the General Contractor from the Direct Vendor.

2.4 VIDEO ENCODER

- A. Direct Vendor shall provide video encoders.
- B. The video encoder blade shall be equipped with six (6) analog video inputs and shall be able to provide simultaneous Motion JPEG and MPEG-4 video streams. Furthermore, the blade shall, for each video channel, support resolutions up to 704x576 (PAL) / 704x480 (NTSC) pixels in full frame rate (25/30fps). The Encoder Shall meet or Exceed the following requirements:
 - 1. Be equipped with 6 analog composite video inputs with PAL/NTSC auto sensing
 - 2. Provide resolutions up to 704x576 (PAL) / 704x480 (NTSC) pixels at 25/30 frames per second for each video channel
 - 3. Support simultaneous Motion JPEG, MPEG-4 and H264 individually configurable for each video channel
 - 4. Support both unicast and multicast MPEG-4, individually configurable for each video channel
 - 5. Provide the ability to control PTZ devices from third party manufacturer
 - 6. Support both IPv4 and IPv6
 - 7. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication
 - 8. Be equipped with 4 alarm inputs and 4 alarm outputs
 - 9. Include embedded event functionality, which may be triggered by alarm input, video loss or by video motion detection
 - 10. Be supported by an open and published API
 - 11. Be equipped with a 1000BaseT Gigabit Ethernet interface

- C. The desktop Video Encoder shall be equipped with one analog video input and one channel of audio, provide simultaneous Motion JPEG and MPEG-4 video streams and shall support resolutions up to 704x576 (PAL) / 704x480 (NTSC) pixels in full frame rate (25/30fps). The Encoder Shall meet or Exceed the following requirements:
 - 1. Be equipped with a 10BaseT/100BaseTX Ethernet interface
 - 2. Be equipped with 1 analog video input, supporting composite and Y/C signals
 - 3. Provide resolutions up to 704x576 (PAL) / 704x480 (NTSC) pixels at 25/30 frames per second
 - 4. Support simultaneous Motion JPEG, MPEG-4 and H264
 - 5. Support both unicast and multicast MPEG-4
 - 6. Provide full duplex audio and be equipped with Line In and Line Out
 - 7. Provide the ability to control PTZ devices from third party manufacturer
 - 8. Support both IPv4 and IPv6
 - 9. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication
 - 10. Be equipped with 4 alarm inputs and 4 alarm outputs
 - 11. Include embedded event functionality, which may be triggered by alarm input, video loss or by video motion or audio detection
 - 12. Be supported by an open and published API
- D. The Video Encoder Blade and Video Encoder Shall be available as Rack Mountable or Desk-top versions.

2.5 VIDEO DECODERS

- A. Video Decoders will support up to (2) remote monitors with full screen camera views; (9) camera views per monitor.
- B. Camera displays approved only by OIG and IS
 - 1. Video Output - HDMI
 - 2. Video Decoding - H.265, H.264 and MPEG-4 Unicast and Multicast
 - 3. Security - Password protected user access HTTPS encryption
- C. Basis of Design: Costar #CV12MV2.

2.6 VIDEO CAMERAS

- A. Direct Vendor shall provide cameras.
- B. IP color cameras for video surveillance and monitoring of specific areas as shown on the drawings and confirmed with Postal Inspection Service and/or OIG through the USPS Project Manager with the following minimum capacities.
- C. Fixed, indoor/outdoor, dome type camera shall be a network camera with WDR, light finder, remote focus and zoom and shall incorporate Power over Ethernet. The camera shall meet or exceed the following requirements:
 - 1. Be equipped with a 10BaseT/100BaseTX Ethernet interface.
 - 2. Include a vandal resistant, indoor/outdoor casing with smoked transparent cover where required.
 - 3. Equipped with pixel counter.
 - 4. Image sensor: Progressive scan RGB CMOS 1/3 inch (effective).
 - 5. Lens: Varifocal, 3.0 – 10.5mm, F1.4: 92 degree – 34 degree horizontal/50 degree – 20 degree vertical.
 - 6. Minimum illumination:
 - a. Color: 0.15 LUX, F1.4.
 - b. B/W: 0.03 LUX, F1.4.
 - 7. Shutter time: 1/66,500 to 1 second; 60 Hz.

8. Pan/Tilt/Zoom: Digital PTZ, preset positions, guard tour.
 9. Angle Adjustment: Pan ± 180 degrees, tilt -5 to -85 degrees, rotation ± 95 degrees.
 10. Resolution: 1920x1080 (2 MP) to 160x90.
 11. Support simultaneous Motion JPEG, MPEG-4 and H264.
 12. Support both unicast and multicast MPEG-4.
 13. Support Power over Ethernet according to IEEE802.3af.
 14. Support both IPv4 and IPv6.
 15. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
 16. Be equipped with 1 alarm input and 1 alarm output.
 17. Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.
 18. Be supported by an open and published API.
 19. Casing: Indoor/Outdoor; IP66, NEMA 4x and IK10 impact resistant, aluminum dome with encapsulated electronics (1.8 lbs).
 20. Processor and Memory: 512 Mb RAM, 256 Mb Flash.
 21. Connectors: RJ45 10 BASE – T/100BASE-TX PoE terminal block for (1) alarm input and (1) alarm output.
 22. Operating Conditions: Indoor/Outdoor; -40 – 122 degrees F; 10 – 100 percent RH.
 23. Accessories: Mounting plate, smoked transparent cover. Provide ceiling, pendant or wall bracket mounting and connector kits.
 24. Basis of Design: Indoor/Outdoor, Axis #P3225-VE-MKII.
- D. Indoor/Outdoor PTZ camera shall be a network dome camera and shall incorporate 23x optical zoom, day/night functionality, and simultaneous Motion JPEG and MPEG-4 video streams. Camera shall meet or exceed the following requirements:
1. Be equipped with a 10BaseT/100BaseTX Ethernet interface.
 2. Include a vandal resistant, indoor/outdoor casing with smoked transparent cover.
 3. Feature a progressive scan CMOS sensor with Wide Dynamic Range (WDR), Electronic Image Stabilizer and day/night functionality.
 4. Be equipped with 23x optical zoom.
 5. Image Sensor: Progressive scan CMOS, 1/2.8".
 6. Lens: F1.6 – F4.2, 4.3 – 98.9 mm, angle of view: Horizontal – 57.9 to 2.9 degrees, Vertical – 33.9 to 1.6 degrees.
 7. Minimum Illumination: 0.2 LUX @ 30IRE F1.6.
 8. Shutter Time: 1/45,500s to 2s.
 9. PTZ:
 - a. E-Flip, 100 preset positions
 - b. 23x optical zoom and 12x digital zoom, total 276x zoom.
 - c. Pan: 360 degrees, 0.1 – 350 degrees/s.
 - d. Tilt: 180 degrees, 0.1 – 350 degrees/s
 10. Video Compression: H264 (MPEG – 4 part 10/AVC) baseline, main and high profiles motion J-PEG.
 11. Resolution: 1280 x 720 (1 MP) to 320x180.
 12. Frame Rate: Up to 60 fps in all resolutions.
 13. Support multiple, Motion JPEG and H264.
 14. Support Power over Ethernet according to IEEE802.3af.
 15. Support both IPv4 and IPv6.
 16. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
 17. Be equipped with full memory card for alarm triggers.
 18. Include embedded event functionality, which may be triggered by alarm input, camera temperature or by video motion or audio detection.
 19. Be supported by an open and published API.
 20. Casing:
 - a. Indoor/Outdoor; IP66, IK10 and NEMA 4x impact – resistant aluminum.
 21. Processor and Memory: 512 MB RAM, 256 MB Flash.

22. Connectors: RJ45 10 BASE – T/100BASE-TX PoE push-pull connector for (2) alarm input and (2) alarm output.
 23. Operating Conditions:
 - a. -22 - 131 degrees F; 10 – 100 percent RH.
 24. Security: Password protection, IP address filtering, HTTPS encryption, IEEE 802.1x network access control.
 25. Power: 24 to 34 VDC max 20W power over Ethernet IEEE 802.3at.
 26. Accessories: Mounting plate, smoke transparent cover. Provide ceiling, wall or pendant mounting and connector kits.
 27. Basis of Design: Indoor, Axis #P5624-EMK11.
- E. Exterior fixed camera shall be (3) mega pixel, outdoor, network type with WDR, light finder, remote focus and zoom and incorporate Power over Ethernet (PoE). The camera shall meet or exceed the following requirements:
1. Be equipped with a 10BASE-T/100BASE-TX Ethernet interface.
 2. Include a vandal proof resistant casing with smoked transparent cover.
 3. Equipped with pixel counter.
 4. Image Sensor – 1/2.8" Progressive scan RGB CMOS.
 5. Lens: F1.3 varifocal, 2.8 to 8 mm, P – iris.
 6. Day and Night: Automatic IR filter removal in low light conditions.
 7. Angle of view: 80 to 32 degrees horizontal.
 8. Minimum Illumination:
 - a. Color (HDTV): 0.22 LUX @ F1.3.
 - b. BW (HDTV): 0.02 LUX @ F1.3.
 9. Shutter Time – 1/66,000s to 2s.
 10. Video Compression, H264 (MPEG-4 part 10/AVC) baseline, main and high profiles motion J-PEG.
 11. Resolutions: 1920x1080 (3 MP) to 160x90.
 12. Frame Rate: Up to 60 fps in all resolutions.
 13. Video Streaming: Multiple motion JPEG and H264 controllable frame rate and band width, VBR/CBR H264.
 14. Support Power over Ethernet according to IEEE802.3af.
 15. Support both IPv4 and IPv6.
 16. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
 17. Be equipped with 1 alarm input and 1 alarm output.
 18. Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.
 19. Be supported by an open and published API.
 20. Casing: Outdoor; IP66 and NEMA 4X, IK10 impact-resistant aluminum with integrated humidifying membrane.
 21. Processor and Memory: 512 Mb RAM, 256 Mb Flash.
 22. Connectors: RJ45 10 BASE – T/100BASE-TX PoE terminal block for (2) alarm input and (2) alarm output.
 23. Power: Camera with built in fan and heater, 24 - 34 VDC max; 12.95 Watts, PoE (IEEE 802.3 af) class 2.
 24. Operating Conditions: -40 - 122 degrees F, Humidity 10 - 100 percent RH (non-condensating).
 25. Accessories: Outdoor, weather shield, cable shield, 16 ft. network cable with pre-mounted gasket. Provide pole attachment.
 26. Basis of Design: Axis #P1365-EMK11.
- F. Products shall utilize internal or external surge protection such that a normally occurring power surge shall not void any manufacturer's warranty.
- G. Product model numbers indicated with the cameras are for convenience only. Errors or obsolescence shall not relieve the furnishing of cameras, which meet the technical description given in specifications noted or required by function designated.

2.7 VIDEO MONITORS

- A. Provide 21.5-inch LCD flat-panel color monitors with the following minimum capabilities.
1. Product Requirements:
 - a. Video Interface Connections: BNC Video – 1 in, BNC Video – 1 out, HDMI – 1 in, VGA – 1 in, Audio – 1 in, Audio – 1 out.
 - 1) Switching between inputs shall be performed using a front panel control.
 - 2) VGA resolution shall be equal to the native resolution of the installed Digital Video Recorder, if applicable.
 - b. Input Power: 120VAC, 60Hz (a power adaptor may be used to provide this voltage).
 - c. Mounting: Each monitor shall be wall or desktop mounted. VESA mounting holes shall be provided and a series of optional VESA compliant mounts shall be made available at extra cost.
 - d. Operating Temperature: Range shall be equal to or greater than 0 to 40 degrees Celsius.
 - e. Humidity: Withstand a minimum of 20% to 80% humidity.
 - f. Resolution: 1920 x 1080 SXGA.
 - g. Pixel Pitch: 0.2482 x 0.2482 mm.
 - h. Brightness: 250 cd/m².
 - i. Contrast Ratio: 1000:1.
 - j. Backlight Type: LED BLU.
 - k. Panel Aspect Ratio: 16:9.
 - l. Warranty: 3 years – parts/labor.
 - m. Adjustments: Must support on-screen display for setup and adjustment of monitor parameters.
 - n. Colors: Must support a minimum of 16.7 million colors.
 - o. Basis of Design: Orion #22RCE.
- B. The contractor shall provide a wall mounted UPS unit at each monitor station location.
1. The UPS shall be line-interactive, rated 1000VA/900W with (18) minute battery reserve at 450 Watts; Tripp-Lite #SMART1000RMXL2U and #2POSRMKITWM wall bracket.

2.8 CAMERA POWER SUPPLIES

- A. Based on the Construction Documents, the Direct Vendor will identify camera power source. When required the Direct Vendor will provide power supplies for camera.
- B. Interior Fixed Cameras: Camera shall be powered by PoE from network switch. Maximum total cable length (including horizontal and vertical distances) from switch to camera is 300 ft. Provide ethernet cable extenders for total cable lengths exceeding 300 ft., but less than 800 ft. a mid-span device is required.
1. Network switch shall be equipped with UPS power supply.
- C. Interior and Exterior PTZ Cameras (non “Blue Sky”): Camera shall be powered by PoE from network switch. Maximum total cable length (including horizontal and vertical distances) from switch to camera is 300 ft. Provide ethernet cable extenders for total cable lengths exceeding 300 ft., but less than 800 ft. A mid-span device is required.
1. Network switch shall be equipped with UPS power supply.
- D. Exterior Building Wall Mounted Fixed Cameras (non “Blue Sky”): Camera and enclosure shall be powered by PoE from network switch. Maximum total cable length (horizontal and vertical distances) from switch to camera is 300 ft. Provide ethernet cable extenders for total cable lengths exceeding 300 ft., but less than 800 ft. a mid-span device is required. Provide fiber cabling for total cable lengths exceeding 800 ft.
1. Network switch shall be equipped with UPS power supply.
 2. Camera enclosures shall be equipped with integral heaters and defoggers.
 3. All exterior building wall mounted cameras are to be considered as “non blue-sky type”.

- E. Exterior Fixed Cameras (Blue Sky): Exterior cameras mounted remote from the building exterior wall are considered "Blue-Sky" type.
 - 1. Wall mounted environmental enclosure power supplies shall be located in a suitably protected area near the camera. Provide individually fused power supplies.
 - 2. Pole mounted Pole mounted environmental enclosure power supplies shall be located within a NEMA 4 enclosure at the pole. Provide individually fused power supplies.
 - 3. Camera enclosures shall be equipped with integral heaters and defoggers.
- F. Fixed and PTZ cameras requiring cable runs in excess of 800 ft. and all exterior cameras not building wall mounted and exposed to the elements ("Blue Sky" type) shall utilize fiber optic transmission equipment and shall be powered by individually fused power supplies.
- G. Provide a means for disconnecting camera power supplies from main power at the power supply enclosure, either through a detachable power cord, master fuse or circuit breaker located in the power supply cabinet, or other UL approved switching device.
 - 1. Power supplies shall be rated to support 200% of the actual (nominal) power loading.
 - 2. Each power supply shall be fed from a dedicated 120Volt circuit.
 - 3. Adjacent cameras shall be fed from different power supplies.
 - 4. Multiple camera power supplies are available in the correct application.
- H. Enclosures housing camera power supplies, media converters and 120 volt receptacle shall contain interior backplanes for mounting of all components and shall be provided by the General Contractor.

2.9 VIDEO CAMERA HOUSINGS AND MOUNTS

- A. Direct Vendor shall provide housings and mounts as required for all camera types with the following minimum capabilities:
 - 1. Interior Cameras:
 - a. All cameras shall be in a housing that is coordinated with adjacent finishes with the appropriate mounting hardware. Selection of housings and mounts, including incremental changes to paint colors, dome materials, and cosmetic finishes shall be approved by the USPS or their authorized agent.
 - b. All housings shall be sufficiently dust and moisture resistant to withstand normal environmental conditions in their chosen installation location.
 - c. Hardware shall be provided to ensure tamper-resistant mounting in public access areas after normal business hours without modification to the integrity of the housing.
 - d. Where used, pendant mounts shall be suitable for use as wall, ceiling and column mounts. Pendant mounts shall attach to the appropriate camera housing using Direct Dealer provided standard threaded schedule 40 rigid iron pipes. Pipe lengths of 10 feet or less are to be a minimum of 1-inch diameter. Pipe lengths exceeding 10 feet are to be a minimum of 1-1/2 inch in diameter. Exterior pipe shall be galvanized.
 - e. All mounts shall incorporate installer provided safety chain or cable of sufficient endurance to support 2 times the weight of the equipment.
 - f. The General Contractor shall terminate the Ethernet, camera power and fiber optic cabling to the patch panels provided by the Direct Vendor and located in the upright racks.
 - 2. Exterior Cameras:
 - a. Environmental: Thermostatically controlled heaters and blowers with defrosting capabilities.
 - b. Moisture: Rainproof seals and gaskets.
 - c. Wind Resistance: Rated for 80mph sustained winds, minimum.
 - d. Ambient Temperature Rating: -22 to 131 degrees F.
 - e. Areas with more demanding environmental conditions will be granted a deviation from this specification.

2.10 ETHERNET CABLE EXTENDERS

- A. Direct Vendor shall provide ethernet cable extenders as required.
- B. Cable extenders, or fiber optics, shall be used at the discretion of the design engineer or when one or more of the following conditions are met:
 - 1. Utilize mid span cable extenders where the total camera cable length (including horizontal and vertical distances) exceeds 300 ft. but is not more than 800 ft. and it is not practical to use a remote switch and bridge to the head-end switch.
- C. Modules located at the field devices shall be located in the camera enclosure or junction box close to the device field device module derives power from the head end module and does require local power.
- D. Modules located at the head-end are standalone modules mounted in the equipment rack.

2.11 CABLING

- A. Cabling requirements:
 - 1. Interior cable runs from cameras to the CCTV headend that do not exceed 800 feet shall be category 6; utilize plenum rated where required.
 - 2. Interior cable runs exceeding 800 feet from cameras to the CCTV headend shall be (2) count 62.5/125, OM1, multi-mode, indoor rated fiber cable; utilize plenum rated where required.
 - 3. Exterior cable runs routed to remotely located "blue sky" cameras shall be (2) count, 62.5/125, OM1, multi-mode, indoor/outdoor rated fiber cable. Where multiple fiber cables are routed within a common conduit provide innerduct separation of each cable.
 - 4. All exterior cable runs shall be contained in conduit.
- B. Camera Ethernet Data Cabling:
 - 1. 4-Pair Category 6 Unshielded Twisted Pair Cable shall be provided and installed by the General Contractor.
 - 2. The General Contractor shall provide and install the RJ-45 jack as shown on the drawings. The General Contractor shall terminate and test the CAT-6 cable and RJ 45 jacks.
 - 3. Complies with individual characteristics established in ANSI/TIA/EIA-568-B terminated to T568A and all addendums for Category 6 cable performance specification.
 - 4. Cabling and wire ways shall be installed in accordance to sections 260533.
- C. Power cable shall be appropriately sized to ensure that any signal loss as a function of cable length does not prohibit the delivery of sufficient voltage and current from the power supply to the powered device. A separate power cable may be required by the design engineer as shown on the drawings.
- D. Cable shall have footage markings to Identify CCTV system Cable lengths.

2.12 CATEGORY 6 CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the work include the following:
 - 1. Belden
 - 2. Berk-Tek
 - 3. CommScope Uniprise
 - 4. General Cable - Preferred
 - 5. Leviton
 - 6. Ortronics (Legrand)
 - 7. Panduit
 - 8. Product options and substitutions. Substitutions: Permitted if approved by Direct Vendor and Manufacturer.

- B. Conductors: 4 twisted pair, minimum 24 AWG, solid copper.
 - 1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire area where cable is installed is not considered a return air plenum according to any applicable codes.
 - 2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6 cable performance specification.
 - 3. Nominal Impedance: 100 ohms plus or minus 15 percent.
 - 4. Certified and capable of performing to a minimum of 250 MHz.

2.13 OM1 FIBER CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Belden
 - 2. Berk-Tek
 - 3. CommScope Uniprise
 - 4. Corning Cable Systems
 - 5. General Cable - Preferred
 - 6. Leviton
 - 7. Optical Cable Corp.
 - 8. Ortronics (Legrand)
 - 9. Superior Essex
 - 10. Product options and substitutions. Substitutions: Permitted if approved by Direct Vendor and Manufacturer.
- B. Conductors: 2 / 6 Strand:
 - 1. Provide multi-strand, 62.5/125 micron, tight-buffered, multimode, OM1 fiber cabling rated as follows:
 - a. 1 Gb/s < 150m @ 850 nm.
 - b. 1 Gb/s < 1000m @ 1300 nm.
 - 2. The fiber cabling shall meet the following specifications:
 - a. EIA/TIA-492AAAA-A-1997, "Detail Specification for 62.5 micron Core Diameter/125 micron Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers."
 - b. IEC 60793-2-10, "Product specifications – Sectional specification for category A1 multimode fibers", Type A1b 62.5/125 micron graded index fiber.
 - 3. Terminate fiber strands onto "SC" ports.
 - 4. Provide individually insulated plenum rated strands under common plenum rated sheath, unless entire area where cable is installed is not considered a return air plenum according to any applicable codes.
 - 5. Fiber cabling shall comply with individual characteristics established in TIA-568-C including all addendums for fiber optic cable performance specification.
 - 6. Interior fiber cabling shall be indoor rated.
 - 7. All exterior or underground fiber cable shall be indoor/outdoor rated.

2.14 ACCESSORIES

- A. Lightning/Surge Protection: Products shall utilize internal or external (power and low voltage) surge protection such that a normally occurring power surge shall not void any manufacturer's warranty.
 - 1. Rack mounted surge protectors shall be provided within the headend and remote node cabinets to protect the CAT-6 cabling serving the exterior, building wall mounted cameras.
- B. The headend equipment rack shall utilize a standalone UPS sized for a minimum of 10 minutes of battery run-time. The UPS shall be provided by the Direct Vendor. General Contractor will provide dedicated 30 Amp, 120VAC power.

1. The UPS shall be line-interactive, rack mounted and rated 3kVA/2.88kW with a 10 minute battery reserve at 1440 Watts; Tripp-Lite #SMART3000RMXL2U.
- C. Upright Racks: The Direct Vendor shall provide and install upright equipment racks to provide sufficient mounting space for the required equipment.
 1. Racks shall be all metal construction conforming to EIA standards with 19 inch equipment mounting opening and 1-3/4 inch vertical spacing of equipment. Rack rails shall be punched with captive nuts, 10-32 screws and nylon washers.
- D. The General Contractor shall terminate the Ethernet, camera power and Fiber Optic cabling to the patch panels provided by the Direct Vendor and located in the Upright Racks.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting Work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
 1. Verify that power and video outlets are in correct locations.
 2. Verify that building structure for attachment of equipment mounting devices is in place.
- C. Report in writing to USPS Project Manager any prevailing conditions that will adversely affect satisfactory execution of Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Postal Service.
- E. Provide required power outlets, low voltage power supplies, interconnecting cables, hardware and equipment for a complete and operable system.
- F. Camera locations are to be reviewed and approved by a Postal Inspector, through the USPS Project Manager prior to installation of conduit and cabling.

3.2 INSTALLATION

- A. Install all equipment in accordance with Direct Vendor's published instructions. Installation must be done by the Direct Vendor to assure proper installation and accountability. This includes, but is not limited to the following:
 1. All hardware used to secure equipment to racking shall include nylon or other non-metallic washer or grommet between the screw head and equipment panel to prevent any damage to the equipment.
 - a. Rack mount screws shall be self-centering Philips-head configuration unless specialized tam-per-resistant hardware has been specified.
 - b. Screws shall be tightened in such a manner as to allow their removal with common hand tools.
 2. Any equipment placed on shelving mounted on an incline of greater than 2 degrees shall be secured to the rack or shelving in such a manner as to prevent movement of the equipment in the direction of the incline. Such fastening shall be done in a manner as to preserve the integrity of the equipment case and chassis, and shall in no way jeopardize warranty coverage of the device.
 3. All equipment cabling shall be dressed in such a manner as to ensure a neat and clean appearance.

