



Davenport Main Post Office
1 South Blvd. East
Davenport, Florida 33837

USPS Project Number E54635
June 16, 2022

000002

PROJECT DIRECTORY

ARCHITECT

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USPS MPF Specifications issued: 10/1/2018
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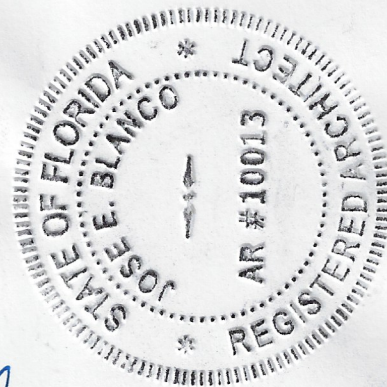
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PROJECT

Name: **Davenport MPO – Building & Parking Expansion**
Location: **Davenport, Florida 33837**
FMS Project Number: **E54635**

ARCHITECT OF RECORD

Jose E. Blanco
2673 SW 14th Court
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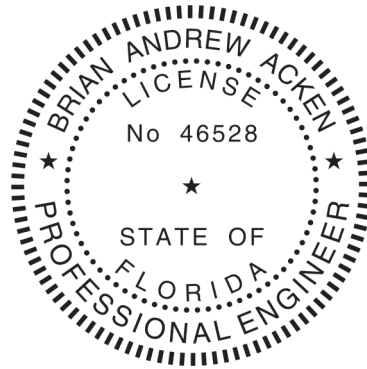


Jose E. Blanco 06/15/22

Architect of Record Date

CIVIL ENGINEER OF RECORD

Advantage Engineering, Inc.
3914 Flatiron Loop # 102
Wesley Chapel, Florida 33544



6/13/2022

Civil Engineer of Record

Date

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06/16/2022

Structural Engineer of Record

Date

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[Handwritten Signature]
06/13/22

Electrical Engineer of Record

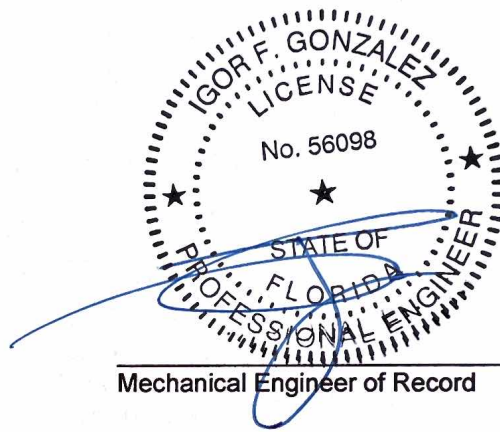
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USPS MPF Specifications issued: 10/1/2021
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MECHANICAL ENGINEER OF RECORD

ESI Consulting Engineers, Inc.
1315 NW 98th Court, Unit #15
Doral, Florida 33172



Mechanical Engineer of Record

6/13/22
Date

DOCUMENT 000010

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Document 000010	Table of Contents	09/08/2021

SCHEDULE, CLAUSES AND ATTACHMENTS, AND SOLICITATION REQUIREMENTS

Issued separately by U.S. Postal Service.

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Section	337173	Electrical Utility Services	09/04/2018

END OF DOCUMENT

USPS CSF Specifications issued: 10/01/2021
Last revised: 09/14/2021

SECTION 011000
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor – used in DBB 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 consists of a Parking and Building Expansion and Miscellaneous modifications to the existing building and parking.
- 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	_____
Off-site inspection fees	_____
Sanitary sewer connection fee	_____
Environmental Permits/Registrations	_____
Other permits or fees	\$10,000

- 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 123504 - Postal Casework
 - 4. 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.

1.6 MISCELLANEOUS EQUIPMENT CROSS-REFERENCE LIST

- A. The following table is a cross-reference for equipment that may be shown in the drawings. The Contractor is solely responsible for ordering, payment, receiving, accepting, storage and installation of the equipment or supplies as specified in each specification section. USPS Standards for Facility Accessibility Handbook RE-4 supersedes standards in question of conflict.

Equipment Number	Description	Specification Section
E506	Metal Wardrobe Lockers	105113
E511	Fire Extinguisher	104400
E531	Bench	105113

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2021
Last revised: 10/1/2021

Postal Service Furnished – Contractor Installed Equipment					
Equipment Number	Postal Stock Number (PSN)/eBuy2 Mfr Part No.	Description	Quantity	Desired Delivery Dates	
				After	Before
Security Items					
	0830	Vestibule Door Chain(s)			
	0831	Vestibule Padlock(s)			
	0931AHL	Left Hand Cylinder for exterior doors to Inspection Offices and/or entrance doors from public spaces to LOG and/or exterior doors to LOG.			
	0931AHR	Right Hand Cylinder for exterior doors to Inspection Offices and/or entrance doors from public spaces to LOG and/or exterior doors to LOG.			
Retail Items					
Miscellaneous Items					

The Contractor is responsible for determining equipment quantities and the desired delivery dates and providing them to the contracting officer within 45 days of Notice to Proceed. The Contractor is responsible for assembling and installing this equipment. Note that certain equipment not listed above, such as security containers, carrier cases and mail processing equipment, may be furnished and installed by USPS. Guidance may be requested from the contracting officer.

Note 1: Special order—the Postmaster must do an off-catalog eBuy approval, then order on eMARS, if available, or by calling National Materials Customer Service at 1-800-332-0317, and NMCS will key in the order.

Note 2: The Contractor shall request this information from the Facilities Project Manager before completing and submitting this form.

Note 3: 2905 Box Modules are no longer available for purchase. The General Contractor shall relocate 2905 Box Modules from the existing facility to the new facility.

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SECTION 011104

CONTRACT DOCUMENTS

PART 1 – GENERAL

1.1 SUMMARY

- A. The contract documents consist of the items included, or attached and incorporated by reference, in Section B, The Contract, B. 1500, *Attachments*.

1.2 DRAWING LIST

- A. The contract drawings consist of the items included, or attached and incorporated by reference, in Section B, The Contract, B. 1500, *Attachments*.

B	Drawing number	Date	Title
	ARCHITECTURE		
	A0.00	06-16-22	Cover
	A0.01	06-16-22	Schedules / Notes
	A0.02	06-16-22	Code References / Area Recapitulation
	A1.01	06-16-22	Overall Site Plan
	A1.02	06-16-22	Site Plan – Existing Demolition
	A1.03	06-16-22	Partial Site Plan – Area “A”
	A1.04	06-16-22	Partial Site Plan – Area “B”
	A1.05	06-16-22	Partial Site Plan – Area “C”
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	A1.07	06-16-22	Details
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	A2.03	06-16-22	Partial Floor Plan - East
	A2.04	06-16-22	Existing Building - Demolition
	A2.05	06-16-22	Partial Reflected Ceiling – West
	A2.06	06-16-22	Partial Reflected Ceiling – East
	A2.07	06-16-22	Partial Floor Plan / CCTV – West
	A2.08	