4. Cable break-outs shall be at 90-degree angles from the harness or chase, and all chases shall be parallel to or at 90-degree angles from the rack frame.
 5. Cables are to be secured to the rack frames at sufficient intervals to ensure that the weight of the cable will not contribute to fatigue or early failure of that cable or the device and connector to which it is attached.
 6. Sufficient excess cable shall be provided in "service loop locations" to ensure that the cable may be re-connected without requiring the addition of extension pieces.
 7. All permanent cabling shall be mechanically numbered in a manner consistent with Direct Vendor's written system documentation.
 8. Wiring for all equipment shall be tie-wrapped (except as indicated below) so that all connectors in a bundle can be removed and re-installed without the possibility of cross connecting.
 9. CAT-6 and Fiber Optic cables shall utilize Velcro fasteners in place of tie wraps to eliminate the risk of over-tightening cable bundles and affecting the strength or rated performance of the cable.
 10. Where wiring is routed through sheet metal or over frame members, the metal edges shall be covered with flexible grommeting or edge dressing (such as automobile door edge trim).
 11. Double-sided foam tape shall not be used to secure any equipment, terminal blocks, or accessory devices. All device mounting shall be of a permanent nature.
 12. All excess length AC cords are to be tie-wrapped out of the way. Where possible, they shall be routed in a separate bundle a minimum of 6 inches away from any signal or control cable.
 13. Exposed wires run to wall mounted cameras shall be fed through tubing or the body of the mount to present a professional appearance.
 - a. Any accessible cables that can be reached by an individual standing on the floor, a stool, or a small stepladder shall be encased in protective tubing or armored sheathing to prevent tampering or cutting with common hand tools.
 14. Care shall be exercised at all times to protect Postal Service property. For example, ladders shall not be placed against wallpapered or finished surfaces, equipment or furnishings; desks or countertops shall not be used in lieu of ladders.
 15. On pendant mounted cameras, label each camera on all four sides with three-inch numbers supplied by the Direct Vendor. Numbers shall be stenciled or laminated vinyl in a contrasting color to the camera housing. Camera number shall match and correspond to the Last Octet of camera IP Address and/or printed map provided by the Direct Vendor. Numbers shall not be placed on lower dome or any area that would obstruct camera viewing.
 16. Ensure that pendant mounted cameras are hung from stable, vibration free mounting platforms, using guy-wires or other support mechanisms to ensure stability where required. Mount cameras below any suspended lighting to avoid glare or reflection on camera dome and/or lens.
 17. Perform complete programming of the system, in coordination with the USPS Project Manager and Postal Inspector, or designated representative. Programming shall include, but not be limited to, elimination of duplicate or redundant titling information, synchronization of system clocks, camera sequences, dome presets, salvos and tours. Programming of any system passwords or limiting of accessibility prior to commissioning and training is prohibited.
 18. Provide the Direct Vendor red-lined drawings with job condition changes required to provide accurate close-out documentation.
- B. Power requirements shall be determined by actual equipment used.
- C. Ensure that:
1. All applicable statutes, ordinances, regulations, license requirements and codes are fully complied with.
 2. All required permits are obtained.
 3. All required inspections are conducted.
 4. All necessary certificates are issued, obtained, and delivered to the Postal Service.
 5. All equipment installations and mounting are in strict accordance with requirements for applicable seismic classification.
- D. Arrange all components to be mounted in the console(s)/rack(s) in accordance with Direct Vendor and/or Postal Service provided System Elevation drawings. Design shall provide a neat appearance and accessibility for servicing equipment.

- E. Provide required power outlets, interconnecting cables, hardware and equipment for a complete and operable system.
 - 1. Power, 120VAC: As required by codes and standards for the facility.
 - 2. Where conduit is used, a minimum of 40% excess capacity shall be provided for future use.
- F. Install cameras as shown on the drawings and in accordance with the USPS specifications.
 - 1. Provide 84-inch minimum headroom below cameras and their mountings. Where necessary modify mounting type to maintain clearance.
- G. All CAT-6 cable connections must be made to 8 pin modular jacks or plugs at the device and to 8 pin modular patch panel at the head end to the T568A standard. Patch panel shall be terminated per direct vendors documentation/drawings by the General Contractor.
- H. When not installed in cable trays, cable (CAT-6, fiber optic, and low voltage power) shall be supported with wide base cable hangers rated for proper support of CAT-6, fiber optic, and inner-duct cables (compliant with UL and NEC requirements for structured cabling).
 - 1. Cable hangers shall be installed every 3 to 6 feet and shall be rated to support the weight of the cable multiplied by a factor of three (3).
 - 2. Cable tray for camera wiring shall not include any low voltage AC wiring.

3.3 CAT-6 COPPER AND FIBER OPTIC CABLE TESTING

- A. Section 014000 – Quality Requirements: Field testing and inspection.
- B. Testing and Certification Overview:
 - 1. The Contractor shall provide Fluke Copper/Fiber equipment and materials for the testing of all installed copper and fiber camera cabling. For Category 6 copper, the supplier shall employ Level III compliant test equipment. The contractor shall provide camera cabling test results to the USPS.
 - a. The test reports shall be typewritten and shall provide complete listings of all tested parameters. Testing instruments shall be annually tested and calibrated.
 - b. The Contractor shall provide all equipment and services necessary to test the cabling.
 - c. The Contractor shall re-terminate and retest any cable found to be defective.
 - d. Cable testing shall be performed prior to installation of any cameras or node cabinets.
- C. Copper Cable Testing:
 - 1. Test parameters shall include:
 - a. Wire map.
 - b. Insertion loss (attenuation).
 - c. DC loop resistance.
 - d. Return loss at camera.
 - e. NEXT, NEXT at camera.
 - 2. Perform end-to-end tests of each 4-pair cable as follows:
 - a. Pair/conductor for proper pinouts and continuity.
 - b. Ground fault.
 - c. Proper termination, shorts, and crossed pairs.
 - d. Channel attenuation per TIA-568-C, including all addendums.
 - e. Channel bi-directional worst case near end cross talk (NEXT) at frequencies up to 250 MHz, per TIA-568-C, including all addendums.
 - f. Measured effective cable run length.

3.4 CONSTRUCTION COORDINATION

- A. The Direct Vendor shall interface with Other Work.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Inspection and testing procedures.
- B. Inspection:
 - 1. The Direct Vendor shall inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
 - 2. The Direct Vendor shall verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.
- C. Testing:
 - 1. The Direct Vendor shall Perform tests and provide test equipment, tools, and personnel required to conduct system tests and inspections. These tests shall include video quality and PTZ operation (where applicable) for all cameras.
 - 2. The Direct Vendor shall provide an actual demonstration of each system function.
 - 3. The Direct Vendor shall conduct system acceptance test upon completion of installation using pre-approved procedures. Test shall consist of system, subsystem, and device level acceptance tests, including software.
 - 4. The Direct Vendor shall use accepted Checklist for system testing.
 - 5. The Direct Vendor shall ensure that test procedures confirm each specification statement and manufacturer requirement has been met or exceeded. An actual demonstration of each system function and a simulation of each system failure shall be provided.
 - 6. An acceptance test period of thirty days shall begin at the start of the acceptance test. Any system failure during the acceptance test period will suspend the acceptance test. The thirty-day test period will restart when the required repairs have been made and certified.
 - 7. Perform all tests in the presence of the USPS Project Manager. The Postal Service reserves the right to accept any portion or activate any phase prior to acceptance of entire system.

3.6 CLEANING AND ADJUSTING

- A. Adjust manual lens irises to meet lighting conditions.
- B. Adjust field of view for each camera per USPS Project Manager direction.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
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SECTION 283100

FIRE EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM (EVACS)

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification provides the minimum requirements for the Fire Emergency Voice/Alarm Communication System. The system shall include, but not limited to all equipment, materials, labor, documentation and services necessary to furnish and install a complete, operational system to include but not limited to the following functions:
 - 1. Initiating devices.
- B. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.
 - 2. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 260533 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

- A. All work and materials shall conform to all applicable federal, state and local codes and regulations governing the installation. If there is a conflict between the referenced standards, federal, state or local codes, and this specification, it is the bidder's responsibility to immediately bring the conflict to the attention of the engineer for resolution. National standards shall prevail unless local codes are more stringent. The equipment and installation shall comply with the current provisions of the following codes and standards.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code.
 - 2. NFPA 72, National Fire Alarm Code.
 - 3. NFPA 101, Life Safety Code.
- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL 521 - Heat Detectors for Fire Protective Signaling Systems.

NOTE: Control equipment shall be listed to comply with both UL864 and UL2572 standards.
- D. Federal Codes and Regulations:
 - 1. Americans with Disabilities Act (ADA).
- E. International Standards Organization (ISO):
 - 1. ISO-9000
 - 2. ISO-9001
- F. Factory Mutual (FM):
 - 1. Provide factory mutual approval.
- G. International Code Council:
 - 1. International Building Code.
 - 2. International Fire Code.
 - 3. International Mechanical Code.

1.3 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): See Public Authorities.
- B. Engineer of Record: A Professional Engineer Registered in the State where the project is located who undertakes design of the fire protection system.
- C. Owner: Building/facility owner, landlord/lessor, tenant/lessee, Insurance Carrier or any designated representative of these entities.
- D. Public Authorities: Local, State or Federal government body having jurisdiction over any portion of the project. This includes, but is not limited to: Fire Departments, Fire Marshal Offices, Aviation Authorities, Insurance Regulatory Boards, etc.
- E. Approved: Unless otherwise stated, materials, equipment or submittals approved by the Authority or AHJ.
- F. Circuit: Wire path from a group of devices or appliances to a control panel or transponder.
- G. Central Station: A remote supervising station (facility) that is listed for central station remote monitoring in accordance with NFPA 72. The central station serves as the constantly attended location that receives alarm, supervisory or trouble signals from the protected premises fire alarm system.
- H. CPU: The central computer of a multiplex fire alarm or voice command control system.
- I. EVACS: Dedicated in building "Emergency Voice/Alarm Communication System" utilized for originating and distributing voice instructions and evacuation signals pertaining to a fire emergency to the occupants of a building.
- J. FAAP: Fire Alarm Annunciator Panel.
- K. FACP: Fire Alarm Control Panel.
- L. FM: FM Global (Factory Mutual).
- M. MPSA: Medium Power Speaker Array.
- N. IDC: Initiating Device Circuit.
- O. LCD: Liquid Crystal Display.
- P. NAC: Notification Appliance Circuit.
- Q. NICET: National Institute for Certification in Engineering Technologies.
- R. NRTL: Nationally Recognized Testing Laboratory.
- S. SLC: Signaling Line Circuit.
- T. Style 1: As defined by NFPA 72, Class B.
- U. Style 4: As defined by NFPA 72, Class B.
- V. Style 6: As defined by NFPA 72, Class A.
- W. Style 7: As defined by NFPA 72, Class A.
- X. Style B: As defined in NFPA 72, Class B.

- Y. Style D: As defined in NFPA 72, Class A.
- Z. Style Y: As defined in NFPA 72, Class B.
- AA. UL Listed: Materials or equipment listed and included in the most recent edition of the UL Fire Protection Equipment Directory.
- BB. Zone: Combination of one or more circuits or devices in a defined building area.

1.4 SYSTEM DESCRIPTION

A. Summary:

1. Provide all permits, labor, equipment, materials and services to furnish and install a fully tested functional, UL Listed, code compliant, intelligent addressable networked, Fire Emergency Voice/Alarm Communication System (EVACS) including duct initiation, all raceways and wiring connected to an existing system.
2. All equipment shall be new and the current products of a single manufacturer, actively engaged in the manufacturing and sale of digital fire detection devices for over ten years.
3. Also included are system wiring, fiber optic cable, raceways, pull boxes, terminal cabinets, mounting boxes, and any accessories and miscellaneous items required for a code compliant system.
4. The system drawings show the intended coverage and suggested device locations. Final device quantity, location, and AHJ approval are the responsibility of the contractor.
5. The final system shall be complete, tested, and ready for operation as described elsewhere in this specification, before owner acceptance.
6. Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed, is compatible with other systems, and will accommodate the future requirements and operations of the building owner. All specified operational features must be met without exception.
7. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional protected premises fire alarm system (System). The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.
8. Certification that the entire system(s) has/have been inspected and tested, is/are installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and ULI listings, and is/are in proper working order. Contractor shall use "Fire Alarm System Certification and Description" as required by NFPA 72.

B. Related Work:

1. Work and/or equipment provided in other sections and related to the fire alarm system shall include, but not be limited to:
 - a. Duct smoke detectors shall be furnished, wired and connected by the electrical contractor.

C. General:

1. Furnish and install a complete UL list/certified, modular, non-coded, independently point addressable, intelligent Fire Alarm System as described herein and as shown on the plans.
2. System shall be dedicated to fire service.
3. The system shall provide a one-way multi-channel emergency communication sub-system for the distribution of emergency messages to facility occupants.

D. System Components:

1. Provide and install a new fire detection and alarm system that shall consist of:
 - a. Duct smoke detectors.

1.5 SEQUENCE OF OPERATIONS

- A. Duct Smoke Operation:
 - 1. The Alarm activation of any duct smoke detector, the following functions shall automatically occur:
 - a. The internal audible device shall sound at the control panel and remote annunciator.
 - b. The LCD display shall indicate all applicable information associated with the alarm condition including; device type, device location and time/date.
 - c. All system activity/events shall be recorded on the system printer and system history file.
 - d. Any remote or local annunciator LED's associated with the alarm shall be illuminated.
 - e. Shutdown the local air handling unit.
 - f. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.

1.6 SYSTEM CONFIGURATION

- A. General:
 - 1. The existing Life Safety System equipment is arranged and programmed to provide a system for the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department (when required), the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building occupants.
 - 2. The existing System utilizes independently addressed, smoke detectors, heat detectors and input/output modules as described elsewhere in this specification.
- B. Initiating Device Circuits:
 - 1. The Initiating device circuits (IDC) used to monitor manual fire alarm stations, smoke and heat detectors, waterflow switches, valve supervisory switches, fire pump functions, and air pressure supervisory switches shall be Class B.
- C. 24 VDC Notification Appliance Circuits:
 - 1. 24 VDC Notification appliance circuits (NAC) shall be Class B. All notification appliance circuits shall have a minimum circuit output rating of 2 amp @ 24 VDC. The notification circuits shall be power limited. Non-power limited circuits are not acceptable.
- D. Signaling Line Circuits (SLC-Data Circuits):
 - 1. The signaling line circuit shall communicate from a panel/node to analog/addressable detectors, input modules, output modules, isolation modules and notification appliance circuits.
 - 2. Each signaling circuit connected to addressable/analog devices shall provide a minimum of 20 spare addresses.
 - 3. The signaling line circuit (SLC) connecting all components Class B (style 4).

1.7 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: For each type of Product required.
 - 2. It shall be the contractor's responsibility to inspect the job site and become familiar with the conditions under which the work will be performed. These conditions should be used to adjust the submittals.
 - 3. Shop Drawings: Include plans, elevations, sections, details, and attachments necessary:
 - a. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
 - b. Include voltage drop calculations for notification appliance circuits.
 - c. Include 25 percent spare capacity on each signal circuit so that additional devices can be added.

- d. Include substantiating emergency (battery) and normal power supply calculations for supervisory and alarm power requirements and calculations of notification device circuit loading (end of circuit voltage drop) to ensure proper operation of all devices.
 - e. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - f. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits. Drawing scale shall match engineers design drawings.
 - g. Include complete schematic circuit diagrams for system, including all equipment. Wiring diagram shall show point to point connections between all system components.
 - h. Include descriptions of system operation, annunciator schedule showing titles for each zone, and manufacturer's literature marked to show model and catalog number for all equipment.
 - i. Include complete riser diagrams for system indicating wiring sequence of all added alarm devices and control equipment shall be included with submittal data.
 - j. Include requirements of the Integrated Automation, Security, and Clean-Agent System and data sharing details.
- B. General Submittal Requirements:
- 1. Submit for approval four 4 sets of shop drawings and submittal documentation to the consulting engineer for review and comment. Drawing and submittal documentation sets shall be bound. Additional copies may be required at no additional cost to the project.
 - 2. Contained in the title block of each drawing shall be symbol legends with device counts, wire tag legends, circuit schedules for all addressable appliance circuits, the project name/address, and a drawing description which corresponds to that indicated in the drawing index on the coversheet drawing. A section of each drawing title block shall be reserved for revision numbers and notes.
 - 3. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified fire-alarm technician, Level III minimum.
- C. Construction Drawings:
- 1. The System's Contractor shall prepare fire alarm system installation drawings for permitting in accordance with Florida Administrative Code Rule 61G15. Drawings shall incorporate all required information per Rule 61G15 and be signed and sealed by a registered professional engineer meeting the requirements of Rule 61G15. The System's Contractor furnishing and installing the fire alarm system is responsible for preparation of these drawings and getting drawings approved by the Authority Having Jurisdiction (AHJ).
- D. Systems Contractor Qualifications:
- 1. The contractor directly responsible for this work shall be a systems contractor, who is and who has been regularly engaged in the furnishing and installation of commercial and industrial fire alarm systems of this type and size for at least the immediate past 5 years. All equipment shall be installed by a technician with experience installing the manufactured system or a recognized training school or course for the installations of this type system. The contractor shall, if requested by the engineer; show proof of a specific individual's training. The system's contractor shall directly employ a suitable number of skilled systems installers whose normal work is systems installation and who shall install and make the wire and cable connections thereto.
 - 2. As part of the project submittal, it shall be demonstrated to the satisfaction of the engineer that the systems contractor has adequate plant and equipment to do the work properly and expeditiously, adequate staff and technical experience.
- E. Test Reports: Submit the following reports directly to USPS Project Manager from Manufacturer's Quality Control Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
- 1. Pre-test.
 - 2. Acceptance test.

- F. Certificates: Manufacturer's certificate certifying that components and Products meet or exceed specified requirements.
- G. Qualification Documentation:
 - 1. Submit documentation of manufacturer and installer experience indicating compliance with specified qualification requirements. Include lists of completed projects with project names and addresses, and names of Engineers and Owners.
 - 2. Fire alarm contractor license issued by State or local authority having jurisdiction.
- H. Manufacturer's Field Reports: Submit the following reports directly to USPS Project Manager from Manufacturer's Quality Control Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.
 - 1. Preparatory inspection.
 - 2. Initial inspection.
 - 3. Follow-up inspection.
 - 4. Final inspection.
- I. A copy of the installing technician's NICET certification shall be provided.
- J. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
 - 1. Operation and Maintenance Data: Project specific operating manuals covering the installed Life Safety System. A generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement. Include user's software data and recommendations for spare parts to be stocked at the site. Provide names, addresses, and telephone numbers of service organizations that stock repair parts for the system.
 - 2. Operations and maintenance data for fire-alarm system and components shall include the following:
 - a. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - b. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
 - c. Record copy of site-specific software.
 - d. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
 - 1) Frequency of testing of installed components.
 - 2) Frequency of inspection of installed components.
 - 3) Requirements and recommendations related to results of maintenance.
 - 4) Manufacturer's user training manuals.
 - e. Manufacturer's required maintenance related to system warranty requirements.
 - f. Abbreviated operating instructions for mounting at fire-alarm control unit.
 - g. Copy of NFPA 25.
 - 3. Project Record Documents: As-Built drawings consisting of a scaled plan of each building showing the placement of each individual item of the Life Safety System equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway. All drawings must reflect point to point wiring, device address and programmed characteristics. All drawings shall be provided in AutoCAD format. A hard copy plot of each sheet shall also be provided. Provide the application program listing for the system (to the facility) as installed at the time of acceptance (disk, hard copy printout, and all required passwords).
 - a. The Contractor shall provide three bound copies of the following, to be forwarded to the Owner at completion of project:
 - 1) As-built wiring and conduit layout diagrams showing all fire alarm devices on floor plans, including wire color code and terminal numbers, and showing all interconnections in the system.
 - 2) Electronic circuit diagrams of all new notification devices.
 - 3) Technical literature on all major parts of the system, including, smoke detectors.
 - 4. Record of Completion: Figure 4.5.2.1 NFPA 72.

- K. Maintenance Material Submittals:
1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. Smoke Detectors: Quantity equal to 10 percent of amount of each type installed.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm experienced in manufacturing equipment of the types and capacities indicated that have record of successful in-service performance with minimum 10 years documented experience. Prime system manufacturer and manufacturers of major system components required to qualify separately.
1. Service Center: The System Supplier shall maintain a service organization with adequate spare parts stock within 75 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor.
 2. System equipment shall be from a single manufacturer and shall be supported by a manufacturer authorized, established service organization that shall stock parts for the equipment supplied.
 3. Equipment shall be manufactured by a firm that has been actively manufacturing fire alarm systems for a minimum of 7 years and that offers a 3 year warranty on all control equipment.
 4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 5. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.
- B. Installer Qualifications: Experience with systems of the type and scope indicated and certified as authorized service representative of the prime system manufacturer with minimum 5 years documented experience.
1. System shall be installed by a single contractor that assumes responsibility for system components and their compatibility.
 2. Only manufacturer's certified installers with NICET Level III or higher shall be utilized.
 3. The addressable fire alarm system shall be connected, programmed, and tested only by the manufacturer or by an authorized distributor who stocks a full complement of spare parts for the system. Technicians performing this service shall be trained and individually certified by the manufacturer for the model of system being installed and NICET Level II or greater. Copies of their certifications must be included with the contractor's submittal to the engineer, prior to installation. The submittal cannot be approved without this information.
- C. Regulatory Requirements:
1. Calculations, Product Data, Shop Drawings: Provide stamp of approval from Public Authorities.
 2. Comply with requirements of Public Authorities for submittals, approvals, materials, installation, inspections, and testing.
 3. Comply with requirements of USPS Project Manager and Owner's insurance underwriter for submittals, approvals, materials, installation, inspections, and testing.
 4. Provide certificate of compliance from Public Authorities indicating approval of field acceptance tests.
 5. Conform to applicable code for submission of design and calculations, reviewed shop and erection drawings and as required for acquiring permits.
 6. Cooperate with regulatory agency or authority and provide data as requested.
- D. Pre-Installation Meetings:
1. Convene a pre-installation meeting one week prior to commencing Work of this Section. Final device and equipment locations shall be coordinated with the Plant and Engineer during this meeting.
 2. Require attendance of parties directly affecting Work of this Section.
 3. Review conditions of operations, procedures and coordination with related Work.
 4. Agenda:
 - a. Tour, inspect, and discuss conditions of building and building structure.
 - b. Review system design and requirements.

- c. Review required submittals, both completed and yet to be completed.
- d. Review system Drawings and data.
- e. Review and finalize construction schedule related to system and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
- f. Review required inspections, testing, certifying, and material usage accounting procedures.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall be responsible for all receiving, handling, and storage of his materials at the job site.
- B. Overnight storage of materials is limited to the assigned storage area. Materials brought to the work area shall be installed the same day or returned to the assigned storage area unless previously approved by the Owner. Store equipment in a clean, dry space and protect from dirt, fumes, water, construction debris, and physical damage.
- C. The Contractor shall remove rubbish and debris resulting from his work on a daily basis. Rubbish not removed by the Contractor will be removed by the Owner and back-charged to the Contractor.
- D. Handle equipment to prevent internal components damage, breakage, denting, and scoring enclosure and finish.
- E. Do not install damaged equipment.
- F. Do not install or connect any smoke detectors (spot or duct) before areas where detectors are installed are cleaned and ready for occupants as indicated in NFPA-72. If detectors are installed before areas are cleaned, and found to be contaminated at time of final commission or soon after. The installing contractor shall replace detectors with new at no cost to the owner.
- G. After installation, protect from damage by work of other trades.

1.10 COORDINATION

- A. Coordinate conduit and cable runs with other contractors. Include fire proofing and fire stopping at penetrations.
- B. Coordinate locations of devices with reflected ceiling plans and wall elevations.
- C. Pre-installation Conference: Conduct conference at Project site. Conference should discuss all necessary coordination and outline specific interface details to be coordinated with the existing mail processing equipment and access control systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approval agency for use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment shall be responsible for the satisfactory installation of the system.
- B. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:

1. Edwards, (800) 655-4497.
2. Siemens, (800) 262-7976.
3. Honeywell/Notifier, (800) 289-3473.
4. Simplex/Grinnell, (978) 731-2500.

C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted subject to approval of USPS Project Manager.

1. Conflicts, deviations, or change requests shall be submitted in writing to USPS Project Manager with supporting documentation. Include written justification, designs, manufacturer's specifications, cost benefits, and any special circumstances dictated by local conditions. Documentation package shall be submitted in sufficient time to minimize any adverse effects of the proposed changes to the project construction schedule. USPS Project Manager reserves the right to reject substitute and other systems.

2.2 FIELD-MOUNTED SYSTEM COMPONENTS

A. Smoke Detectors and Accessories:

1. Smoke Detector - Photoelectric (Duct Mounted):
 - a. Provide analog/addressable photoelectric smoke detectors at all duct applications. The system shall have the ability to set the sensitivity and alarm verification of each of the individual detectors on the circuit. It shall be possible to automatically change the sensitivity of individual analog/addressable detectors for the day and night periods. Each smoke detector shall be capable of transmitting alarm signals as well as normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds approximately six times an hour. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 80 percent and 100 percent of the allowable environmental compensation value.
 - b. Provide key operated "normal-reset-test" switch at each duct smoke detector.
 - c. Basis of Design: Edwards model SIGA-PD.
2. Duct Detector Housing:
 - a. Provide smoke detector duct housing assemblies to mount an analog/addressable detector along with a standard, relay or isolator detector mounting base. The housing shall also protect the measuring chamber from damage and insects. The housing shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. Drilling templates and gaskets to facilitate locating and mounting the housing shall also be provided. The housing shall be finished in baked red enamel. Remote alarm LED indicators and remote test stations shall be provided.
 - b. Basis of Design: Edwards model SIGA-DH.

2.3 CONDUCTORS

- A. The requirement of this section apply to all system conductors, including all signaling line, initiating device, notification appliance, auxiliary function, remote signaling, AC and DC power and grounding/shield drain circuits, and any other wiring installed by the Contractor pursuant to the requirements of these Specifications.
- B. All circuits shall be rated power limited in accordance with NEC Article 760.
- C. All new system conductors shall be of the type(s) specified herein.
 1. All initiating circuit, signaling line circuit, AC power conductors, shield drain conductors and grounding conductors, shall be solid copper, stranded or bunch tinned (bonded) stranded copper.

2. All signaling line circuits, including all addressable initiating device circuits shall be 18 AWG minimum multi-conductor jacketed twisted cable or twisted shielded or as per manufacturer's requirements.
3. All non-addressable initiating device circuits, 24 VDC auxiliary function circuits shall be 18 AWG minimum or per manufacturer's requirements.
4. Color code fire alarm conductors as follows:

<u>ITEM</u>	<u>COLOR</u>
Initiating Device	Orange/Brown

5. All conductors shall be terminated with crimp type, open end, space lugs using tool approved by lug manufacturer. Terminal cabinets shall be provided with screw type terminal strips and plywood backboards.

2.4 CONDUCTORS AND RACEWAY

- A. Except as otherwise required by Code and/or these Specifications, the installation of all system circuits shall conform to the requirements of Article 760 and raceway installation to the applicable sections of NFPA 70, National Electrical Code. Fire alarm circuit wiring shall include all circuits described in Section 760.1 including Fine Print Note No. 1 (FPN No. 1), and as defined by the manufacturer's UL listing.
- B. The system shall be installed in a skillful manner in accordance with approved manufacturer's installation manuals, shop drawings and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type required by the NEC and approved by local authorities having jurisdiction for the purpose.
- C. Any shorts, opens, or grounds found on new or existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.
- D. The contractor shall neatly tie-wrap all field-wiring conductors in the gutter spaces of the control panels and secure the wiring away from all circuit boards and control equipment components. All field-wiring circuits shall be neatly and legibly labeled in the control panel. No wiring except home runs from life safety system circuits and system power supply circuits shall be permitted in the control panel enclosures. No wiring splices shall be permitted in a control panel enclosure.
- E. All penetration of floor slabs and firewalls shall be fire stopped in accordance with all local fire codes.

2.5 CONDUIT RACEWAY

- A. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems maybe installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.
- B. The requirements of this section apply to all system conduits, raceways, electrical enclosures, junction boxes, pull boxes and device back boxes.
- C. All system conduits shall be EMT, 3/4 -inch minimum, except for flexible metallic conduit used for whips to devices only, maximum length 6 feet, 3/4-inch diameter, minimum.
- D. All system conduits, which are installed in areas, which may be subject to physical damage or weather, shall be IMC or rigid steel, 3/4 -inch minimum.

- E. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40 percent.
- F. All fire alarm conduit systems shall be routed and installed to minimize the potential for physical, mechanical or by fire damage, and so as not to interfere with existing building systems, facilities or equipment, and to facilitate service and minimize maintenance.
- G. All conduits, except flexible conduit whips to devices, shall be solidly attached to building structural members, ceiling slabs or permanent walls. Conduits shall not be attached to existing conduit, duct work, cable trays, other ceiling equipment, drop ceiling hangers/grids or partition walls, except where necessary to connect to initiating, notification, or auxiliary function devices.
- H. All system conduits, junction boxes, pull boxes, terminal cabinets, electrical enclosures and device back boxes shall be readily accessible for inspection, testing, service and maintenance.
- I. All electrical junction boxes shall be labeled "Fire Alarm System" with decal or other approved markings and shall be painted "red".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Examine areas in which Work of this Section is to be performed.
 - 2. Verify that surfaces and site conditions are ready to receive Work.
- C. Report in writing to USPS Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. General:
 - 1. All equipment shall be attached to walls and ceiling/floor assemblies and shall be mounted firmly in place. Detectors shall not be supported solely by suspended ceilings. Fasteners and supports shall be sized to support the required load.
- B. Installation Sequence:
 - 1. Installation of the systems shall be conducted in stages and phased such that circuits and equipment are installed in the following order:
 - a. Install all new detection devices.
 - b. Terminate between field devices and the associated control equipment.
 - c. Complete contractor pre-test of system.
- C. Detectors:
 - 1. A unique identification number shall be assigned to each detector. (Identification shall be by zone number and device number within the zone.) This number shall be noted on the submittals and as built plans, and also be permanently mounted adjacent to the detector or affixed to its base.

- 2. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
- D. Install products in accordance with NFPA standards and manufacturer's published instructions.
- E. End-of-line resistor device at the last easily accessible mount device or separate box adjacent to last device.
- F. Flush mount outlet box for electric door holder to withstand 80 pounds pulling force.

3.3 PREPARATION

- A. Coordinate work of this Section with other affected work and construction schedule.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Manufacturer's Field Services: Provide services of NICET certified Level III technician to supervise installation, adjustments, final connections, and system testing. Submit written certification on manufacturers letterhead to USPS Project Manager that system has been installed in accordance with applicable codes and is functioning properly. Provide copy of "Certificate of Completion" and place inside plastic envelope at Fire Alarm Control Panel.
- C. Tests and Inspections: The contractor shall perform all testing in occupied facilities at times of day that present the lowest impact and disruption to business and activities. Coordinate all testing in occupied buildings with the building owner's representative to assure that fire alarm system testing does not interrupt operations. This may require extensive after hours work to perform such testing.
- D. Visual Inspection:
 - 1. Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72. The systems operation matrix created by the equipment supplier shall be used to identify each alarm input and verify all associated output functions.
- E. Prepare test and inspection reports.
- F. Advise Plant, Engineer and authorities having jurisdiction in advance of dates and times that tests are to be performed on fire alarm systems.
- G. Preliminary Testing: Conduct preliminary tests to ensure that all devices and circuits are functioning properly. Tests shall meet the requirements of the written test plan. Correct any deficiencies, omissions or anomalies and retest the affected devices to assure proper function per the specification.

H. Acceptance Testing:

1. A final acceptance test shall not be scheduled until the system manuals are provided to and approved by the owner and the following are provided at the job site:
 - a. "As Built" Record drawings of the system as actually installed.
 - b. A copy of the system operation matrix.
2. The acceptance inspector shall use the system "As Built" record drawings in combination with the system operation matrix and the written acceptance test plan during the testing to verify system operation.
3. Should the system not perform to the above criteria it shall not be accepted and the Contractor shall correct all deficiencies and shall re-test the system at Contractor's expense in the presence of the Architect using the same test criteria.
4. The building owner's representative shall witness the final tests.
5. Operate every installed device to verify proper operation and correct annunciation at control panel.
6. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.

3.5 WARRANTY AND MAINTENANCE

- A. Warranty: The contractor shall warranty all materials, installation and workmanship for 24 months from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with close-out documentation and included with the operation and installation manuals. The full cost of maintenance labor and materials required to correct any defect during the warranty period shall be included in the submitted bid.

END OF SECTION

SECTION 311000

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cleaning site of debris, grass, trees and other plant life in preparation for site or building excavation Work.
 - 2. Protection of existing structures, trees or vegetation indicated to remain.
 - 3. Stripping topsoil from areas indicated.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 013543 - Environmental Procedures: Recycling and reuse of waste materials.
 - 2. Section 312000 - Earth Moving: Cutting, filling, and grading for proposed site improvements.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Obtain required permits and licenses in accordance with requirements of Federal Clean Water Act (CWA) and Water Quality Act (WQA). File Notice of Intent (NOI) with United States Environmental Protection Agency, or appropriate state agency where project is located.
 - 2. Provide temporary erosion control systems as indicated on Drawings or as directed by Owner's Representative to protect adjacent properties and water resources from erosion and sedimentation.
 - 3. CWA (1972) and WQA (1987) Requirements:
 - a. Where Work on this project will disturb 5 or more acres, do not start Work without obtaining a "National Pollution Discharge Elimination System" (NPDES) permit governing discharge of storm water from project site for duration of Contract. Prepare and obtain approval of a "Storm Water Pollution Prevention Plan" (SWP³) that includes monitoring of erosion control measures for duration of Contract.
 - b. Provide storm water management in accordance with NPDES permit, SWP³ and for any enforcement action taken or imposed by Federal or State agencies, including cost of fines, construction delays and remedial actions resulting from failure to comply with all provisions of NPDES permit and SWP³.
 - c. Keep SWP³ on site and make available for inspection by appropriate authority having jurisdiction at any time.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Existing Conditions:
 - 1. Notify the Contracting Officer of variations to conditions or discrepancies in actual site conditions prior to start of site preparation Work.

2. Traffic: Conduct operations and removal of debris with minimum interference to roads, streets, walks, and other adjacent facilities. Do not close or obstruct streets, walks or other facilities without permission from authorities having jurisdiction.
3. Protections: Provide protection for safe passage of persons around area of site preparation. Take precautions and conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
 - a. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Friable clay loam surface soil containing humus, organic matter, found in a depth of not less than 4 inches free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other unsuitable material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 1. Locate existing utilities as specified in Section 312000.
 2. Verify that survey benchmark and intended elevations for the Work are as indicated and are not located in an area that may be damaged.
 3. Verify that existing plant life and clearing limits are clearly tagged, identified and marked in such a manner as to insure their safety throughout construction operations.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Provide temporary erosion control systems as indicated on Drawings or as directed by Contracting Officer to protect project site and adjacent properties and water resources from erosion and sedimentation.

3.3 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of Work as indicated on Drawings. Removal includes digging out stumps and roots. Fill

depressions caused by clearing and grubbing operations to subgrade elevation. Prevent water ponding. Place suitable fill material in horizontal layers not exceeding 8 inches loose depth, and compact as specified herein and in Section 312000.

- C. Remove grass, trees, plant life, stumps and all other construction debris from site.
 - 1. Collect, recycle, reuse, and dispose of demolished materials as specified in Section 013543 - Environmental Procedures and as approved by the U.S. Postal Service in the Solid Waste Management and Environmental Protection Plan.
 - a. Mulch: Identify organic debris that is free of disease, pest infestation, and chemical contamination and that is suitable for recycling on site. Chip and compost suitable organic debris for use as mulch on site. Stockpile where indicated on Drawings or directed by Contracting Officer. Coordinate with mulch requirements of Section 329200 - Turf and Grasses and Section 329300 - Plants.

3.4 TOPSOIL EXCAVATION

- A. Strip topsoil from areas that are indicated to be filled, excavated, landscaped, or re-graded to depth that prevents contact with underlying subsoil or unsuitable material. Where trees are indicated to remain, stop topsoil stripping sufficient distance from tree to prevent damage to main root system.
- B. Cut heavy growths of grass from areas prior to start of stripping. Remove heavy growths of grass along with clearing of other vegetation materials.
- C. Topsoil: Organic surface soil found in depth not less than 6 inches.
- D. Satisfactory Topsoil: Soil reasonably free of subsoil, clay lumps, stones and other objects over 2 inches in diameter, weeds, roots, and other unsuitable material.
- E. Stockpile topsoil where indicated on Drawings or directed by Contracting Officer. Construct stockpile areas to positively drain surface water. Cover stockpile areas as required to prevent windblown dust. Dispose of unsuitable topsoil off-site as specified clearing, unless directed otherwise by Contracting Officer. Dispose of excess topsoil off-site as specified for clearing, unless directed otherwise by Contracting Officer.

3.5 REMOVAL

- A. Remove debris, rock, extracted plant life, paving, curbs, and other structures indicated on Drawings as specified in Section 024113.
 - 1. Collect, recycle, reuse, and dispose of demolished materials as specified in Section 013543 - Environmental Procedures and as approved by the U.S. Postal Service in the Solid Waste Management and Environmental Protection Plan.

3.6 PROTECTION

- A. Protect existing streets, structures, and utilities as specified in Section 312000.
- B. Protect trees, plant growth, and features indicated to remain.
- C. Protect natural resources as specified in Section 013543 - Environmental Procedures and as approved by the U.S. Postal Service in the Solid Waste Management and Environmental Protection Plan.

END OF SECTION

USPS CSF Specifications issued: 10/1/2015 Last revised: 09/22/15

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SECTION 312000

EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparation of subgrade for building, slabs, walks, pavements, and other sitework.
 - 2. Rough and finish grading.
 - 3. Excavation for filling and grading.
 - 4. Filling and subgrade preparation.
 - 5. Geotechnical Data
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 013543 - Environmental Procedures: Recycling and reuse of waste materials, and protection of natural resources
 - 2. Section 024113 - Selective Site Demolition: Demolition and removal of designated existing site items.
 - 3. Section 311000 - Site Clearing: Clearing site of debris, grass, trees, and other plant life.
 - 4. Section 312300 - Excavation and Fill: Earthwork for structures, utilities, and pavement.
 - 5. Section 313200 - Soil Stabilization: Lime, cement, fly ash, and geotextile subgrade stabilizers.
 - 6. Section 312500 - Erosion and Sedimentation Controls: Temporary and permanent erosion control and slope protection systems.
 - 7. Section 312317 - Rock Excavation: Removal of rock during excavation.
 - 8. Section 329113 - Soil Preparation: Placing topsoil and fine grading.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 136 - Method for Sieve Analysis of Fine and Course Aggregates.
 - 2. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - 3. ASTM D 1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 4. ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
 - 5. ASTM D 2167 - Test Method for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method.
 - 6. ASTM D 2487 - Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - 7. ASTM D 2922 - Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 8. ASTM D 3017 - Test Method for Moisture Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
 - 9. STM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 88 - Particle Size Analysis of Soils

1.3 DEFINITIONS

- A. Building Area Subgrade Pad: Portion of site directly beneath and within a line 10 feet 0 inches beyond building and appurtenances including limits of any future building expansion areas indicated on Drawings.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Submit drawings or details indicating proposed alternate earthwork procedures or proposed procedures not indicated in Contract Documents.
 - b. Submit drawings or details of design for use of fabrics or geogrids.
 - 2. Assurance/Control Submittals:
 - a. Material Source: Submit name of imported materials suppliers. Provide materials from same source throughout the Work. Change of source requires Contracting Officer approval.
 - b. Test Reports: Submit the following reports directly to Contracting Officer from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
 - 1) Test reports on borrow material.
 - 2) Verification of each footing subgrade.
 - 3) Field density test reports.
 - 4) Optimum moisture-maximum density curve for each type of soil encountered.
 - 5) Report of actual unconfined compressive strength and bearing tests/results for each strata tested. Give "three-dimensional" description of each test location.
 - c. Certificates: Gradation and certification of aggregate material for Testing Laboratory review.
 - d. Qualification Documentation: Submit earthwork company documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record final grade contours, spot elevations, and slope gradients.

1.5 QUALITY ASSURANCE

- A. Qualifications: Earthwork company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements: Perform earthwork in accordance with applicable requirements of governing authorities having jurisdiction.
- C. Pre-Installation Meetings:
 - 1. Convene a pre-installation meeting one week prior to commencing Work of this Section.
 - 2. Require attendance of parties directly affecting Work of this Section.
 - 3. Review conditions of earthwork operations, earthwork procedures and coordination with related Work.
 - 4. Agenda:
 - a. Tour, inspect, and discuss conditions of existing soils and soil substrates.
 - b. Review dust control measures and their requirements.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review Survey and Civil sitework Drawings.
 - e. Approve proposed earthwork equipment.

- f. Approve excess material dump location.
- g. Approve import material storage location.
- h. Review and finalize construction schedule related to earthwork and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
- i. Review required inspections, testing, certifying, and material usage accounting procedures.
- j. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
- k. Review safety precautions relating to earthwork operations.
- l. Review environmental procedures.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:

1. Geotechnical Data:
 - a. Soils investigation reports and data are not a part of Contract Documents.
 - b. Soil and subsurface investigations were conducted at site by an Independent Testing Laboratory and a report with log of borings prepared. Report was obtained for Architect and Engineer design use only.
 - c. Soils investigation data is not warranted to indicate actual conditions. U.S. Postal Service, Architect, and Engineer do not assume responsibility for variations in kind, depth, quantity and condition of soils. U.S. Postal Service, Architect and Engineer disclaim responsibility for accuracy, true location, and extent of soils investigation prepared by others; and further disclaim responsibility for interpretation of data by Contractor such as projecting soil bearing values, rock profiles, soil stability, and presence, level, and extent of underground water.
 - d. Contractor may make additional test borings and other exploratory operations at no additional cost to U.S. Postal Service. Coordinate tests with Contracting Officer.
2. Classification of Excavations: Contractor acknowledges that Contractor has investigated project site to determine type, quantity, quality, and character of excavation work to be performed. Consider excavation as unclassified excavation:
3. Existing Utilities: Contact local utility companies and make arrangements to obtain utility company location and marking service prior to start of Earthwork operations.
 - a. Locate existing underground utilities in areas of Work. If utilities are to remain in place, provide means of support and protection during Earthwork operations.
 - 1) Pothole and locate existing underground utilities at locations to assure that no conflict with Work of this Contract will occur and required clearance is available to prevent damage to existing utilities.
 - 2) Perform potholing minimum 10 days before start of excavation or underground work.
 - b. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility company and Contracting Officer immediately for directions.
 - c. Coordinate with Contracting Officer and utility companies to keep existing utility services and facilities in operation.
 - d. Repair damaged utilities to satisfaction of utility company, at no additional cost to U.S. Postal Service.
 - e. Do not interrupt existing utilities serving facilities occupied and used by U.S. Postal Service or others, during occupied hours, except when permitted in writing by Contracting Officer and then only after acceptable temporary utility services have been provided and approved by Contracting Officer.
 - f. Demolish and completely remove from site existing underground utilities indicated on Drawings to be removed as specified in Section 024113. Coordinate with utility companies for shut-off of services if lines are active.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subsoil: Approved by Testing Laboratory and Contracting Officer.

1. Imported Borrow.
2. Graded.
3. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
4. Conforming to ASTM D 2487.

B. Aggregate: Approved by Testing Laboratory and Contracting Officer.

1. Coarse Aggregate: Crushed stone; free of shale, clay, friable material and debris; graded in accordance with ASTM D 2487 Group Symbol [GW] [GP] [GM] [GC]; within the following limits:

SIEVE SIZE	PERCENT PASSING
2 inches	100
1 inch	95
3/4 inch	95 to 100
5/8 inch	75 to 100
3/8 inch	55 to 85
No. 4	35 to 60
No. 16	15 to 35
No. 40	10 to 25
No. 200	5 to 10

2. Pea Gravel: Natural Stone; washed, free of clay, shale, organic matter; graded in accordance with ASTM D 2487 to the following limits:
 - a. Minimum Size: 1/4 inch.
 - b. Maximum Size: 5/8 inch.
3. Fine Sand: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM D 2487 within the following limits:

SIEVE SIZE	PERCENT PASSING
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

C. Topsoil: Approved by Testing Laboratory and Contracting Officer.

1. Select.
2. Graded.
3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.
4. Conforming to ASTM D 2487.

D. Topsoil: Approved by Testing Laboratory and Contracting Officer.

1. Imported borrow.
2. Friable loam.
3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.
4. Acidity range (pH) of 5.5 to 7.5.
5. Containing a minimum of 4 percent and a maximum of 25 percent inorganic matter.
6. Conforming to ASTM D 2487.

E. Filter/Drainage Fabrics:

1. Mirafi 140N.
2. Amoco Style #4546.

- 3. DuPont Typar 3341.
- F. Soil Stabilization Materials: Specified in Section 313200.

2.2 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Testing Laboratory services.
- B. Testing and Analysis:
 - 1. Soil: Perform in accordance with ASTM D 698.
 - 2. Aggregate: Perform in accordance with ASTM D 698.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials from same source throughout the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
 - 1. Verify that existing site soils and soil conditions encountered are as indicated in Geotechnical Data.
 - 2. Verify quantity and type of each soil material before start of material installation.
 - 3. Backfilling:
 - a. Verify imported fill and stockpiled fill to be reused is approved.
 - b. Verify foundation perimeter drainage installation has been inspected and approved.
 - c. Verify foundation or basement walls are braced to support surcharge forces imposed by backfilling operations.
 - d. Verify areas to be backfilled are free of debris, snow, ice, or water, and ground surfaces are not frozen.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Clear site as specified in Section 311000.
- B. Identify required lines, elevations, levels, contours, grades, and datum necessary to perform earthwork operations as indicated on Drawings.
- C. Examine Project Site with Contracting Officer before start of earthwork operations. Identify areas and prepare to brace or shore areas of adjacent property subject to rotation, slumping, or cave-in to prevent dislocation of adjacent soil, pavement, utilities, structures, or other items to remain.

- D. Verify that survey benchmark and intended elevations for Work are as indicated on Drawings. Short form contour designations are intended to be a continuing of the long form bench mark.
- E. Locate, identify, and protect existing utilities to remain and previously installed utilities that may be damaged by construction operations.
 - 1. Notify Contracting Officer and utility company immediately of utilities, not indicated on Drawings, encountered.
 - 2. Maintain existing utilities, active utilities, and drainage systems in operating condition.
 - 3. Comply with utility company requirements and directions of Contracting Officer to keep utilities in operation.
 - 4. Repair damage to utilities as directed by Contracting Officer.
- F. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from earthwork operations, excavating equipment, and vehicular traffic.
- G. Protect benchmarks, property corners, and other survey monuments from damage or displacement. Where markers are required to be removed, provide removal and reinstallation by licensed land surveyor licensed in State where project is located.
- H. Remove material encountered in grading operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and as directed by Contracting Officer. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
- I. Prior to placing fill in low areas, such as previously existing creeks, ponds, or lakes, perform following procedures:
 - 1. Drain water out by gravity with ditch having flow line lower than lowest elevation in low area. If drainage cannot be performed by gravity ditch, use pumping equipment.
 - 2. After drainage of low area is complete, remove mulch, mud, debris, and other unsuitable material by using equipment and methods keeping natural soils underlying low areas dry and undisturbed.
 - 3. If proposed for fill, dry muck, mud, and other materials removed from low areas on-site by spreading in thin layers for inspection by Testing Laboratory and Contracting Officer. Place material determined by the Testing Laboratory and contracting Officer suitable for use as fill material into lowest elevation of site filling operation. Do not place under building subgrade pad or paving subgrade. If material is determined by the Testing Laboratory and Contracting Officer to be unsuitable, remove material from site.

3.3 EXCAVATION FOR FILLING AND GRADING

- A. Provide dewatering, drainage, and ground water management to control moisture of soils when performing grading operations during periods of wet weather.
- B. Shore, brace, and drain excavations to maintain excavations safe, secure, and free of water at all times.
- C. Provide protection for workers within trench areas in accordance with local, State, and Federal Occupational Safety and Health requirements and regulations.
- D. Unacceptable Fill Material for Building and Paving Areas: Excavated material containing rock or stone greater than 6 inches in largest dimension.
- E. Acceptable Fill Material:
 - 1. Rock or stone less than 6 inches in largest dimension as fill to within 24 inches of surface of proposed subgrade when mixed with suitable material.

2. Rock or stone less than 2 inches in largest dimension mixed with suitable material as fill within the upper 24 inches of proposed subgrade.

3.4 FILLING AND SUBGRADE PREPARATION

- A. Fill areas to contours and elevations as indicated on Drawings with materials specified herein.
- B. Place fill in continuous lifts as specified herein.
- C. Refer to Section 312300 for filling requirements for structures, utilities, and pavements.
- D. Areas Exposed by Excavation or Stripping:
 1. Scarify areas exposed by excavation or stripping on which building subgrade preparations are to be performed to minimum 8 inch depth.
 2. Compact to minimum 95 percent optimum density in accordance with ASTM D 698.
 3. Proofroll to detect any areas of insufficient compaction by making minimum of 2 complete passes with fully-loaded tandem-axle dump truck, or Contracting Officer approved equivalent, in each of two perpendicular directions under supervision and direction of Testing Laboratory and Contracting Officer.
 4. Excavate and recompact areas failing to meet specified requirements.
- E. Fill Material Placement:
 1. Place in 8 inch maximum lifts compacted minimum 95 percent optimum density in accordance with ASTM D 698.
- F. Provide material imported from off-site with CBR (California Bearing Ratio) or LBR (Limerock Bearing Ratio) value equal to or above pavement design subgrade CBR or LBR value indicated on Drawings.

3.5 MAINTENANCE OF SUBGRADE

- A. Verify finished subgrades for conformance to elevations as indicated on Drawings and for specified conditions for subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
- C. Remove areas of finished subgrade with compaction density below specified density to depth required as directed by Testing Laboratory and Contracting Officer. Fill removed areas and compact to specified compaction density
- D. Provide surface of subgrade after compaction hard, uniform, smooth, stable, and true to grade and cross-section.

3.6 FINISH GRADING

- A. Grade areas other than paved areas and building pad areas to finish grade elevations or contours as indicated on Drawings including the following:
 1. Excavated areas.
 2. Filled and transition areas.
 3. Landscaped areas.
- B. Provide finish graded areas uniform and smooth, free from rocks, debris, or irregular surface changes with maximum tolerance of 0.10 feet above or below established finish subgrade elevation. Provide graded surfaces sloping uniformly between indicated elevations.
- C. Provide drainage ditches graded with uniform slope to allow drainage without ponding, minimizing potential for erosion. Refer to Section 312500 for procedures to protect slopes and control erosion.

- D. Refer to Section 313200 for soil stabilization using lime, cement, fly ash and geotextile fabric methods for subbase materials.
- E. Refer to Section 329113 for placing topsoil and fine grading in landscaped areas.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Excavation: Notify Testing Laboratory and Contracting Officer for visual inspection of bearing surfaces, 48 hours prior to backfilling and other subsequent Work.
- C. Site Tests - Quantity:
 - 1. Building Area Subgrade Pad:
 - a. Cut Areas: Minimum one compaction test for every 2500 square feet.
 - b. Fill Areas: Minimum [one] compaction test for every 2500 square feet for each 8 inch lift, measured loose.
 - 2. Areas Outside Building Area Subgrade Pad:
 - a. Cut Areas: Minimum one compaction test for every 10,000 square feet.
 - b. Fill Areas: Minimum one compaction test for every 10,000 square feet for each 8 inch lift, measured loose.
- D. Site Tests - Methods:
 - 1. Perform tests on each type of existing on-site or imported off-site material used for compacted fill.
 - a. Moisture and Density Relationship: ASTM D 698 or ASTM D 1557.
 - b. Mechanical Analysis: AASHTO T-88
 - c. Plasticity Index: ASTM D 4318
 - 1) One optimum moisture-maximum density curve for each type of soil encountered.
 - 2) Report of actual unconfined compressive strength and bearing tests/results for each strata tested. Give "three-dimensional" description of each test location.
 - 2. Perform field density tests for in-place materials in accordance to one of the following standards:
 - a. Sand-Cone Method: ASTM D 1556
 - b. Balloon Method: ASTM D 2167
 - c. Nuclear Method: ASTM D 2922 (Method B-Direct Transmission)
 - 3. Perform a CBR (California Bearing Ratio) or LBR (Limerock Bearing Ratio) test for each type of imported off-site material in areas where pavement will be placed.
- E. If tests indicate the Work does not meet specified requirements, remove Work, replace, compact, and retest at no additional cost to United States Postal Service.

3.8 PROTECTION

- A. Protect building subgrade pad and building related earthwork from damage by construction operations and erosion.
- B. Prohibit vehicles from entering building subgrade pad area. Vehicles not permitted.
- C. Scarify surface, reshape, and compact areas damaged by construction operations or weather erosion.

END OF SECTION

USPS CSF Specifications issued: 10/1/2015
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SECTION 312300
EXCAVATION AND FILL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating and backfilling for structures, utilities, and pavement.
 - 2. Pipe bedding.
 - 3. Compacting fill materials.
 - 4. Borings and casings under roads.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 312000 - Earth Moving: Cutting, filling, and grading for proposed site improvements.
 - 2. Section 312317 - Rock Excavation: Removal of rock during excavation.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - 2. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 180 - Moisture-Density relations of Soils Using a 10 Pound Rammer and an 18 Inch Drop.
- C. American Water Works Association (AWWA):
 - 1. AWWA C 200 - Steel Water Pipe, 6 Inch and Larger.
 - 2. AWWA C 206 - Field Welding of Steel Water Pipe.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electric code.

1.3 DEFINITIONS

- A. Building Area Subgrade Pad: Portion of site directly beneath and within a line 10 feet beyond building and appurtenances including limits of any future building expansion areas indicated on Drawings.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:

- a. Submit drawings or details indicating proposed alternate earthwork procedures or proposed procedures not indicated in Contract Documents.
 - b. Shop Drawings or details pertaining to Site Utilities are not required unless required by regulatory authorities or unless use of materials, methods, equipment, or procedures are contrary to Drawings or these specifications are proposed. Do not perform work until required shop drawings have been approved by Contracting Officer.
- 2. Assurance/Control Submittals:
 - a. Material Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Contracting Officer approval.
 - b. Test Reports: Submit the following reports directly to Contracting Officer from Testing Laboratory, with copy to Contractor:
 - 1) Test reports on borrow material.
 - 2) Verification of each footing subgrade.
 - 3) Field density test reports.
 - 4) Optimum moisture-maximum density curve for each type of soil encountered.
 - 5) Report of actual unconfined compressive strength and bearing tests/results for each strata tested. Give "three-dimensional" description of each test location.
 - c. Certificates: Gradation and certification of aggregate material for Testing Laboratory review.
 - d. Qualification Documentation: Submit earthwork company documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following.
 - a. Spot elevations for building area subgrade pad.
 - b. Location of existing utilities remaining, re-routed utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.5 QUALITY ASSURANCE

- A. Qualifications: Earthwork company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements: Perform earthwork in accordance with applicable requirements of governing authorities having jurisdiction.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Existing Conditions: Requirements specified in Section 312000.
- B. Existing Utilities: Requirements specified in Section 312000.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stockpiled on-site fill and backfill material specified in Section 312000, tested by Testing Laboratory and approved by Contracting Officer.
- B. Imported off-site fill and backfill material specified in Section 312000, tested by Testing Laboratory and approved by Contracting Officer.

- C. Pipe Bedding Material: Processed sand and gravel free from clay lumps, organic, or other deleterious material complying with the following gradation requirements:

SIEVE SIZE	PERCENT PASSING
1 Inch	100
3/4 Inch	90 to 100
3/8 Inch	20 to 55
No. 4	0 to 10
No. 8	0 to 5

- D. Steel Casing Pipe: AWWA C 200, minimum grade B; size and wall thickness as indicated on Drawings.
- E. Stabilization Fabrics and Geogrids:
1. Mirafi 500X or 600X.
 2. Amoco Style #2002 Woven.
 3. Reemay Typar 3401 and 3601.
 4. Trevira S1114 and S1120.
 5. Tensar 1100 and 1200.
- F. Filter/Drainage Fabrics:
1. Mirafi 140 N.
 2. Amoco Style #4546.
 3. Reemay Typar 3341.
 4. Carthage Mills, Carthage 6%.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to United States Postal Service.

3.2 PREPARATION

- A. Identify required lines, elevations, levels, contours, grades, and datum necessary to perform earthwork operations as indicated on Drawings.
- B. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings.
- C. Locate, identify, and protect existing utilities to remain and previously installed utilities that may be damaged by construction operations.
1. Notify Contracting Officer, municipality, and utility company immediately of utilities, not indicated on Drawings, encountered.

2. Maintain existing utilities, active utilities, and drainage systems in operating condition.
 3. Comply with utility company requirements and directions of Construction Manager to keep utilities in operation.
 4. Repair damage to utilities as directed by Contracting Officer.
- D. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from earthwork operations, excavating equipment, and vehicular traffic.
- E. Protect bench marks, property corners, and other survey monuments from damage or displacement. Where markers are required to be removed, provide removal and reinstallation by licensed land surveyor licensed in State where project is located.
- F. Overexcavate areas of building subgrade found consisting of unsuitable materials as determined by Testing Laboratory and Contracting Officer. Prepare, fill with suitable material, and compact as specified. Stabilize areas as specified in Section 313200.

3.3 EXCAVATION

- A. Excavation for filling and grading specified in Section 312000.
- B. Rock excavation specified in Section 312317.
- C. Excavation for Structures:
1. Excavate subbase for building foundations, slabs-on-grade and site structures to width and depth indicated on Drawings.
 - a. Cut excavation banks vertically.
 - b. Remove rocks, loose soil, and debris from bottom of excavation.
 - c. Overexcavate wet or unsuitable soil from bottom of excavation.
 - d. Provide stable base for concrete reinforcing installation and concrete placement.
 - e. Hand trim to indicated lines and grades just prior to concrete reinforcing installation.
 2. Provide protection for workers within trench areas in accordance with local, state, and national Occupational Safety and Health requirements and regulations.
 - a. Trenches minimum 4 feet in depth.
 3. During excavation, stockpile materials suitable for backfilling away from excavation to prevent overloading, slides, or cave-ins.
 4. Remove material encountered in excavating operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and Contracting Officer. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
 5. Prevent surface water from flowing into excavations by temporary grading or other approved methods.
 - a. Do not allow water to accumulate in excavations.
 - b. Remove accumulated water in excavations.
 - c. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components required to remove water from excavations.
- D. Excavation for Utilities:
1. Excavate trench width and depth required for laying pipe, conduit, or cable. Cut trench banks vertical. Remove stones from bottom of trench as required to avoid point-bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as required to provide suitable base for continuous and uniform bedding.
 2. During excavation, stockpile materials suitable for backfilling away from trench bank to prevent overloading, slides, or cave-ins.
 3. Remove material encountered in trenching operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and Contracting Officer. Dispose of

- materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
4. Prevent surface water from flowing into trenches or other excavations by temporary grading or other approved methods.
 - a. Do not allow water to accumulate in excavations.
 - b. Remove accumulated water in excavations.
 - c. Provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components required to remove water from excavations.
 5. Open cut excavation using trenching machine or backhoe. Do not use dirt clods for backfill created by use of machines other than ladder or wheel-type trenching machines.
 6. Grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material along entire trench length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Do not excavate trench deeper, longer, or wider than required to make proper joint connection.
 7. Excavate trench width below the top of pipe minimum 300 mm wide and maximum 460 mm wider than outside surface of pipe or conduit installed to elevations and grades indicated on Drawings. Excavate trench width for other pipe, conduit, or cable to least practical width allowing for proper compaction of trench backfill.
 8. Excavate trench depth measured from finished grade or paved surface to the following requirements or applicable codes and ordinances:
 - a. Water Mains: 30 inches to top of pipe barrel or 6 inches below frost line established by local building official, whichever is deeper.
 - b. Sanitary Sewer: Elevations, and grades indicated on Drawings.
 - c. Storm Sewer: Depths, elevations, and grades indicated on Drawings.
 - d. Electrical Conduits: 24 inches minimum to top of conduit or as required by NFPA 70, or local utility company requirements, whichever is deeper.
 - e. TV Conduits: 18 inches minimum to top of conduit or as required by local utility company, whichever is deeper.
 - f. Telephone Conduits: 18 inches minimum to top of conduit, or as required by local utility company, whichever is deeper.
 - g. Gas Mains and Service: 30 inches minimum to top of pipe, or as required by local utility company, whichever is deeper.
 9. Provide shoring, sheeting, and bracing, as required, in trenches and other excavations where protection of construction personnel is required. Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.
- E. Excavation for Pavement:
1. Excavate roadway and pavement areas to line and grade indicated on Drawings.
 2. Stockpile excavated material suitable for backfilling on-site.
 3. Remove excavated materials not required or not suitable for backfill from site.
 4. Overexcavate areas of pavement subgrade found to contain unsuitable material. Prepare, fill with suitable material, and compact as specified. Stabilize areas as specified in Section 313200.

3.4 PIPE BEDDING

- A. Excavate trenches, for pipe or conduit installed to elevations indicated on Drawings, 4 inches below bottom of pipe and to width as specified. Place 4 inches of bedding material, compact in bottom of trench, and shape to conform to lower portion of pipe barrel. After pipe installation, backfill and compact to top of trench.
- B. Place geotextile fabric as indicated on Drawings.

3.5 BACKFILLING AND SUBGRADE PREPARATION

- A. Backfilling:
 - 1. Verify that imported off-site fill and stockpiled on-site fill is tested and approved.
 - 2. Verify that foundation perimeter drainage installation is inspected and approved.
 - 3. Verify that foundation or below grade structure walls are braced to support surcharge forces imposed by backfilling operations.
 - 4. Verify that backfill areas are free of debris, snow, ice, or water, and that ground surfaces are not frozen.
- B. Prepare building area subgrade pad in accordance with foundation subsurface preparation information indicated on Drawings and specified herein. Do not use rock larger than 6 inches for building subgrade fill.
- C. Areas Exposed by Excavation or Stripping:
 - 1. Scarify areas exposed by excavation or stripping on which building subgrade preparations are to be performed to minimum 8 inch depth.
 - 2. Compact to minimum 95 percent optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content 1 percent below and maximum 3 percent above optimum moisture content.
 - 3. Proofroll to detect any areas of insufficient compaction by making minimum of 2 complete passes with fully-loaded tandem-axle dump truck, or Contracting Officer approved equivalent, in each of two perpendicular directions under supervision and direction of Contracting Officer.
 - 4. Excavate and recompact areas failing to meet specified requirements.
- D. Fill Material Placement:
 - 1. Place in 8 inch maximum lifts compacted minimum 95 percent optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content of 1 percent below and maximum moisture content 3 percent above optimum moisture content.
- E. Provide material imported from off-site with CBR (California Bearing Ratio) or LBR (Limerock Bearing Ratio) value equal to or above pavement design subgrade CBR or LBR value indicated on Drawings.

3.6 MAINTENANCE OF SUBGRADE

- A. Verify finished subgrades for elevations indicated on Drawings and specified conditions for construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
- C. Remove areas of finished subgrade found to have insufficient compaction density. Replace in a manner that will comply with compaction requirements as directed by Contracting Officer. Provide hard, uniform, smooth, stable surface, true to grade and cross-section after completion of compaction.

3.7 BORINGS AND CASINGS UNDER ROADS

- A. Install street, road, or highway crossings for utility mains by jacking and boring method in accordance with requirements of governing authorities having jurisdiction.
- B. Locate approach pits and trenches within right- of-way of street, road, highway, or railroad distance from paving permitting traffic to pass without interference. Tamp backfill for approach pits and trenches within right- of-way in layers not greater than 6 inches thick for entire length and depth of trench or pit. Compact backfill to 95 percent of maximum density obtained at optimum moisture as determined by

AASHTO T 180, Method A (Modified Proctor). Mechanical tampers may be used after cover of 6 inches has been obtained over top of pipe barrel.

- C. Use commercial type boring rig providing hole bored to proper alignment and grade within 2 inches of same diameter as largest outside joint diameter of pipe installed. Install pipe in hole immediately after bore has been made, and in no instance shall hole be left open while unattended.
- D. Clean and prime interior and exterior of casing pipe; apply two coats of asphalt in accordance with requirements of governing authorities having jurisdiction.
- E. Butt weld steel casing. Weld using full penetration single butt-welds in accordance with AWWA C 206.
- F. Install casing and utility pipe with end seals, vent pipe, and other special equipment in accordance with requirements of governing authorities having jurisdiction.
- G. Paving Damage Caused by Contractor Construction Operations:
 - 1. Repair paving where cracks occur on either side of line where pipe was installed by removing damaged paving between cracks, sawcutting paving in straight line at a point sufficiently beyond location of cracks for repair, and placing new paving to match existing in areas where paving removed.
 - 2. Make repairs to the satisfaction of paving owner.
 - 3. Make repairs at no additional cost to United States Postal Service within one year from Date of Substantial Completion.

3.8 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Excavation: Notify Testing Laboratory and Contracting Officer for visual inspection of bearing surfaces, 48 hours prior to backfilling and other subsequent Work.
- C. Site Tests:
 - 1. Specified in Section 312000.
- D. If tests indicate the Work does not meet specified requirements, remove Work, replace, compact and retest at no additional cost to United States Postal Service.

3.9 PROTECTION

- A. Protect building subgrade pad and building related earthwork from damage by construction operations and erosion.
- B. Prohibit vehicles from entering building subgrade pad area. Vehicles not permitted.
- C. Scarify surface, reshape, and compact areas damaged by construction operations or weather erosion.

END OF SECTION

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SECTION 312500
EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Temporary and permanent erosion control systems.
 - 2. Slope protection systems.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 313200 - Soil Stabilization: Lime, cement, fly ash, and geotextile subgrade stabilizers.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for Quality Assurance/Control submittals.
 - 1. Material Source: Submit name of material suppliers.
 - 2. Provide materials from same source throughout Work. Change of source requires Contracting Officer approval.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Protect adjacent properties and water resources from erosion and sediment damage throughout Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Quick Growing Grasses: Wheat, rye, or oats.
- B. Straw Bales: Free of weed seed.
- C. Fencing for Siltation Control: Indicated on Drawings.
- D. Erosion Control Blankets and/or Erosion Control Geotextiles.
- E. Bale Stakes:
 - 1. Minimum 4 feet length.
 - 2. 2 No. 4 steel reinforcing bars or,
 - 3. 2 steel pickets or,
 - 4. 2 - 2x2 inch hardwood stakes driven 18 inches to 24 inches into ground.

- F. Temporary Mulches: Loose straw, netting, wood cellulose, or agricultural silage free of seed.
- G. Metal Fence Stakes: Minimum 8 foot length.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting Work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to U.S. Postal Service.

3.2 PREPARATION

- A. Review Stormwater Pollution Prevention Plan SWP³.
- B. Notify Contracting Officer of deficiencies or changes in Stormwater Pollution Prevention Plan SWP³ required by current site conditions. Revisions of plan will be made as determined by Contracting Officer.

3.3 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. Contracting Officer may direct Contractor to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and may direct Contractor to provide immediate permanent or temporary pollution control measures.
- B. Provide permanent erosion control measures at earliest practical time to minimize requirement for temporary erosion controls. Permanently seed and mulch cut slopes as excavation proceeds.
- C. Maintain temporary erosion control systems installed by Contractor as directed by Contracting Officer to control siltation at all times throughout Work. Provide maintenance or additional Work directed by Contracting Officer within 48 hours of notification by Contracting Officer.
- D. Apply soil stabilization as specified in Section 313200 or seed slopes that may be easily eroded with wheat, rye or oat grasses.

END OF SECTION

USPS CSF Specifications issued: 10/1/2015
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SECTION 321216

ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Bituminous concrete paving.
 - 2. Surface course.
 - 3. Binder course.
 - 4. Paving base course.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 312000 - Earth Moving: Earthwork for Pavement.
 - 2. Section 321723 - Pavement Markings: Painted pavement markings.

1.2 REFERENCES

- A. Asphalt Institute (AI):
 - 1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
 - 2. AI MS-3 - Asphalt Plant Manual.
 - 3. AI MS-8 - Asphalt Paving Manual.
 - 4. AI MS-19 - Basic Asphalt Emulsion Manual.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM D 242 - Specification for Mineral Fiber for Bituminous Paving Mixtures.
 - 2. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 Pound Rammer and 12 inch Drop.
 - 3. ASTM D 1188 - Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
 - 4. ASTM D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 Pound Rammer and 18 inch Drop.
 - 5. ASTM D 1560 - Test Method for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.
 - 6. ASTM D 2397 - Specification for Cationic Emulsified Asphalt.
 - 7. ASTM D 2399 - Practice for Selection of Cutback Asphalt.
 - 8. ASTM D 2726 - Test Method for Bulk Specific Gravity and Density of Nonabsorbative Compacted Bituminous Mixtures.
 - 9. ASTM D 3381 - Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
 - 10. ASTM D 3549 - Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
 - 11. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- C. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 88 - Particle Size Analysis of Soils.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Provide asphalt-aggregate mixture as recommended by local or state paving authorities to suit project conditions. Use locally available materials and gradations which meet standard state highway specifications and exhibit satisfactory records of previous installations.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Design Data:
 - 1) Submit design mix following format indicated Asphalt Institute Manual MS-2, Marshall Stability Method; including type/name of mix, gradation analysis, grade of asphalt cement used, Marshall Stability (pounds), flow, effective asphalt content (percent), and direct references to applicable state highway department specification sections for each material.
 - 2) Provide design mixture listed in current edition of applicable state highway department specifications.
 - 3) Use mix designs prepared within 3 years maximum.
 - 4) Provide documentation of state highway limitations, if any, on use of recycled content materials.
 - b. Certificates: Submit materials certificate to Testing Laboratory signed by material supplier and Contractor, certifying that materials comply with, or exceed, the requirements specified herein.
 - c. Qualification Documentation: Paving installer documentation of experience indicating compliance with specified qualification requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AI MS-8
- B. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
 - 1. Conform to applicable requirements for paving work on public property.
 - 2. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Use temporary striping, flagmen, barricades, warning signs, and warning lights as required.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 - 1. Apply prime and tack coats when ambient temperature is above 40 degrees F, and when temperature has been above 35 degrees F for 12 hours immediately prior to application. Do not apply when base is wet, contains excess moisture, or during rain.
 - 2. Construct bituminous concrete paving when atmospheric temperature is above 40 degrees F.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management:
 - 1. Recycled Content: Provide aggregate fabricated from a minimum of 30% recycled rubble or concrete. Provide asphalt cement fabricated from recycled content asphalt.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Base Course: As indicated on Drawings, complying with applicable state highway specifications regarding source, quality, gradation, liquid limit, plasticity index and mix proportioning.
 - 1. Unless otherwise specified in applicable state highway specifications, provide base course aggregate fabricated from minimum 30 percent recycled rubble or concrete.
- B. Asphalt Cement: Fabricated from minimum 15 percent recycled asphalt and complying with ASTM D 3381; Table 2 AC-10, AC-20, or AC-30, viscosity grade, depending on local mean annual air temperature as indicated below:

TEMPERATURE CONDITION	ASPHALT GRADES
Cold, mean annual air temperature at 45 degrees F or lower	AC-10 85/100 pen.
Warm, mean annual air temperature between 45 degrees F and 75 degrees F	AC-20 60/70 pen.
Hot, mean annual air temperature at 75 degrees F or higher	AC-30

- C. Prime Coat: A medium curing cut-back asphalt or an asphalt penetrating prime coat consisting of either ASTM D 2397 or ASTM D 2399, MC- 30 or SS-1h.
- D. Tack Coat: Emulsified asphalt; ASTM D 2397 or ASTM D 2399, SS-1h, CSS-1, or CSS-1h, diluted with one part water to one part emulsified asphalt.
- E. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M-17/ASTM D 242, if recommended by applicable state highway department standards.
- F. Asphalt-Aggregate Mixture: Unless otherwise indicated on Drawings, the Design Mix shall have a minimum stability based on a 50-blow Marshall complying with ASTM D 1559 of 1000 pounds with a flow between 8 and 16. The Design Mix shall be within sieve analysis and bitumen ranges below:
- G. Asphalt-Aggregate Mixture: Unless otherwise indicated on Drawings, the Design Mix shall have a minimum stability based on CALTRANS AR4000. The Design Mix shall be within sieve analysis and bitumen ranges below:

SIEVE ANALYSIS OF MIX

Square Sieve	Total Percent Passing	Percent Tolerance
1/2 inch	80 - 100	5
3/8 inch	65 - 93	4
No. 8	0 - 55	4
No. 50	2 - 27	2
No. 200	0 - 10	2

Percent Bitumen by Weight of Total Mix: 5.0 - 8.5.
Percent Air Voids: 3-6.
Percent Aggregate Voids Filled with Asphalt Cement: 70 - 82.
Allowable Variance of Percent Bitumen by Weight of Total Mix: 0.4.

2.2 EQUIPMENT

- A. Maintain equipment in satisfactory operating condition and correct breakdowns in a manner that will not delay or be detrimental to progress of paving operations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
 - 1. Verify gradients and elevations of base are correct, and base is dry.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 BASE COURSE PLACEMENT

- A. Perform base course construction in a manner that will drain surface properly at all times and at the same time prevent runoff from adjacent areas from draining onto base course construction.
- B. Compact base material to not less than 98 percent of optimum density as determined by ASTM D 698 or 95 percent of optimum density, as determined by ASTM D 1557, unless otherwise indicated on the Drawings.
- C. Granular Base: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 8 inches, measured loose.
- D. Sand/Shell Base: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 4 inches, measured loose.
- E. Asphalt Institute Type IV Mix for Full Depth Asphalt Base: Construct to thickness indicated on Drawings in lifts or layers not exceeding 3 inches, measured loose.
- F. Asphalt Institute Type VI, VII, or VIII Mixes for Hot-Mix Sand Asphalt Bases: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 3 inches, measured loose.
- G. Soil Cement Stabilized Base: Construct to thickness and strength as indicated on Drawings and in accordance with applicable state highway specifications. If not indicated on the Drawings, the minimum compressive strength shall be 500 pounds per square inch, tested at 28 days.

3.3 APPLICATIONS

A. Prime Coat:

1. Apply bituminous prime coat to all base material surfaces where bituminous concrete paving will be constructed.
2. Apply bituminous prime coat in accordance with applicable state highway specifications.
3. Apply at minimum rate of 0.25 gallon per square yard over compacted base material. Apply to penetrate and seal, but not flood surface.
4. Make necessary precautions to protect adjacent areas from overspray.
5. Cure and dry as long as necessary to attain penetration of compacted base and evaporation of volatile substances.

B. Tack Coat:

1. Apply to contact surfaces of previously constructed bituminous concrete base courses or portland cement concrete and surfaces abutting or projecting into bituminous concrete or into bituminous concrete pavement.
2. Apply tack coat to bituminous concrete base course or sand asphalt base course. Apply emulsified asphalt tack coat between each lift or layer of full depth bituminous concrete and sand asphalt bases and on surface of all such bases where bituminous concrete paving will be constructed.
3. Apply emulsified asphalt tack coat in accordance with applicable state highway specifications.
4. Apply at minimum rate of 0.05 gallon per square yard of surface.
5. Allow to dry until at proper condition to receive paving.

3.4 BITUMINOUS CONCRETE PLACEMENT

A. Place bituminous concrete mixture on completed compacted subgrade surface, spread, and strike off. Spread mixture at following minimum temperatures:

1. When ambient temperature is between 40 degrees F and 50 degrees F, mixture temperature equal to 285 degrees F.
2. When ambient temperature is between 50 degrees F and 60 degrees F, mixture temperature equal to 280 degrees F.
3. When ambient temperature is higher than 60 degrees F, mixture temperature equal to 275 degrees F.

B. Whenever possible, all pavement shall be spread by a finishing machine; however, inaccessible or irregular areas may be placed by hand methods. The hot mixture shall be spread uniformly to the required depth with hot shovels and rakes. After spreading, the hot mixture shall be carefully smoothed to remove all segregated course aggregate and rake marks. Rakes and lutes used for hand spreading shall be of the type designed for use on asphalt mixtures. Loads shall not be dumped faster than they can be properly spread. Workers shall not stand on the loose mixture while spreading.

C. Paving Machine Placement: Apply successive lifts of bituminous concrete in transverse directions with the surface course placed in the direction of surface-water flow. Place in typical strips not less than 10 feet wide.

D. Joints: Make joints between old and new pavements, or between successive days and work in a manner that will provide a continuous bond between adjoining work. Construction joints shall have same texture, density, and smoothness as other sections of bituminous concrete course. Clean contact surfaces of all joints and apply tack coat.

3.5 ROLLING AND COMPACTION

- A. The mixture, after being spread, shall be thoroughly compacted by rolling as soon as it will bear the weight of the rollers without undue displacement. The number, weight, and types of rollers and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in a workable condition.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling with hot material.
- D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
- E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
- F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot bituminous concrete. Compact by rolling to maximum surface density and smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 CONSTRUCTION

- A. Site Tolerances:
 - 1. Paving Surface Smoothness: Maximum allowable 10 foot straightedge tolerance for smoothness.
 - a. Base Course Surface: 1/4 inch.
 - b. Wearing Surface Course: 3/16 inch.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection and testing procedures
- B. Site Tests:
 - 1. Paving Base Course: Perform testing of in-place base courses for compliance with requirements for thickness, compaction, density, and tolerance.
 - a. Moisture/Density Test: ASTM D 698 or ASTM D 1557.
 - b. Mechanical Analysis Test: AASHTO T-88.
 - c. Plasticity Index Test: ASTM D 4318.
 - d. Base Material Thickness Test: Minimum one test for every 20,000 square feet.
 - e. Base Material Compaction Test: Minimum one test for every 20,000 square feet.
 - f. Field Density Tests: Perform testing of in-place base courses for compliance with requirements for density using one of the following methods:
 - 1) Sand-cone Method: ASTM D 1556.
 - 2) Balloon Method: ASTM D 2167.
 - 3) Nuclear Method: ASTM D 2922, Method B (Direct Transmission).
 - g. Test each source of base material for compliance with applicable state highway specifications.
 - 2. Asphalt Concrete Paving: Perform testing of in-place asphalt concrete paving courses for compliance with requirements for thickness, compaction, and surface smoothness.

- a. Thickness: ASTM D 3549; Thickness shall not be less than thickness specified on Drawings.
 - b. Surface Smoothness: Testing shall be performed on the finished surface of each asphalt paving course using 10 foot straightedge applied parallel with, and at right angles to centerline of paved areas. Smoothness shall not be less than tolerances specified herein.
3. Compaction: Field density test for in place materials shall be performed by examination of field cores in accordance with one of the following standards:
- a. Bulk Specific Gravity of Paraffin-Coated Specimens: ASTM D 1188, minimum one core per 20,000 square feet.
 - 1) Standard Duty Areas: Minimum 3 cores.
 - 2) Heavy Duty Areas: Minimum 3 cores.
 - b. Bulk Specific Gravity Using Saturated Surface-Dry Specimens: ASTM D 2726, minimum one core per 20,000 square feet.
 - 1) Standard Duty Areas: Minimum 3 cores.
 - 2) Heavy Duty Areas: Minimum 3 cores.

END OF SECTION

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SECTION 321313
CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete Pavement
 - 2. Concrete walks and terraces.
 - 3. Concrete curbs, and curb and gutters.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 312000 - Earth Moving: Earthwork for pavement.
 - 2. Section 321216 - Asphalt Paving.
 - 3. Section 033000 - Cast-In-Place Concrete: Concrete requirements for pavement.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 308 - Standard Practice for Curing Concrete.
- B. American society for Testing and Materials (ASTM):
 - 1. ASTM A 185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
 - 2. ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
 - 4. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - 5. ASTM D 1751 - Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for the following:
 - a. Joint filler.
 - b. Joint sealant.
 - c. Concrete admixtures.
 - d. Concrete curing compounds.
 - 2. Assurance/Control Submittals:
 - a. Concrete Mix Design: Submit three copies of each proposed mix design for each class of concrete in accordance with ACI 301, Sections 3.9 "Proportioning on the basis of previous field experience or trial mixture", or 3.10 "Proportioning based on empirical data". Submit separate mix design for concrete to be placed by pumping, in addition to the mix design for concrete to be placed directly from the truck chute.
 - b. Include the following information in concrete mix design:
 - 1) Proportions of cement, fine and coarse aggregate, and water.

- 2) Water-cement ratio, 28-day compressive design strength, slump, and air content.
- 3) Type of cement and aggregate.
- 4) Aggregate gradation.
- 5) Type and dosage of admixtures.
- 6) Special requirements for pumping.
- 7) Range of ambient temperature and humidity for which design is valid.
- 8) Special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product specified.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Conform to ACI 305R when mixing and placing concrete during hot weather.
- C. Conform to ACI 306R when mixing and placing concrete during cold weather.
- D. Regulatory Requirements:
 1. Conform to applicable requirements for paving work on public property.
 2. Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 - PRODUCTS

2.1 FORM AND REINFORCING MATERIAL

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required.
 1. APA Exterior Plyform BB with a medium density, smooth, hard, fused resin fiber overlay, or metal forms.
 2. Form Oil: Coat forms with nonstaining type coating that will not discolor or deface surface of concrete. Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Eucoslip" - Euclid Chemical Co., Cleveland, OH (800) 321-7628.
 - b. "Form Coating" - Nox-Crete Chemicals, Omaha, NE (800) 669-2738.
 - c. Substitutions: Under provisions of Section 016000.
- B. Curb, Curb and Gutter Forms: Use flexible spring-steel forms or laminated boards to form radius bends. Tolerance: Not to deviate more than 1/4 inch in 10 feet in grade and alignment.
- C. Reinforcing:
 1. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to Owner.
 2. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.
 3. Fiber reinforced concrete mixtures having the same strength or exceeding as specified for concrete mixes, as verified by Manufacturer's testing laboratory procedures, shall be considered as an alternate for welded wire mesh in exterior flat work, curbs and sidewalks.
- D. Reinforcing Accessories:

1. Reinforcing Accessories: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. Dayton Superior Corp., Miamisburg, OH (800) 745-3700.
 - b. Heckmann Building Products, Inc., Chicago, IL (800) 621-4140.
 - c. Hohmann & Barnard, Inc., Hauppauge, NY (800) 645-0616.
 - d. Richmond Screw Anchor Co., Inc., Ft. Worth, TX (817) 284-4981.
2. Conform to Concrete Reinforcing Steel Institute Manual of Standard Practice. Include spacers and chairs with plastic tipped legs, ties and other devices necessary for properly assembling, placing, spacing and supporting forms and reinforcement in place.
3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 CONCRETE MATERIALS

- A. Comply with requirements of applicable Section 033000 for concrete materials, admixtures, bonding materials, curing materials, surface sealers and others as required.
- B. Cement:
 1. Portland Cement: ASTM C150 Type 1.
 2. High-early Strength Portland Cement: ASTM C150, Type III.
- C. Aggregates: ASTM C33.
 1. Fine aggregate shall be natural sand, or sand prepared from stone or gravel. Grains shall; be clean, hard, durable, uncoated and free from silt, loam and clay.
 2. Coarse Aggregates: Crushed stone, gravel, or other approved inert materials of similar characteristics, or combinations thereof, having hard, strong, durable pieces free from adherent coatings. Maximum size of pieces shall be 3/4" to #4 except for footings, which may be 1-1/2". The maximum size of aggregate may also be not larger than one fifth of the narrowest dimension between forms, nor larger than three fourths of the minimum clear spacing between reinforcing bars.
- D. Water: Clean and free from injurious amounts of oil, acids, salts, organic or other deleterious matter.
- E. Air Entrainment: ASTM C260.
 1. Use air-entrained concrete for exterior exposed concrete including walls, walks, paving, etc. where minimum daily temperatures are expected below 38 degrees F during pouring or subsequent 38 day curing period.
 2. Proportion air-entraining concrete to attain minimum 28-day compressive strength specified.
 3. Total Air Entrainment in Concrete: Not less than four percent nor more than six percent volume of concrete.
- F. Admixtures:
 1. May be used at contractors option to provide workability at low slumps, increased compressive strength, retardation or acceleration of the concrete.
 2. Chemical Admixtures: ASTM C494. Mineral Admixtures: ASTM C618.
 3. The cement factor shall not be reduced and changes shall be made in the other mix proportions to ensure the minimum strength requirements.
 4. Use of admixtures approved in writing by Architect. No additional expense to the Owner will be allowed.
 5. No calcium chloride shall be used.
 6. Before any admixture is accepted for use, the Contractor shall submit certified laboratory reports on each additive material to the architectural consultant. The report shall show the following:
 - a. Confirmation of compliance with the applicable ASTM Standard.

- b. Evaluation of the effects of the admixture on the properties of the concrete to be made on the job, including consideration of the anticipated ambient conditions on the job, and proposed construction procedures.
- c. Determination of within-lot uniformity of product proposed for use.

2.3 CONCRETE MIXES

A. Concrete Proportions:

- 1. Concrete shall be homogenous, and when hardened, shall have the required strength, resistance to deterioration, durability, water tightness and the properties as specified.
- 2. Minimum concrete strength at 28 days shall be;
 - a. 3,000 psi for walks, terraces, curbs and gutters.
 - b. 4,000 psi for concrete pavement and pads.
- 3. Slump of concrete:
 - a. Pavement: 2-1/2 inch minimum to 4 inch maximum.
 - b. Ramps and sloping surfaces: Not more than 3 inches.

B. Ready-Mix Concrete:

- 1. Ready-mix concrete shall conform to ASTM C94. The mixing agitation shall begin within 30 minutes, and the concrete shall be discharged from the truck within one hour after the water has been added to the concrete mix.
- 2. Delivery tickets are to accompany each concrete truck and shall be kept in the job superintendent's file. Delivery tickets must indicate the following information or be subject to rejection:
 - a. Name of project.
 - b. Supplier of concrete.
 - c. Truck identity and ticket serial number.
 - d. Date of delivery.
 - e. Brand of cement.
 - f. Cement content.
 - g. Strength classification.
 - h. Batching time.
 - i. Point of deposit.
 - j. Total amount of water.
 - k. Weight of aggregate.
 - l. Daily temperature.
 - m. Number of cubic yards in load.
 - n. Admixture content.
 - o. Name of Contractor.
 - p. Name of driver.
 - q. Time loaded and first mixing of concrete.
 - r. Reading of revolution counter.
- 3. Quantity of water used for each batch shall be accurately measured.

2.4 JOINT MATERIALS

A. Sealed expansion and contraction joints: Filler of nonbituminous rubber or cork conforming to ASTM D1752.

B. Non-sealed joints:

- 1. Non-sealed Joints: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Flexcell" - Celotex Corp., Tampa, FL (813) 873-1700.
 - b. "Seal Tight Fiber Expansion Joint" - W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.

2. Filler premolded bituminous type conforming to ASTM D1751.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Noncompressive Filler:
1. Noncompressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Styrofoam SM" - Dow Chemical Co., Midland, MI (517) 636-0754.
 - b. "Foamular" - Owens Corning, Toledo, OH (800) 828-7155.
 2. 2 inch or 1 inch thick sheets.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- D. Compressive Filler:
1. Compressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Ethafoam" - Dow Chemical Co., Midland, MI (800) 322-8723.
 - b. "Rodofoam No. 423" - Sternson Group, Brampton, ON (800) 265-8417.
 2. 2 inch or 1 inch thick sheets, compression modulus within the range of 15 to 25 pounds per square inch per inch.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- E. Filler Adhesive for Noncompressive Filler and Compressive Filler:
1. Filler Adhesive: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "General Purpose Mastic No. 11" - Dow Chemical Co., Midland, MI (800) 322-8723.
 - b. "Rodofast" - Sternson Group, Brampton, ON (800) 265-8417.
 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- F. Slab-on-grade Construction Joints: Provide a full slab depth 24 gauge metal preshaped key, approximate depth of key to be 1/4 slab thickness and a key width of about 1/10 slab thickness.
- G. Joint Sealants: ASTM C920. Non-priming, pourable, self-leveling polyurethane. Subject to compliance with project requirements manufacturers offering joint sealants which may be incorporated in the Work include, but are not limited to the following:
1. Sonolastic Paving Joint Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 2. Sonomeric CT 1 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 3. Sonomeric CT 2 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 4. Vulkem 45, by Mameco, Cleveland, OH (800) 321-6412.
 5. Chem-Caulk, by Bostik, Middleton, MA (800) 726-7845.
 6. "THC-900" - Tremco, Beachwood, OH (800) 562-2728.
 7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.5 CURING MATERIALS

- A. Sealers:
1. Sealers: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Polyseal" - W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.
 - b. "Kure-N-Seal" - Sonneborn, Shakopee, MN (800) 433-9517.
 - c. "Cure-Hard" - W.R. Meadows, Inc., Elgin, IL (312) 683-4500.

2. ASTM C156 and ASTM C309, Type I. Material shall become integral part of concrete and leave slab free of residue or film.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Membrane: Opaque-white polyethylene sheet, 0.006 inch thick, meeting requirements of ASTM C171.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
 1. Verify gradients and elevations of base are correct, and base is dry.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 SUBGRADE PREPARATION

- A. Conform with the requirements specified in Section 312000 .
- B. Thoroughly wet subgrade and then compact with two passes of a 500 pound roller.
- C. Pumping: Where concrete paving or sidewalks, and curbs are to be placed, yielding material deflecting more than 1/2 inch under a 500 lb. roller shall be removed to a depth of not less than 4 inches below subgrade elevation and replaced with an approved granular material which shall then be compacted as described above.
- D. The subgrade shall be in a moist condition when the concrete is placed. In cold weather the subgrade shall be prepared and protected so as to provide a subgrade free from frost when the concrete is deposited.

3.3 FORM CONSTRUCTION

- A. Comply with the requirements of Section 033000. Install sufficient quantity of forms to allow continuous progress of the work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check complete formwork for grade and alignment to the following tolerances:
 1. Top of form: Not more than 1/8 inch in 10 feet.
 2. Vertical face: Longitudinal axis not more than 1/4 inch in 10 feet.

3.4 PLACING REINFORCEMENT

- A. Support reinforcing and wire securely together to prevent displacement by construction loads and traffic, or the placing of concrete. For slabs on grade, supporting pieces of concrete blocks or bricks may be used.
- B. Place wire mesh reinforcing two inches above bottom of slab unless otherwise indicated.
- C. Reinforcement shall be kept clean from oil, dirt and loose mill scale or other coatings which might destroy the concrete bond. Remove tags and markings prior to concrete placement.
- D. Do not place concrete until reinforcement has been inspected and approved by local authorities, if required.

3.5 CONCRETE PLACEMENT AND FINISHING

- A. Tamp and consolidate concrete with a suitable wood or metal tamping bar and the surface shall be finished to grade with a wood float.
- B. Finished surfaces shall not vary more than 3/16 inch from the testing edge of a 10 foot straightedge.
- C. Curb Expansion Joints: Fill joints with 1/2 inch thick joint filler strips conforming to ASTM D1751 or ASTM D1752.
- D. Contraction Joints: Divide the surface of paving, walks and terraces into rectangular areas not to exceed 5 feet 0 inches each way.
 - 1. Cut a groove in the top portion of the slab to a depth of at least one-fourth of the slab thickness using a jointer or by sawing a groove in the hardened concrete with a power-driven saw.
 - 2. Membrane-cured surface damaged during the sawing operations shall be resprayed as soon as the surface becomes dry.
- E. Slab Finishes: ACI 301, paragraph 11.7 and as follows:
 - 1. Broom Finish: On stair treads with abrasive nosings and on walks, unless other finishes have been indicated or specified.
 - 2. Broom or Belt Finish: On level walks. Broom in direction perpendicular to travel and approved sample panel. Submit joint pattern layout prior to starting work.

3.6 TOLERANCES

- A. Horizontal slabs: Finished surfaces true with no deviation in excess of 1/8 inch when tested with a 10 foot straightedge, non-accumulative. No coarse aggregate showing.
- B. Steps:
 - 1. Variation in steps within a flight of stairs:
 - a. Rise: 1/8 inch.
 - b. Tread: 1/4 inch.
 - 2. Variation in consecutive steps:
 - a. Rise: 1/16 inch.
 - b. Tread: 1/8 inch.

3.7 EXPANSION JOINTS

- A. Install transverse expansion joints at returns and 15 feet on center.
- B. Install longitudinal expansion joints where curbs and paved areas abut each other, buildings, other concrete slabs and pads or vertical restraints.
- C. Place joint filler with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing.
- D. Immediately after finishing operations are completed, round joint edges with edging tool having a radius of 1/8 inch. Remove concrete over the joint filler.
- E. At the end of the curing period, clean and fill expansion joints with joint sealer. Fill joints flush with concrete surface. Dummy groove joints shall not be sealed.

3.8 CURING

- A. Immediately after the finishing operations, the exposed concrete surface shall be cured for 7 days by the mat, impervious sheet, or membrane-curing method.

3.9 BACKFILLING

- A. After curing, remove debris and backfill the adjoining areas, grade and compact to conform to the surrounding area in accordance with the lines and grades indicated.

3.10 PROTECTION

- A. Protect the completed work from damage. Repair damaged concrete and clean concrete discolored during construction. Remove work that is damaged and reconstruct to entire length between regularly scheduled joints. Refinishing damaged portion is not acceptable.
- B. Prevent cars and trucks from driving on new pavement for a minimum of 14 days.

END OF SECTION

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SECTION 321723
PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Painted pavement markings.
 - 2. Painted curbs, guard posts, and light pole bases.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 321216 - Asphalt Paving: Asphalt paving substrate for marking application.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Technical data sheets indicating manufacturer's catalog number, paint type description, and VOC content for each paint type specified.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer certificate that Products meet or exceed specified requirements.
 - b. Test Reports: Manufacturer Material Safety Data Sheets (MSDS) for each paint type specified.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Provide paint materials that conform to Federal, State, and local restrictions for Volatile Organic Compounds (VOC) and lead free content.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time , cleanup requirements, color designation, and instructions for mixing and/or reducing.
- C. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's published instructions.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs and warning lights as required.

1.6 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Requirements for Closeout Submittals.
 - 1. Extra Materials:
 - a. Provide 1 gallon of each color to Contracting Officer.
 - b. Label each container with color and type, in addition to manufacturer's label.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified Products which may be incorporated into the Work include the following:
 - 1. ICI Dulux Paints, Cleveland, OH (800) 984-5444.
 - 2. Sherwin-Williams Company, Cleveland, OH (800) 321-8194.
 - 3. McCormick Paint Works, Rockville, MD (877) PAINT-55
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Ready-mixed; pigments fully ground maintaining a soft paste consistency, capable of readily and uniformly dispersing to a complete homogeneous mixture providing good flowing and brushing properties capable of drying or curing free of streaks or sags. Dry to traffic and touch in 2 hours.
- B. Traffic Paint: Flat, Water Base, Acrylic, complying with Federal Specifications TT-P 1952D
 - 1. 1st Coat:
 - a. Devoe: Traffic-Line Interior-Exterior Water Borne Traffic Marking Paint, 850XX; MDF 7 mils.
 - b. Sherwin-Williams: Setfast Acrylic Waterborne Traffic Marking Paint, MDF 7 mils.
 - c. McCormick: Acrylic Latex Traffic Marking Paint #01705.
 - 2. 2nd Coat:
 - a. Devoe: Traffic-Line Interior-Exterior Water Borne Traffic Marking Paint, 850XX; MDF 7 mils.
 - b. Sherwin-Williams: Setfast Acrylic Waterborne Traffic Marking Paint, MDF 7 mils.
 - c. McCormick: Acrylic Latex Traffic Marking Paint #01705.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Sweep pavement and surfaces to receive paint markings clean of dust and dirt. Allow pavement to cure a minimum of 60 days prior to application of paint markings.
- B. Clean surfaces free of glaze and grease, road film, and other foreign materials.
- C. Where existing pavement markings are indicated on Drawings to be removed or would interfere with the adhesion of new paint, use a motorized abrasive device to remove existing markings.
 - 1. Use equipment that will not damage existing paving or create surface hazardous to vehicle or pedestrian traffic.
 - 2. Use marking removal methods approved by governing authority having jurisdiction in areas within public rights-of-way.

3.3 APPLICATION

- A. Apply paint products in accordance with manufacturer's published instructions using application procedures approved for the particular application and substrate to the specified Minimum Dry Film Thickness (MDF). Apply each coat to uniform finish.
- B. Do not apply paint markings on surfaces that are not dry and if rain is expected within 24 hours.
- C. Do not apply paint markings when surface or air temperature is below 50 degrees F.
- D. Apply 2 coats at manufacturer recommended rate without addition of thinner. Apply with mechanical equipment to produce uniform straight edges. At sidewalk curbs and crosswalks, use straightedge to provide uniform, clean, and straight stripe.

3.4 PAINT MARKING SCHEDULE

- A. Paint the following items with colors indicated below:
 - 1. Pedestrian Crosswalks: White.
 - 2. Bollards: Yellow.
 - 3. Fire Lanes: Red or per local code.
 - 4. Lane Striping Where Separating Traffic in Opposite Directions: Yellow.
 - 5. Lane Striping Where Separating Traffic in Same Direction: White.
 - 6. Handicap Symbols: Per local code.
 - 7. Parking Stall Striping: White.

END OF SECTION

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MODULAR CONCRETE RETAINING WALLS

PART 1 - GENERAL

1.1 SUMMARY

Provisions of the Bidding Requirements, Conditions of the Contract, and Division 1 apply to all Sections of this Project Manual. Refer to Table of Contents for complete list of Bidding Requirements, Conditions, and Sections included in the Project Manual.

A. Work Included in this Section: Provide design, materials, manufacture and construction of Modular Concrete Retaining Wall System or equal in accordance with these specifications and in conformity with the lines, grades, and dimensions shown on the plans. Work includes preparing foundation soil, furnishing and installing leveling pad, unit drainage fill and backfill to the lines and grades shown on the construction drawings. Furnish and install geogrid soil reinforcement of the type, size, and location designated on the construction drawings.

B. Related Work in Other Sections: Refer to the following sections for related work:

311000 for site clearing

312000 for earth moving

1.2 REFERENCES

Listed publications form a part of this Section to the extent indicated by references thereto.

A. WSDOT: Standard Specifications for Road, Bridge, and Municipal Construction, 2002 edition, by Washington State Department of Transportation and American Public Works Association.

B. American Society for Testing and Materials (ASTM)

1. ASTM C-1372 Specification for Segmental Retaining Wall Units.
2. ASTM D-422 Particle Size Analysis
3. ASTM D-698 Laboratory Compaction Characteristics of Soil -Standard Effort
4. ASTM D-4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils
5. ASTM D-4595 Tensile Properties of Geotextiles - Wide Width Strip
6. ASTM D-5262 Unconfined Tension Creep Behavior of Geosynthetics
7. ASTM D-3034 Polyvinyl Chloride Pipe (PVC)
8. ASTM D-1248 Corrugated Plastic Pipe

C. Geosynthetic Research Institute (GRI)

1. GRI-GG4 Determination of Long Tern Design Strength of Geogrids
2. GRI-GG5 Determination of Geogrid (soil) Pullout

D. National Concrete Masonry Association (NCMA)

1. NCMA SRWU-1 Test Method for Determining Connection Strength of SRW
2. NCMA SRWU-2 Test Method for Determining Shear Strength of SRW

1.3 SUBMITTALS

Refer to Section 01330 for general submittal requirements.

- A. Design and calculations prepared, sealed and signed by a professional engineer registered in the State of Washington.
- B. Product literature.
- C. Shop drawings showing lines, grades, designs, and dimensions required; any control information required for coordination with other trades; seal and signature of engineer.
- D. Contractor shall submit a test report documenting strength of specific modular concrete unit and geogrid reinforcement connection. The maximum design tensile load of the geogrid shall be equal to the laboratory tested ultimate strength of geogrid / facing unit connection at a maximum normal force limited by the "Hinge Height" of the structure divided by a safety factor of 1.5. The connection strength evaluation shall be performed in accordance with NCMA test method SRWU-1 and all local regulations.
- E. Submit copies to City of Newcastle DDES and secure Building Permit for same.

1.4 QUALITY ASSURANCE

- A. Conform to WSDOT as applicable and as referenced herein.
- B. Conform to City standards and requirements.
- C. Design shall be conducted under seal of a professional engineer registered in the State of Washington. Drawings required for permits and construction shall be sealed and signed by said Engineer.
- D. Owner may provide soil testing and quality assurance inspection during earthwork and wall construction operations. Owner's quality assurance program does not relieve the contractor of responsibility for wall performance.

PART 2 - PRODUCTS

2.1 MANUFACTURER

Mutual Materials "Cornerstone" Retaining Wall System, Keystone or equal.

2.2 DEFINITIONS

- A. Modular Unit: a concrete retaining wall element machine made from portland cement, water, and aggregates.
- B. Structural Geogrid: a structural element formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth and function primarily as reinforcement.
- C. Unit Drainage Fill: drainage aggregate that is placed within and immediately behind the modular concrete units.
- D. Reinforced Backfill: compacted soil that is placed within the reinforced soil volume as outlined on the plans.

2.3 Modular Concrete Retaining Wall Units shall conform to the following architectural requirements:

- A. Face color: two standard manufacturers' colors placed in a simple geometric pattern will be specified by the Owner prior to construction.
- B. Face finish: sculptured rock face in classic straight configuration.

- C. Bond configuration: running with bonds nominally located at midpoint vertically adjacent units, in both straight and curved alignments.
 - D. Exposed surfaces of units shall be free of chips, cracks or other imperfections when viewed from a distance of 10 feet under diffused lighting.
- 2.4 Modular concrete materials shall conform to the requirements of ASTM C1372 - Standard Specifications for Segmental Retaining Wall Units.
- 2.5 Modular concrete units shall conform to the following structural and geometric requirements measured in accordance with appropriate references:
- A. compressive strength = 3000 psi minimum;
 - B. absorption = 8 % maximum (6% in northern states) for standard weight aggregates;
 - C. dimensional tolerances = $\pm 1/8$ " from nominal unit dimensions not including rough split face, $\pm 1/16$ " unit height - top and bottom planes;
 - D. unit size: 8" (H) x 18" (W) x 18" (D) minimum;
 - E. unit weight: 100 lbs/unit minimum for standard weight aggregates;
 - F. inter-unit shear strength: 1500 plf minimum at 2 psi normal pressure;
 - G. geogrid/unit peak connection strength: 1000 plf minimum at 2 psi normal force.
- 2.6 Modular concrete units shall conform to the following constructability requirements:
- A. vertical setback = $1/8$ " \pm per course (near vertical) or 1" + per course per the design;
 - B. alignment and grid positioning mechanism: fiberglass pins, two per unit minimum;
 - C. maximum horizontal gap between erected units shall be 1/2 inch.
- 2.7 Shear Connectors: Shear connectors shall be 1/2 inch diameter thermoset isophthalic polyester resin-pultruded fiberglass reinforcement rods or equivalent to provide connection between vertically and horizontally adjacent units. Strength of shear connectors between vertical adjacent units shall be applicable over a design temperature of 10 degrees F to + 100 degrees F. Shear connectors shall be capable of holding the geogrid in the proper design position during grid pre-tensioning and backfilling.
- 2.8 Base Leveling Pad Material: Material shall consist of a crushed rock (or as recommended by manufacturer) pad under the entire wall.
- 2.9 Unit Drainage Fill: Unit drainage fill shall consist of clean 1" minus crushed stone or crushed gravel meeting the following gradation tested in accordance with ASTM D-422:

<u>Sieve Size</u>	<u>Percent Passing</u>
1 inch	100
3/4 inch	75-100
No. 4	0 – 10
No. 50	0 – 5

One cubic foot, minimum, of drainage fill shall be used for each square foot of wall face. Drainage fill shall be placed within cores of, between, and behind units to meet this requirement.

- 2.10 Reinforced Backfill: Reinforced backfill shall be free of debris and meet the following gradation tested in accordance with ASTM D-422:

<u>Sieve Size</u>	<u>Percent Passing</u>
2 inch	100-75
3/4 inch	100-75
No. 40	0-60
No. 200	0-35

Plasticity Index (PI) <15 and Liquid Limit <40 per ASTM D-4318.

The maximum aggregate size shall be limited to 3/4 inch unless field tests have been performed to evaluate potential strength reductions to the geogrid design due to damage during construction.

Material can be site-excavated soils where the above requirements can be met.

Unsuitable soils for backfill (high plastic clays or organic soils) shall not be used in the backfill or in the reinforced soil mass.

Contractor shall submit reinforced fill sample and laboratory test results to the Architect/Engineer for approval prior to the use of any proposed reinforced fill material.

- 2.11 Geogrid Soil Reinforcement: Geosynthetic reinforcement shall consist of geogrids manufactured specifically for soil reinforcement applications and shall be manufactured from high tenacity polyester yarn or high-density polyethylene. Polyester geogrid shall be knitted from high tenacity polyester filament yarn with a molecular weight exceeding 25,000 Meg/m and a carboxyl end group values less than 30. Polyester geogrid shall be coated with an impregnated PVC coating that resists peeling, cracking, and stripping.

- A. Ta, Long Term Allowable Tensile Design Load, of the geogrid material shall be determined as follows:
$$Ta = Tult / (RFcr * RFd * RFid * FS)$$

Ta shall be evaluated based on a 75 year design life.
- B. Tult, Short Term Ultimate Tensile Strength
Tult is based on the minimum average roll values (MARV)
- C. RFcr, Reduction Factor for Long Term Tension Creep
RFcr shall be determined from 10,000 hour creep testing performed in accordance with ASTM D5262. Reduction value = 1.60 minimum.
- D. RFd, Reduction Factor for Durability
RFd shall be determined from polymer specific durability testing covering the range of expected soil environments. RFd = 1.10 minimum.
- E. RFid, Reduction Factor for Installation Damage
RFid shall be determined from product specific construction damage testing performed in accordance with GRI-GG4. Test results shall be provided for each product to be used with project specific or more severe soil type. RFid = 1.10 minimum.
- F. FS, Overall Design Factor of Safety
FS shall be 1.5 unless otherwise noted for the maximum allowable working stress calculation.
- G. The maximum design tensile load of the geogrid shall not exceed the laboratory tested ultimate strength of the geogrid/facing unit connection as limited by the "Hinge Height" divided by a factor of safety of 1.5. The connection strength testing and computation procedures shall be in accordance with NCMA SRWU-1 Test Method for Determining Connection Strength of SRW.

- H. Soil Interaction Coefficient, C_i : C_i values shall be determined per GRI:GG5 at a maximum 0.75 inch displacement.
 - I. Manufacturing Quality Control: The geogrid manufacturer shall have a manufacturing quality control program that includes QC testing by an independent laboratory. The QC testing shall include: Tensile Strength Testing, Melt Flow Index (HDPE), Molecular Weight (Polyester).
- 2.12 Drainage Pipe: The drainage pipe shall be perforated or slotted PVC pipe manufactured in accordance with ASTM D-3034 or corrugated HDPE pipe manufactured in accordance with ASTM D-1248.

PART 3 - EXECUTION

3.1 Excavation

- A. Contractor shall excavate to the lines and grades as required to construct wall as shown on the construction drawings. Owner's representative shall inspect the excavation prior to placement of leveling material or fill soils. Proof roll foundation area as directed by soils engineer to determine if remedial work is required.
- B. Over-excavation and replacement of unsuitable native foundation soils and replacement with approved compacted fill to a depth of one foot (12") shall be included in the base bid. Over-excavation and replacement of unsuitable native foundation soils and replacement with approved compacted fill deeper than one foot (12") will be compensated as agreed upon with the Owner.

3.2 Base Leveling Pad

- A. Material shall consist of leveling pad a minimum of 8 inches thick.
- B. Leveling pad shall be trenched in below grade to a depth such that the top of the pad is a minimum of 1.5 inches below grade for each 1 foot of wall height, with height measured from top of units to bottom of leveling pad, unless otherwise noted on the construction drawings.
- C. Leveling pad shall be prepared to insure full contact to the base surface of the concrete units.

3.3 Modular Unit Installation

- A. First course of units shall be placed on the leveling pad at the appropriate line and grade. Alignment and level shall be checked in all directions and insure that all units are in full contact with the base and properly seated.
- B. Place the front of units side-by-side. Do not leave gaps between adjacent units. Layout of corners and curves shall be in accordance with manufacturer's recommendations.
- C. Install shear/connecting devices per manufacturer's recommendations.
- D. Place and compact drainage fill within and behind wall units. Place and compact backfill soil behind drainage fill. Follow wall erection and drainage fill closely with structure backfill.
- E. Maximum stacked vertical height of wall units, prior to unit drainage fill and backfill placement and compaction, shall not exceed two courses.

3.4 Structural Geogrid Installation

- A. Geogrid shall be oriented with the highest strength axis perpendicular to the wall alignment.
- B. Geogrid reinforcement shall be placed at the strengths, lengths, and elevations shown on the construction design drawings or as directed by the Engineer.
- C. The geogrid shall be laid horizontally on compacted backfill and attached to the modular wall units. Place the next course of modular concrete units over the geogrid. The geogrid shall be pulled taut and anchored prior to backfill placement on the geogrid.
- D. Geogrid reinforcements shall be continuous throughout their embedment lengths and placed side-by-side to provide 100% coverage at each level. Spliced connections between shorter pieces of geogrid or gaps between adjacent pieces of geogrid are not permitted.

3.5 Reinforced Backfill Placement

- A. Reinforced backfill shall be placed, spread, and compacted in such a manner that minimizes the development of slack in the geogrid and installation damage.
- B. Reinforced backfill shall be placed and compacted in lifts not to exceed 6 inches where hand compaction is used or 8-10 inches where heavy compaction equipment is used. Lift thickness shall be decreased to achieve the required density as required.
- C. Reinforced backfill shall be compacted to 95% of the maximum density as determined by ASTM D698. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be dry of optimum, + 0% - 3%.
- D. Only lightweight hand-operated equipment shall be allowed within 3 feet from the tail of the modular concrete unit.
- E. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.
- F. Rubber tired equipment may pass over geogrid reinforcement at slow speeds, less than 10 MPH. Sudden braking and sharp turning shall be avoided.
- G. At the end of each day's operation, the Contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from wall face. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

3.6 Cap Installation: Cap units shall be glued to underlying units with an all-weather adhesive recommended by the manufacturer. Provide double cap blocks where required to cover top of blocks.

3.7 As-built Construction Tolerances

- A. Vertical alignment: $\pm 1.5"$ over any 10' distance.
- B. Wall Batter: within 2 degrees of design batter.
- C. Horizontal alignment: $\pm 1.5"$ over any 10' distance.
- D. Corners, bends, curves: ± 1 ft to theoretical location.
- E. Maximum horizontal gap between erected units shall be 1/2 inch.

3.8 Field Quality Control

3.9 EROSION CONTROL

Measures must be taken to prevent erosion both during and after construction. Runoff must be channeled or diverted from the backslope of the wall to prevent the surface water from washing out the fill material.

3.10 FIELD QUALITY CONTROL

- A. Testing and inspections services shall only be performed by qualified and experienced technicians and engineers.
- B. Testing: Field testing will be performed under provisions of Section 01400 by geotechnical engineer, as required for engineer to certify compliance with Contract Documents. This does not relieve the Contractor from securing the necessary construction control testing during construction.
- C. Contractor shall comply with inspection and testing requirements of geotechnical engineer.
- D. As a minimum, quality assurance testing should include foundation soil inspection, soil and backfill testing, verification of design parameters, and observation of construction for general compliance with design drawings and specifications.

END OF SECTION 02276

SECTION 323113

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Chain link fence framework, fabric, and accessories.
 - 2. Excavation for post bases, concrete footings for posts, and center drop for gates.
 - 3. Chain link manual gates and related hardware.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 033000 - Cast-In-Place Concrete: Post footings.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 90 - Tests for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
 - 2. ASTM A 116 - Specification for Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
 - 3. ASTM F 1184 - Specification for Industrial and Commercial Horizontal Slide Gates, Type II, Class
 - 4. ASTM A 123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5. ASTM A 392 - Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - 6. ASTM F 567 - Standard Practice for Installation of Chain Link Fence.
 - 7. ASTM A 824 - Specification for Metallic-Coated Steel Marcellled Tension Wire Use with Chain Link Fence.
 - 8. ASTM F 1043 - Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
 - 9. ASTM F 668 - Specification for Poly (Vinyl Chloride) (PVC) Coated Steel Chain Link Fence Fabric.
 - 10. ASTM F 900 - Specification for Industrial and Commercial Swing Gates.
 - 11. ASTM F 1083 - Specification for Pipe, Steel, Hot-Dipped Zinc Coated (Galvanized) Welded, For Fence Structures.
- B. Underwriter's Laboratories (UL):
 - 1. UL325, Door, Drapery, Gate, Louver, Window Operators, and Systems.
- C. Chain Link Fence Manufacturer's Institute (CLFMI):
 - 1. CLF-PM0610 (July 2011) - Product Manual.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for fabric, posts, accessories, fittings, and hardware.
 - 2. Shop Drawings: Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorage's, and schedule of components.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with CLFMI PM.
- B. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site, store, and protect products under provisions of Section 016000.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Allied Tube & Conduit, Harvey, IL (800) 882-5543.
 - 2. Anchor Fence Division, Master-Halco, Incorporated, Baltimore, MD (800) 229-5615.
 - 3. Merchant's Metals, Houston, TX (800) 254-0080.
 - 4. The Tymetal Corporation, Fort Miller, NY (518) 695-9000.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Conform to CLFMI Product Manual.
- B. Steel Framing:
 - 1. Type I: ASTM F 1083 Schedule 40, standard weight galvanized steel pipe, welded construction, minimum yield strength of 25 ksi; coating conforming to ASTM F 1043 Group IA on pipe exterior
- C. Fabric: ASTM A 392; Class 2: 2 ounce zinc 9 gage (0.148 inch diameter) galvanized steel wire, 2 inch diamond mesh interwoven wire, twisted top and knuckled bottom.

2.3 MIXES

- A. Footing Concrete: 3,000 psi Portland cement concrete.
- B. Grout: Premixed, factory packaged, non staining, non corrosive grout. Provide type formulated for exterior application.

2.4 COMPONENTS

- A. End, Corner, and Pull Posts: Minimum sizes and weights as follows:
 - 1. Up to 6 Foot Fabric Height:
 - a. Type I Posts: 2.375 inch outside diameter pipe, 3.65 pounds per lineal foot.
 - 2. Over 6 Foot to 13 Foot Fabric Height:
 - a. Type I Posts: 2.875 inch outside diameter pipe, 5.79 pounds per lineal foot.
- B. Line (Intermediate) Posts: Minimum sizes and weights as follows:

1. Up to 6 Foot Fabric Height:
 - a. Type I Posts: Round; 1.90 inch outside diameter pipe, 2.72 pounds per lineal foot.
2. Over 6 Foot to 8 Foot Fabric Height:
 - a. Type I Posts: Round; 2.375 inch outside diameter pipe, 3.65 pounds per lineal foot.
- C. Swinging Gate Posts: For leaf widths, as follows:
 1. Up to 4 Feet Width:
 - a. Type I Posts: 2.875 inch outside diameter pipe, 5.79 pounds per lineal foot.
 2. Between 4 Feet and 10 Feet Width:
 - a. Type I Posts: Round; 4.00 inch outside diameter pipe, 9.10 pounds per lineal foot.
- D. Sliding Gate Posts:
 1. All leaf widths:
 - a. Type I Posts: Round; 4.00 inch outside diameter pipe, 9.10 pounds per lineal foot.
- E. Bottom Rail and Intermediate Rails: Manufacturer's longest lengths.
 1. Typical:
 - a. Type I: Round; 1.66 inch outside diameter pipe, 2.27 pounds per lineal foot.
 2. Couplings: Expansion type, approximately 6 inches long.
 3. Attaching Devices: Means of attaching bottom rail securely to each gate, corner, pull, and end post.
- F. Swinging Gate Hardware:
 1. Hinges: Size and material to suit gate size; offset to permit 180 degree gate opening. Provide 1-1/2 pair of hinges for each leaf over 6 foot 0 inch nominal height.
 2. Latch: Forked type or plunger-bar type to permit operation from both sides of gate, with padlock eye.
 3. Double Gate Hardware: In addition to the above, provide gate stops for double gates, consisting of mushroom type flush plate with anchors set in concrete to engage center drop rod or plunger bar. Configure for use of one padlock to lock both gate leaves.
- G. Sliding Gate Hardware:
 1. Provide manufacturer's standard heavy duty track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, and accessories required.
 2. For 10 feet to 30 feet opening:
 - a. Frame shall be fabricated from 6063-T6 aluminum alloy extrusion. The top member shall be 3 inch x 5 inch aluminum structural channel/tube extrusion weighing not less than 3.9 lbs/lf. The top member shall be "keyed" to interlock with the "keyed" track member. The bottom member shall be a single horizontal aluminum structural tube weighing not less than 2.0 lbs/lf or a spliced 2 inch x 5 inch aluminum structural channel weighing not less than 2.65 lbs/lf. The two horizontal sections may be spliced in the field.
 - b. SPLICING: A 1/4 inch x 5 inch x 24 inch galvanized steel splice plate shall be used to secure the two 5 inch channel bottom members together utilizing eight 3/8 inch x 1 1/2 inch plated carriage bolts with lock nuts. The top members shall be spliced together on the side opposite the track member using a 1/4 inch x 2 inch x 24 inch aluminum splice plate secured with six 1/4 inch x 1/2 inch drive rivets on one side and welded to the top member on the other side. On the track side, the track is to be overlapped 24 inch onto the opposing section, interlocked with the top member and vertically secured in place using six 1/4 inch x 1/2 inch drive rivets and horizontally secured in place using six 5/16 inch x 1 inch plated hex head cap screws. The respective splice end vertical member shall be 1 inch x 2 inch, weighing not less than 0.82 lbs/lf. The 1 inch x 2 inch members will be joined utilizing 5/16 inch x 2 3/4 inch plated hex head cap screws, quantity varying by height of gate.
 - c. The vertical members shall alternate between 2 inch x 2 inch and 1 inch x 2 inch in cross section weighing not less 1.1 lbs/lf and 0.82 lbs/lf respectively. The spacing for the vertical intermediates shall be no greater than half the height of the gate.
 - d. The gate frame shall have a separate semi-enclosed "keyed" track, extruded from 6105-T5 aluminum alloy, weighing not less than 2.9 lbs/lf. Track member to be located on only one

side of the top member. When interlocked with the "keyed" top member and welded to it, it forms a composite structure with the top of the gate frame. Welds to be placed alternately along the top and side of the track at 9 inch centers and a minimum of 2 inches long.

- e. The gate frame is to be supported from the track by two swivel type, self aligning, 4-wheeled, sealed lubricant, ball-bearing truck assemblies. The bottom of the support posts shall be equipped with two pairs of 3 inch rubber guide wheels.
- f. Diagonal "X" bracing of 3/16 inch minimum diameter stainless steel aircraft cable shall be installed to brace the gate panels and to provide a ready means of vertical alignment.

2.5 ACCESSORIES

- A. Sleeves: Galvanized steel pipe with inside diameter not less than 1/2 inch greater than outside diameter of fence posts. Provide steel plate closure welded to bottom of sleeves of width and length not less than 1 inch greater than outside diameter of sleeve.
 - 1. Up to 6 Foot Fabric Height: Provide sleeve not less than 12 inches long.
 - 2. Over 6 Foot Fabric Height: Provide sleeve not less than 24 inches long.
 - 3. Fabric Installed Tight to Roof Deck (Posts Braced to Roof Structure): Provide sleeve not less than 12 inches long.
- B. Tension Wire: 7 gage steel, metallic-coated coil spring wire, in accordance with ASTM A 824, located at the top of fence fabric.
- C. Wire Ties: 11 gage galvanized steel.
- D. Post Brace Assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same materials as top rail for brace, and truss to line posts with 0.375 inch diameter rod and adjustable tightener.
- E. Post Tops: Galvanized steel, weather tight closure cap for tubular posts, one cap for each post. Furnish cap with openings to permit passage of top rail.
- F. Stretcher Bars: Galvanized steel, one piece lengths equal to full height of fabric; with minimum cross section of 3/16 inch x 3/4 inch. Provide one stretcher bar for each gate and end post, one for each bottom rail, and two for each corner and pull post.
- G. Stretcher Bar Bands: Manufacturer's standard.
- H. Gate Cross-Bracing: 3/8 inch diameter galvanized steel adjustable length truss rods.

2.6 FABRICATION

- A. Fabricate swing gate perimeter frames of 1.90 inch outside diameter galvanized steel pipe. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space frame members maximum 8 feet apart.
- B. Assemble gate frames rigidly by welding or with special fittings and rivets. Use same fabric as for fence. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to frame at not more than 15 inches on center. Install diagonal cross-bracing on gates as required to ensure frame rigidity without sag or twist.
- C. Attach hardware to provide security against removal or breakage.

2.7 FINISHES

- A. All fence posts, fabric, components, and accessories shall be galvanized.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 INSTALLATION

- A. Install fence in accordance with ASTM F 567 and manufacturer's published instructions.
- B. Install gates in accordance with ASTM F 900, ASTM F2200 or ASTM 1184 as applicable and to manufacturer's published instructions.
- C. Space line posts 10 feet 0 inches on center maximum, unless otherwise indicated on Drawings.
- D. Grade-set Posts:
 - 1. Drill or hand excavate.
 - 2. Excavate each post hole to 12 inch diameter, or not less than four times diameter of post.
 - 3. Excavate approximately 3 inches lower than post bottom; set post bottom not less than 36 inches below finish grade.
 - 4. Hold post in position while placing, consolidating, and finishing concrete.
- E. Sleeve-set Posts: Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with grout, mixed and placed to manufacturer's recommendations.
- F. Rails: Run rail between post, bending smoothly for curved runs located at the bottom of the fence fabric. Provide expansion couplings as recommended by fencing manufacturer.
- G. Center Rails: Provide center rails where indicated. Install in one piece between posts and flush with post on fabric side, using offset fittings where necessary.
- H. Brace Assemblies: Install braces so posts are plumb with rod in tension.
- I. Tension Wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 gage galvanized wire. Fasten fabric to tension wire using 11 gage galvanized steel hog rings spaces 24 inches on center.

- J. Fabric: The fence fabric must be installed within 2 inches between finish grade and bottom selvage. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on the exterior side of the fence, and anchor to framework so fabric remains in tension after pulling force is released.
- K. Stretcher Bars: To secure end, corner, pull, and gate posts, thread through or clamp to fabric 4 inches on center and secure to posts with metal bands spaced 15 inches on center.
- L. Tie Wires:
 - 1. Use U-shaped wire conforming with diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted two full turns. Bend wire ends to minimize hazards to persons or clothing.
 - 2. Tie fabric to line posts with wire ties spaced 12 inches on center. Tie fabric to rails and braces with wire ties spaced 24 inches on center. Manufacturer's standard procedure will be accepted if of equal strength and durability.
- M. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- N. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.3 CONSTRUCTION

- A. Site Tolerances:
 - 1. Maximum Variation from Plumb: 1/4 inch.
 - 2. Maximum Offset from True Position: 1 inch.
 - 3. Locate fencing components completely within site boundaries. Do not infringe adjacent property lines.
 - 4. Maximum Fence Distance from Ground: 1 1/2 inches.
 - 5. Maximum Gate Distance from Ground: 4 inches.

3.4 FIELD QUALITY CONTROL

- A. Test gate operator through ten full cycles and adjust for operation without binding, scraping or uneven motion. Test limit switches for proper "at rest" gate position.
- B. All anchor bolts shall be fully concealed in the finished installation.
- C. Owner, or owner's representative, shall complete "punch list" with installing contractor prior to final acceptance of the installation and submit completed warranty documentation to manufacturers where applicable.

END OF SECTION

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SECTION 329113
SOIL PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. pH Adjusters.
 - 2. Soil Conditioners.
 - 3. Fertilizer.
 - 4. Pesticides.
 - 5. Application of topsoil.
 - 6. Landscape grading.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 312000 - Earth Moving: Topsoil.
 - 2. Section 329200 - Turf and Grasses: Groundcover materials.
 - 3. Section 329300 - Plants: Plants, trees, and shrubs.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Requirements: Procedures for submittals.
 - 1. Product Data: Manufacturer's data including installation and storage instructions for each product specified.
 - 2. Assurance/Control Submittals:
 - a. Pesticide Control Plan: Proposed sequence of pesticide work. Include common name, chemical composition, formulation, concentration, rate and method of application, for all products furnished; and names of state certified applicator(s), in the appropriate category.
 - b. Test Reports: Topsoil composition, in duplicate.
 - c. Certifications: In duplicate. Certify that topsoil, peat, lime, aluminum sulfate perlite and vermiculite conforms with requirements specified.
 - d. Field Reports: Pesticide application, in duplicate.
 - e. Qualification Documentation: Pesticide applicator documentation of experience indicating compliance with specified qualification requirements.

1.3 QUALITY ASSURANCE

- A. Applicator Qualification: Applicator specializing in performing Work of this Section with minimum 5 years documented experience.
 - 1. Pesticide applicator; state certified, using procedures, materials and equipment of type required for Work.
- B. Regulatory Requirements: Conform to applicable requirements of the Local and State Department of Agriculture Extension Service of the state in which the project is located.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials to job site in unopened containers bearing manufacturer's name and content identification, Environmental Protection Agency (EPA) registration number and manufacturer's registered uses.
- C. Store materials as recommended by manufacturer.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Protection of Personnel Property: Apply pesticides so damage will not result to personnel or property from wither direct spray of drifting of chemicals both on and off site.
 - 2. Disposal of Excess Chemicals and Containers: In accordance with Federal, State laws and local rules and regulations.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Specified in Section 312000.

2.2 SOIL CONDITIONERS

- A. Use singly or in combinations required to meet requirements for topsoil.
- B. Soil Conditioners: Nontoxic to plants.
- C. Peat:
 - 1. Peat moss derived from a freshwater site and conforming to ASTM D 2607 as modified herein.
 - 2. Shred and granulate peat to pass 1/2 inch mesh screen and condition in storage pile for minimum six months after excavation.
- D. Sand: Clean and free of materials harmful to plants.
- E. Perlite: Horticultural grade for planters.
- F. Vermiculite: Horticultural grade for planters.
- G. Rotted Manure:
 - 1. Well rotted horse or cattle manure containing maximum 25 percent by volume of straw, sawdust, or other bedding materials; free of stones, sticks and soil.
- H. Composted Wood Derivatives:
 - 1. Ground bark, sawdust, or other wood waste material free of stones, sticks, and soil stabilized with nitrogen having the following properties:
 - a. Particle Size: Minimum percent by weight passing:
 - 1) No. 4 mesh screen 95 percent
 - 2) No. 8 mesh screen 80 percent
 - b. Nitrogen Content: Minimum percent based on dry weight:

1)	Redwood Sawdust	0.5 percent
2)	Fir Sawdust	0.7 percent
3)	Fir or Pine Bark	1.0 percent

I. Calcined Clay:

1. Granular particles produced from montmorillonite clay calcined to minimum temperature of 1200 degrees F to the following gradation:
 - a. Minimum 90 percent passing 8-mesh screen.
 - b. 99 percent retained on 60-mesh screen.
 - c. Maximum 2 percent passing 100-mesh screen.
2. Bulk Density: 40 pounds maximum per cubic foot.

2.3 FERTILIZER

- A. Specified in Section 329200 and 329300.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Subgrade:
 1. After areas required to be landscaped have been brought to required subgrade, thoroughly till to minimum depth of 6 inches by scarifying, disking, harrowing, or other approved methods.
 2. Remove debris and stones larger than one inch in any dimension remaining on surface after tillage.

3.3 TOPSOIL APPLICATION

- A.
- B. Immediately prior to placing topsoil, scarify subgrade to a 2 inch depth for bonding of topsoil with subsoil.
- C. Lawns: Spread topsoil evenly to a minimum depth of 4 inches. Do not spread topsoil when frozen or excessively wet or dry.

END OF SECTION

SECTION 329200
TURF AND GRASSES

GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Seed.
 - 2. Sod.
 - 3. Sprigs.
 - 4. Mulches.
 - 5. Asphalt Adhesive.
 - 6. Water.
 - 7. Erosion Control Material.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 311000 - Site Clearing: Mulch from recycled site debris.
 - 2. Section 312000 - Earth Moving: Topsoil material.
 - 3. Section 313200 - Soil Stabilization: Stabilization materials and procedures.
 - 4. Section 312500 - Erosion and Sedimentation Controls: Slope and erosion protection materials.
 - 5. Section 329200 - Plants: Planting materials.
 - 6. Section 092900 - Gypsum Board: Soil amendment from recycled scrap gypsum.

1.2 REFERENCES

- A. American Society For Testing and Materials (ASTM):
 - 1. ASTM C 602 - Specification for Agricultural Liming Materials.
 - 2. ASTM D 977 - Specification for Emulsified Asphalt.
- B. American Sod Producers Association (ASPA):
 - 1. ASPA STSMT - Specification for Turfgrass Sod Materials and Transplanting/Installing.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit certificate from seed supplier 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.
 - 2) Submit certificate from sod supplier for each seed mixture, identifying sod source, including name and telephone number of supplier.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.

1. Operation and Maintenance Data: Include maintenance instructions, cutting method and maximum grass height, types of application frequency, and recommended coverage of fertilizer for one full growing cycle.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to applicable requirements of the Local and State Department of Agriculture Extension Service of the state in which the project is located.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management:
 1. Renewable Resources: Plants specified are indigenous, low maintenance varieties, tolerant of site's existing soils and climate without supplemental irrigation or fertilization once established.
 - a. Soil amendments: No chemical fertilizers; use organic/natural matter to support establishment of indigenous plants; use inorganic materials such as sand or gypsum to improve workability and drainage of soil as appropriate to indigenous plants.
 - b. Mulch: Provide organic mulch products.
 2. Recycled Content:
 - a. Wood fiber mulch: Provide products manufactured from 100 % post-consumer paper content and yard trimming composts.
 - b. Mulch from recycled site debris: Coordinate with Section 311000 - Site Clearing to identify and prepare suitable organic debris for use as mulch on site.
 - c. Soil amendment from recycled scrap gypsum: Coordinate with Section 092900 - Gypsum Board to prepare scrap gypsum board for use as soil amendment.

PART 2 - PRODUCTS

2.1 SEED

- A. Classification:
 1. Latest season's crop delivered in original sealed packages bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weedseed content, and inert material.
 2. Label in conformance with applicable state seed laws.
 3. Wet, moldy, or damaged seed will be rejected.

2.2 SOD

- A. Classification:
 1. Nursery grown as classified in ASPA STSMT.
 2. Machine cut sod at a uniform thickness of 3/4 inch with a tolerance of 1/4 inch, excluding top growth and thatch. Each individual sod piece capable of supporting its own weight when lifted by ends.
 3. Broken pads, irregularly shaped pieces, torn or uneven ends will be rejected.
 4. Wood pegs and wire staples for anchorage as recommended by sod supplier.

2.3 MULCHES

- A. Provide mulch free from noxious weeds, mold, and other deleterious materials.

- B. Wood Cellulose Fiber:
 1. Processed to contain no growth or germination-inhibiting factors, dyed with non toxic, biodegradable dye to an appropriate color to facilitate visual metering of materials application.
 2. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 3.5 to 5.0
 3. Use with hydraulic application of grass seed and fertilizer.
 4. Provide organic mulch products manufactured from 100 percent post-consumer paper content and yard trimming composts.
 5. Manufacturers:
 - a. National Fiber, Belcher, MA, (800) 282-7711 or (413) 283-8747.
 - b. Wood Recycling Inc., Woburn, MA, (800) 982-8732 or (617) 937-0855.
 - c. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.4 STABILIZING MATERIALS

- A. Specified in Section 313200.
- B. Asphalt Adhesive: ASTM D 977, Grade RS-1. Use with straw or hay mulch.
- C. Cellulose Fiber: Use for anchoring straw. Fiber binding shall be applied at a net dry weight of 750 pounds per acre. Cellulose fiber may be mixed with water. Mixture shall contain maximum of 50 pounds of cellulose fiber per 100 gallons of water.
- D. Mulch Netting: Stake light weight plastic netting over the mulch according to manufacturer's recommendations. Stakes shall be driven to ground level.

2.5 WATER

- A. Suitable quality for irrigation.

2.6 EROSION CONTROL MATERIAL

- A. Specified in Section 312500.
- B. Net: Heavy, twisted jute mesh, plastic mesh, biodegradable paper fabric with knitted yarns, or standard weave burlap.

2.7 TOPSOIL

- A. Topsoil:
 1. Containing organic matter as needed to support establishment of plants; maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4 inch screen.
 2. Component Percentages:
 - a. Silt: 25 to 50
 - b. Clay: 10 to 30
 - c. Sand: 20 to 30
 - d. pH: 5.5 to 7.0
 - e. Soluble Salts: 600 ppm maximum

2.8 pH ADJUSTERS

- A. Lime:
 - 1. Material: ASTM C 602, Class T, agricultural commercial grade ground limestone containing not less than 50 percent of total oxides.
 - 2. Gradation: Minimum 75 percent passing 100 mesh sieve and 100 percent passing 20 mesh sieve.
- B. Ferrous Sulfate: Commercial Grade.

2.9 FERTILIZER

- A. Bonemeal: Commercial, raw, finely ground; minimum 4 percent nitrogen and 20 percent phosphoric acid.
- B.
- C. Superphosphate: 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 following composition:

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Place topsoil as specified in Section 312000.

3.3 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's published instructions.
- B. Apply after smooth after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.
- F. No chemical fertilizers.

3.4 SEEDING

- A. Sow one-half of seed in one direction and remainder at right angles to first sowing.
- B. Cover seed to average depth of 1/2 inch by means of spike-tooth harrow, cultipacker, or other recommended device.
- C. Hydroseeding:
 - 1. Mix seed, fertilizer, and wood cellulose fiber in required amount of water to product a homogeneous slurry. Add wood cellulose fiber after seed, water, and fertilizer have been thoroughly mixed and apply at the rate of 200 pounds per acre dry weight.
 - 2. Hydraulically spray material on ground to form a blotter-like cover impregnated uniformly with grass seed.
- D. Rolling:
 - 1. Immediately after seeding, firm entire area except for slopes in excess of 3 to 1 with a roller not exceeding 90 pounds for each foot of roller width.
 - 2. If seeding is performed with cultipacker-type seeder or hydroseeding, rolling may be eliminated.
- E. Erosion Control Material: Install in accordance with manufacturer's instructions.

3.5 SODDING

- A. Placing:
 - 1. Place a maximum of 20 hours after initial harvesting, in accordance with ASPA GSS as modified herein.
 - 2. Thoroughly moisten areas to be sodded immediately prior to placing.
- B. Slopes and Ditches:
 - 1. For slopes 2:1 and greater, lay with long edge parallel to slope.
 - 2. V-ditches and flat bottomed ditches, lay with long edge perpendicular to flow of water.
 - 3. Anchor each piece of sod with wood pegs or wire staples maximum 2 feet on center.
 - 4. On slope areas, start sodding at bottom of slope.
- C. Finishing: After completing sodding, blend edges of sodded area smoothly into surrounding area.
- D. Watering: Start immediately after completing each day's sodding. Apply at a rate sufficient to ensure thorough wetting of soil to minimum depth of 4 inches.

3.7 CLEANING AND PROTECTION

- E. Remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.
- F. Immediately after seeding, sodding or sprigging, protect the area against traffic or other use.
- G. Restore existing lawn and grass areas which have been damaged during execution of this work to original condition.
- H. Keep one paved pedestrian access route and one paved vehicular access route to each building clean at all time. Clean other paving when work in adjacent areas is complete.

3.6 ESTABLISHMENT PERIOD

- A. Definitions:
 - 1. Lawns and grasses establishment period will be in effect until lawns and grasses have been mowed 3 times.
 - 2. Stand of lawn and grass is 95 percent ground cover of established species.
- B. Maintenance During Establishment Period:
 - 1. Mow lawns and grassed areas to an average height of 3 inches whenever average height of grass becomes 8 inches.
 - 2. Promotion of growth: Mow, remove excess clippings, eradicate weeds, water, fertilize, overseed, and perform other operations necessary to promote growth.

3.7 FINAL INSPECTION AND ACCEPTANCE

- A. Final Inspection and Acceptance:
 - 1. Final inspection will be made upon written request from the Contractor at least 10 days prior to last day of lawn and grasses establishment period.
- B. Replanting: Replant areas which do not have a satisfactory stand of lawns and grasses.
- C. Contractor is to maintain lawns and grasses for one year from completion.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 09/22/2015

SECTION 329300

PLANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plants, Trees and Shrubs.
 - 2. Antidesiccants.
 - 3. Pesticides.
 - 4. Fertilizer.
 - 5. Planting Soil Mixtures.
 - 6. Membrane Ground Covers.
 - 7. Drainage Pipe and Bedding.
 - 8. Mulches.
 - 9. Edging Material.
 - 10. Trunk Wrapping Material.
 - 11. Staking and Guying Material.
 - 12. Water.
 - 13. Maintenance of Existing Erosion Control.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 311000 - Site Clearing: Mulch from recycled site debris.
 - 2. Section 312000 - Earth Moving: Topsoil materials.
 - 3. Section 313200 - Soil Stabilization: Stabilization materials and procedures.
 - 4. Section 312500 - Erosion and Sedimentation Controls: Slope and erosion protection materials.
 - 5. Section 329200 - Turf and Grasses: Grass, sod, and sprigs.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI Z60.1 - American Standard for Nursery stock.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 4 - Specification for Clay Drain Tile.
 - 2. ASTM C 136 - Method for Sieve Analysis of fine and Coarse Aggregates.
 - 3. ASTM C 498 - Specification for Perforated Clay Drain Tile.
 - 4. ASTM C 700 - Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
 - 5. ASTM D 1621 - Test Method for Compressive Properties of Rigid Cellular Plastics.
 - 6. ASTM D 2103 - Specification for Polyethylene Film and Sheeting.
 - 7. ASTM D2178 - Specification for Asphalt Glass (Felt) Used in Roofing and Waterproofing.
 - 8. ASTM D 2729 - Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - 9. ASTM D 4491 - Test Methods for Water Permeability of Geotextiles by Permittivity.
 - 10. ASTM D 4716 - Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
 - 11. ASTM F 405 - Specification for Corrugated Polyethylene (PE) Tubing and Fittings.

- C. National Arborist Association (NAA):
 - 1. NAA PSST - Pruning Standards for Shade Trees.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - a. Assurance/Control Submittals:
 - b. Delivery Schedule: Submit schedule of delivery of trees, plants, and ground covers minimum 10 days prior to first scheduled delivery.
 - c. Pesticide Control Plan:
 - 1) Submit plan for proposed sequence of pesticide application including common name, chemical composition, formulation, concentration rate, and method of application of each type of pesticide.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operation and Maintenance Data: Include maintenance instructions recommending procedures to be established by United States Postal Service for maintenance of trees, plants, and ground covers during entire year. Include cutting and trimming method and types, application frequency, and recommended coverage of fertilizer. Submit before expiration of maintenance during plant establishment period.

1.4 QUALITY ASSURANCE

- A. Horticultural Standards:
 - 1. Names conform to "Standardized Plant Names" by American Joint Committee on horticultural Nomenclature.
 - 2. Material selection, sizing, transportation, protection and planting in accordance with "American Standard for Nursery Stock", by American Association of Nurserymen and American National Standard Institute (ANSI) Publication Z60.1.
- B. Regulatory Agencies: Conform to applicable requirements of the Local and State Department of Agriculture Extension Service of State where Project is located.
- C. Plant, tree, and shrub materials will be inspected by Contracting Officer at growing site; tagged for size and quality, and approved for delivery.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Delivery:
 - 1. Branched Plants: Branches tied and exposed branches covered with material that allows air circulation. Prevent damage to root balls and desiccation of leaves.
 - 2. Fertilizer and Lime: In original, unopened containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal rules and regulations. May be furnished in bulk with certificate indicating above information.
 - 3. Labels: Durable waterproof labels in weather-resistant ink, legible for a minimum of 60 days after delivery to planting location, stating the correct name and size as specified in the list of required plants. Attach to plants, bundles and containers of plants. Groups of plants may be labeled by tagging one plant.
 - 4. Pesticides: In original unopened containers with legible label indicating Environmental Protection Agency (EPA) registration number and manufacturer's registered uses.

- C. Storage:
1. Plants, Trees and Shrubs: Store and protect plants not planted on day of arrival at Project Site as follows:
 - a. Shade and protect plants in outside storage areas protected from wind and direct sunlight until planted.
 - b. Heel-in bare root plants.
 - c. Protect balled and burlapped plants from freezing or drying out by covering balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering which allows air circulation.
 - d. Keep all plants in a moist condition by watering with fine mist spray until planted.
 2. Lime, Fertilizers, Mulch: Store in dry locations away from contaminants.
 3. Pesticides, Antidesiccants: Do not store with other landscape materials.
- D. Handling: Do not drop or dump materials from vehicles. Handle plants by rootballs or containers. Do not lift or carry by stems or crown.

1.6 PROJECT CONDITIONS

- A. Jobsite Requirements:
1. Protection of Personnel and Property: Apply pesticides so damage will not result to personnel or property from either direct spray or drifting of chemicals both on and off site.
 2. Disposal of Excess Chemicals and Containers: In accordance with federal and state laws.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management:
1. Renewable Resources: Plants specified are indigenous, low maintenance varieties, tolerant of site's existing soils and climate without supplemental irrigation or fertilization once established.
 - a. Soil amendments: No chemical fertilizers; use organic matter to support establishment of indigenous plants; use inorganic materials such as sand or gypsum to improve workability and drainage of soil as appropriate to indigenous plants.
 - b. Mulch: Provide organic mulch products.
 - c. Pesticides: No chemical pesticides.
 2. Recycled Content:
 - a. Mulch from recycled site debris: Coordinate with Section 311000 - Site Clearing to identify and prepare suitable organic debris for use as mulch on site.

1.8 WARRANTY

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Submit written warranty signed by material supplier and installer agreeing that they will:
1. Warrant plants, trees and shrubs unconditionally for 1 year or 1 full growing season, whichever is greater.
 2. Replace any material diseased or 25 percent dead or more at no additional cost to United States Postal Service.
 3. Warrant deciduous material to break dormancy if planted in dormant season.
 4. Warrant perennials to show signs of healthy growth by May 15 to June 1.
 5. Provide replacement material during next planting period.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Pre-Bid: If any plant specified is not obtainable, submit a written substitution request to Contracting Officer during bidding.
- B. Substitutions of planting materials will not be permitted unless authorized by Contracting Officer.

2.2 PLANTS, TREES, AND SHRUBS

- A. Varieties: Botanical names indicated are listed in "HORTUS III". Furnish nursery stock in accordance with ANSI Z60.1, except as otherwise specified or indicated. Furnish plants grown under climatic conditions similar to those in locality of Project Site. Spray plants budding into leaf of having soft growth with an antidesiccant before digging. Provide plants of same specified size in uniform size and character of growth.
- B. Shape: Well branched, well formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and having healthy, normal, and unbroken root system.
- C. Deciduous Trees and Shrubs: Symmetrical tops with typical spread of branches for each particular species or variety.
- D. Evergreen Trees and Shrubs: Well developed symmetrical tops with typical spread of branches for each particular species or variety.
- E. Ground Covers and Vines: Number and length of runners and clump sizes indicated, and of proper age for grade of plants indicated, furnished in removable containers, integral containers or formed homogeneous soil section.
- F. Size: Minimum sizes measured before pruning and with branches in normal position, conform to measurements indicated, based on average width or height of plant for species specified in ANSI Z60.1. Plants of larger size than specified may be used with approval of Contracting Officer. When larger plants are used, increase ball of earth or spread of roots in accordance with ANSI Z60.1.
- G. Balled and Burlapped (B&B) and Balled and Potted (B&P) Plants: Ball size and ratios, conform to ANSI Z60.1. Ball plants with firm, natural balls of soil. Wrap B&B plants firmly with burlap or strong cloth, and tie securely.
- H. Balled and Platformed (BP) Plants: Wrap and ball in same manner as B&B plants and fasten securely to strong platforms.
- I. Bare-Root Plants: Dig with root system substantially intact but with earth carefully removed. Cover roots with a thick coating of mud by puddling after plants are dug or wrap with moist material immediately after digging.
- J. Container Grown Plants: Sufficient root growth to hold earth intact when removed from containers. Root bound plants not permitted.

2.3 ANTIDESICCANTS

- A. Antidesiccants: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
1. "Vapor Guard" - Miller Chemicals & Fertilizer Corp.; Hanover, PA (717) 632-8921.

2.4 PESTICIDES

- A. Soil fumigant, herbicide, insecticide and fungicide, EPA registered and state approved. Furnish for preemergence and postemergence application(s).

2.5 FERTILIZERS

- A. Commercial Grade Fertilizer: Granular, free flowing, and uniform in composition with nitrogen-phosphorus-potash.
- B. Controlled Release Fertilizer: Magnesium ammonia phosphate and magnesium potassium phosphate

2.6 PLANTING SOIL MIXTURES

- A. 5 way mix.

2.7 MEMBRANE GROUND COVERS

- A. Sheet Polyethylene: Black, conforming to ASTM D2103, minimum thickness 6 mils.

2.8 DRAINAGE PIPE AND BEDDING

- A. Granular Fill for Plant Pit and Bed Drainage: Uniformly graded sand, stone, gravel, or stone screening free from an excess of soft or unsound particles or other objectionable material. When testing in accordance with ASTM C136, material shall conform to the following gradation limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8 inch	100
No. 4	85 - 100
No. 16	45 - 80
No. 50	10 - 30
No. 100	0 - 10
No. 200	0 - 3

2.9 MULCHES

- A. Free from noxious weeds, mold, or other deleterious materials.
- B. Inert Mulch Materials: Riverbank stone.

- C. Organic Mulch Materials: Ground or shredded bark.

2.10 TRUNK WRAPPING

- A. Two thicknesses burlap minimum 4 inch width.
- B. Tying Material: 3 ply, lightly tarred medium or coarse sisal yarn twine.

2.11 STAKING AND GUYING

- A. Tree Support Stakes: Rough sawn hard wood free of knots, rot, cross grain, bark, long slivers, or other defects that impair strength. Minimum 2 inches square or 2 1/2 inch diameter by 8 feet long, pointed at one end. Paint or stain wood stakes dark brown.
- B. Guying Wire: 12 gauge galvanized steel.
- C. Hose Chafing Guards: New or used 2 ply, 3/4 inch diameter, reinforced rubber or plastic hose, black or dark green, all of same color.
- D. Flags: White surveyor's plastic tape, 6 inches long, fastened to guying wires or cables.
- E. Driven Anchors: May be used instead of guy stakes for trees with 3 to 6 inch caliper. malleable iron, arrow shaped, galvanized.

2.12 WATER

- A. Suitable quality for irrigation.

PART 3 - EXECUTION

3.1 TIME RESTRICTIONS AND PLANTING CONDITIONS

- A. Restriction: Do not plant when ground is frozen, snow covered, or muddy.

3.2 PREPARATION

- A. Layout: Stake out approved plant material locations and bed outlines on the project site before digging plant pits or beds. The landscape consultant reserves the right to adjust plant material locations to meet field conditions.
- B. Verify location of underground utilities prior to excavation. Protect existing adjacent turf before excavations are made. Where planting beds occur in existing turf areas, remove turf to a depth that will ensure removal of the entire root system. Measure depth of pits from finished grade. Depth of excavation shall provide proper relation between top of ball and finished grade as specified in paragraph entitled "Handling."

3.3 PLANTING

- A. Handling: Move balled, burlapped and container-grown plants only by supporting the ball or container. Set plants on hand compacted layer of planting soil 6 inches thick and hold in position until soil has been firmly placed around roots or ball. Set plants 1/8 to 1/4 depth of ball above surrounding grade. Replaced balled plant whose balls are cracked or broken either before or during the planting process.
 - 1. Ball diameter 12 inches or less: Balled or potted items; excavate pits at least 16 inches larger in diameter and 6 inches deeper than size of ball or container.
 - 2. Ball diameter greater than 12 inches: Balled or potted items; excavate pits at least 24 inches larger in diameter and 6 inches deeper than size of ball or container.
 - 3. Mulch: Provide mulching material over entire earth saucer and berm surface around trees and shrubs 3 inches deep or as indicated on drawings, ground cover and annuals 2 inches deep or as indicated on drawings. Keep mulch out of the crowns of shrubs.
- B. Balled and Burlapped Stock: Backfill with topsoil to approximately half the depth of ball and then tamp and water. Carefully remove or fold back excess burlap and tying materials. Tamp and complete backfill, place mulch and water.
- C. Container Grown Stock: Remove from container to prevent damage to plant or root system. Cut root ball vertically in 3 to 5 places with sharp knife before planting.
- D. Ground Covers and Vines: Plant after placing mulch. Do not remove from flats and containers until immediately before planting. Space at intervals indicated, sufficiently deep to cover all roots. Immediately sprinkle with water until entire area is soaked. Smooth planting areas after planting to provide even, smooth finish. Mulch as indicated.
- E. Fertilization: After establishment of finished grade around plants, top dress all pit and bed areas with fertilizer. If fertilizer adheres to plants, carefully remove it by flushing.
- F. Application of Pesticides: No chemical pesticides.

3.4 FINISHING

- A. Mulching: Provide mulching materials at other indicated locations 3 inches deep. Keep mulch off buildings, sidewalks, light standards, and other structures.
 - 1. Placing Inert Materials: Lay membrane with edges lapped 6 inches to 12 inches to receive inert mulch material. Punch a grid of 1/4 inch holes for drainage in the membrane one foot on centers over entire area. Spread mulch 3 inches deep or as indicated.
 - 2. Placing Mulching Materials: Spread a uniform thickness 3 inches deep or as indicated.
- B. Wrapping: Tie trunk wrapping material to trunks of deciduous trees with specified material within the next full working day after planting. Contracting Officer will inspect the trunks of deciduous trees for physical damage, insect infestation, or disease, and determine required treatment or rejection prior to wrapping operation. Begin wrapping at base and extend to first branches. Overlap wrapping half with width of underlying wrap and securely tie at top, bottom, and 18 inch maximum intervals with twine.
- C. Staking and Guying:
 - 1. Deadmen: Stake, guy and place deadmen for plantings as indicated.
 - 2. Chafing Guards: Hold plants firmly between stakes with double-strand of 12 gauge guying wire. Use hose chafing guards, where wire will contact the plant. (Provide turnbuckles as indicated).
 - 3. Stakes: Drive vertically into ground 3 feet deep outside of plant balls. Do not injure ball or roots.
 - 4. Ground Stakes: Drive into firm ground outside of plant pit with top of stakes flush with ground.
 - 5. Deadmen: Place minimum 18 inches below ground surface.
 - 6. Iron Anchors: Drive minimum 30 inches below ground surface.
 - 7. Steel Anchors: Insert steel screw anchors as recommended in manufacturer's data.

8. Flags: Securely fasten flags on each guy [wire] [cable] approximately two-thirds of the distance up from ground level.
- D. Pruning: NAA DSST; prune in accordance with safety requirements of ANSI Z133.1.
 1. Trees and Shrubs: Remove dead and broken branches. Prune deciduous trees and shrubs to reduce total amount of branching structure by maximum one-third. Retain typical grown habit of individual plant with as much height and spread as is practical. Make cuts with sharp instruments flush with trunk or adjacent branch, above node.
 2. Wound Dressing: Apply tree wound dressing to cuts 1/2 inch in diameter and larger immediately after pruning.

3.5 MAINTENANCE

- A. Commencement: Begin maintenance immediately after each plant is planted.
- B. Inspection: Inspect plants at least once a week during installation period and perform needed maintenance promptly.

3.6 PLANT ESTABLISHMENT PERIOD

- A. Commencement: On the date that inspection by Contracting Officer shows that all new plants furnished under this Contract have been satisfactorily installed.
- B. Maintenance During Plant Establishment Period:
 1. Promote Plant Growth: Water, prune, mulch, re-guy, re-wrap and perform other operations necessary to promote plant growth.
 2. Fertilizing Plants: At least once during the plant establishment period.
 3. Remove Dead Plants: Remove and replace dead plants and replace stakes, guys, wraps, and eroded plant saucers required. No additional plant establishment period will be required for replacement plants.
 4. Tracking Unhealthy Plants: Plants not in healthy growing condition, as determined by Contracting Officer, will be noted and removed as soon as seasonal conditions permit and replaced with plants of the same species and sizes as originally specified. Make replacements in same manner as specified for original plantings.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspect plant conditions, placement, and soil conditions.

3.8 FINAL INSPECTION AND ACCEPTANCE

- A. Final Acceptance: Base on compliance with the following:
 1. Total Plants on Site: Plants have been accepted and required number of replacement are in place.
 2. Mulching and Weeding: Plant beds and saucers are properly mulches and free of weeds.
 3. Supports: Stakes and guys are in good condition.
 4. Remedial Work: Remedial measures directed by Contracting Officer have been carried out to ensure plant survival.

5. Fertilizing: Plant materials have been fertilized as required.
- B. Contractor is to maintain exterior plants for one year from completion.

END OF SECTION

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SECTION 334000

STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Site storm sewer drainage piping, fittings and accessories, and bedding.
 - 2. Connection of storm sewer system to municipal storm sewer system.
 - 3. Catch basins, paved area drainage, site surface drainage, and storm water detention facilities.
- B. Related Documents: The Contract Documents, as defined in the General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 312300 - Excavation and Fill: Earthwork for utilities.
 - 2. Section 334913- Storm Drainage Manholes, Frames, and Covers: Manholes, manhole lids, frames, and accessories.
 - 3. Section 333000 - Sanitary Sewerage Utilities: Site sanitary sewer system.
 - 4. Section 033000 - Cast-In-Place Concrete: Concrete for catch basins, inlets, and junction boxes.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 760 - Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains.
 - 2. ASTM C 12 - Practice for Installing Vitrified Clay Pipe Lines.
 - 3. ASTM C 76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 4. ASTM C 443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 5. ASTM D 2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
 - 6. ASTM D 3034 - Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
 - 7. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.3 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to start of backfill operations.

1.4 SUBMITTALS

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following.
 - a. Actual locations of pipe runs, connections, manholes, catch basins, cleanouts, and invert elevations.
 - b. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to local Public Works Standard Specifications for materials and installation of the work of this Section.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

Conform to Division 9 of WSDOT as applicable and as referenced herein.

- A. Storm Pipe: As shown and specified on Drawings.
- B. Footing (Foundation) Drains: Footing drains shall be 4-inch diameter perforated PVC pipe - ASTM D3034, SDR 35. Perforations shall be two rows of ½-inch holes, 5 inches on center, 120 degrees apart. All joints shall be solvent welded. Drain rock backfill shall be washed 5/8-inch diameter pea gravel.
- C. Downspout Connection to Storm System: Tie-in pipe shall be N-12 pipe. All pipes shall be 6 inches in diameter, except as otherwise indicated on the drawings.
- D. Subsurface Drains: Subsurface drains for rain gardens, wall drains, rock strip drains, and playfield drains be perforated PVC pipe - ASTM D3034, SDR 35. Pipe diameter shall be as shown on the plan set or a minimum diameter of 4 inches. Perforations shall be two rows of ½-inch holes, 5 inches on center, 120 degrees apart. All joints shall be solvent welded. Drain rock backfill shall be washed 5/8-inch diameter pea gravel. Rock strip drains shall be finished to the surface with 2 to 4-inch diameter river rock.
 - 1. Cleanouts: Provide in quantities and locations shown on the drawings, but not less than at end of runs, changes in direction, and intervals of 100 feet. Provide cleanouts at each downspout for the entire building.

2.2 INLETS, CATCH BASINS AND JUNCTION BOXES

- A. Lid and Frame: Cast iron as indicated on Drawings.
- B. Structure: As indicated on Drawings.
- C. Concrete: Specified in Section 033000.
- D. Stormfilter Detention Gallery and Catch basins: As shown and specified on Drawings

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings.

- 2. Verify that trench cut and excavation is ready to receive Work and excavations, dimensions, and elevations are as indicated on Drawings.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

- A. Excavate pipe trench as specified in Section 312300. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level materials in continuous layers not exceeding 6 inches compacted depth, each layer. Place compacted bedding material to elevation of paving subgrade as indicated on Drawings.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.
- D. Remove excess backfill and excavated material from site.

3.4 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with ASTM C 12, ASTM D 2321 or manufacturer's published instructions, and state or local requirements. Seal joints watertight.
- B. Install pipe on minimum 4 inch bedding as specified in Section 312300.
- C. Lay pipe to slope gradients indicated on Drawings.
- D. Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness equal to paving subgrade indicated on Drawings.
- E. Refer to Section 312300 for trenching requirements. Do not displace or damage pipe when compacting.
- F. Refer to Section 334913 for manhole requirements.
- G. Connect to municipal storm sewer systems, manholes, and inlets as indicated on Drawings.

3.5 INSTALLATION - CATCH BASINS, INLETS, AND JUNCTION BOXES

- A. Form bottom of excavation clean and smooth to elevation indicated on Drawings.

- B. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe to be placed at required elevations.
- C. Form and place cast-in-place concrete walls, sleeved at required elevation, to receive storm sewer pipe as indicated on Drawings.
- D. Form and place cast-in-place top of structure as indicated on Drawings.
- E. Mount grate and frame level, in grout, secured to top section at elevation indicated.

3.6 CONSTRUCTION

- A. Interface with Other work: Coordinate the Work with termination of storm sewer connection outside building including connection to municipal storm sewer system.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection and testing.
- B. Site Tests:
 - 1. Perform inspections prior to and immediately after placing bedding.
 - 2. Compaction: Specified in Section 312300.
 - a. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
 - b. Frequency of Tests: One test for each 50 lineal feet of trench.
 - 3. Perform the following tests in accordance with applicable local Public Works Department Standard Specifications and requirements.
 - a. Pressure Test.
 - b. Infiltration Test.
 - c. Deflection Test.

END OF SECTION

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SECTION 334913

STORM DRAINAGE MANHOLES, FRAMES, AND COVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Monolithic concrete manhole section with the option of monolithic concrete or masonry transition to lid frame, covers, anchorage and accessories.
 - 2. Modular precast concrete manhole section with tongue-and-groove joints and with the option of precast concrete or masonry transition to lid frame, covers, anchorage and accessories.
 - 3. Masonry manhole section with masonry transition to lid frame, covers, anchorage and accessories.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 312300 - Excavation and Fill: Earthwork for utilities.
 - 2. Section 334000 - Storm Drainage Utilities: Site storm drainage system.
 - 3. Section 033000 - Cast-In-Place Concrete: Concrete for utility structure base pads.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C55 - Specification for Concrete Building Brick.
 - 2. ASTM A48 - Specification for Gray Iron Castings.
 - 3. ASTM C478 - Specification for Precast Reinforced Concrete Manhole Sections.
 - 4. ASTM C923 - Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- B. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data for manhole covers, manhole steps, component construction, features, configuration, and dimensions.
 - 2. Shop Drawings: Drawings of manhole locations, elevations, piping with sizes, locations and elevations of penetrations.

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Requirements: IMIAC - Recommended Practices and Specifications for Cold Weather Masonry Construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manhole Section: Reinforced precast concrete. in accordance with ASTM C 478 with gaskets in accordance with ASTM C 923.
 - 1. Construct manholes of precast concrete sections as required by Drawings to size, shape, and depth indicated, but never less than 4 foot 0 inch inside diameter.
- B. Manhole Section: Non-reinforced cast-in-place concrete as specified in Section 033000 -- Cast-In-Place Concrete.
 - 1. Cast-in place Manholes shall be constructed of 3500 psi concrete.
 - 2. Forms shall be made of steel sheets accurately shaped and fabricated of sufficient strength to form dense watertight walls to true dimensions.
 - 3. Concrete shall be deposited in evenly distributed layers of about 18 inches, with each layer vibrated to bond it to the preceding layer.
- C. Concrete Brick Units: ASTM C 55, Grade N Type I- Moisture Controlled, normal weight, of same Grade, Type and weight as block units, nominal modular size of 3 5/8 x 7 5/8 x 2 1/4 inches.
- D. Mortar and Grout: Mortar for finishing and sealing shall be Class "C". Honeycombing less than 2 inches deep shall be repaired using Class "D" mortar.
- E. Brick Transition Reinforcement: Formed steel 8 gage wire with galvanized finish.

2.2 COMPONENTS

- A. Lid and Frame: ASTM A 48, Class 30B Heavy Duty Cast iron construction, machined flat bearing surface, removable lid, closed or open as indicated on Drawings; sealing gasket; manufactured by Neenah Foundry Company.
- B. Manhole Steps: Neenah Foundry Company catalog No. R- 1982-F for precast or catalog No. R-1980-0 for brick/cast-in-place manholes or M.A. Industries PS-1.
- C. Base Pad: Cast-in-place concrete as specified in Section 033000 - Cast-In-Place Concrete.
- D. Section 016000 - Product Requirements: Product requirements and substitutions. Substitutions: Permitted.

2.3 CONFIGURATION

- A. Manhole Section Construction: Concentric with eccentric cone top section.
- B. Shape: Cylindrical.
- C. Clear Inside Dimensions: 48 inch diameter or as indicated on Drawings.
- D. Design Depth: As indicated on Drawings.
- E. Clear Lid Opening: 24 inches minimum.
- F. Pipe Entry: Provide openings as indicated on Drawings.

- G. Main and Lateral Pipes: Neatly cut off main and lateral pipes flush with inside of manhole or inlet where they enter structure walls, and point up irregularities and rough edges with nonshrinking grout.
- H. Inverts: Shape inverts for smooth flow across structure floor as shown on Drawings. Use concrete and mortar to obtain proper grade and contour and finish surface with fine textured wood float.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or duct sleeves as indicated on Drawings for drainage system piping specified in Section 334000.

3.3 PLACING PRE-CAST MANHOLE SECTIONS

- A. Place base pad to proper elevation and location and trowel top surface level for placement of manhole section.
- B. Place manhole section plumb and level to correct elevations and anchor to base pad.
 - 1. After completion of slab foundation the first joint of manhole section shall be lowered into position, grooved end first, and set level and plumb on concrete base. Align and adjust to proper grade prior to placing and forming invert which shall be poured immediately after setting of first section of manhole section.
 - 2. Prior to setting subsequent manhole sections, apply primer to tongue and groove ends and allow to set in accordance with manufacturer recommendations. Place "Ram-nek", or equivalent, plastic rope on tongue end. Lower next section into position, and remove excess material from interior of structure. Add additional material on exterior of joint, if necessary, for completely watertight joint.

3.4 MASONRY MANHOLE SECTION CONSTRUCTION

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- B. Lay masonry units in running bond. Course 3 brick units and 3 mortar joints to equal 8 inches.

- C. Form flush mortar joints.
- D. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- E. Install joint reinforcement 16 inches on center
- F. Place joint reinforcement in first and second horizontal joints above base pad and below lid frame opening.
- G. As work progresses, build-in fabricated metal items.
- H. Cut and fit masonry for pipes as specified herein.
- I. Set cover frames and covers level without tipping, to correct elevations.
- J. Grout base of shaft section to achieve slope to exit piping. Trowel smooth. Contour as required.
- K. Coordinate with other sections of Work to provide correct size, shape and location.

3.5 BACKFILLING

- A. Backfill around manholes as specified in Section 312300.

END OF SECTION

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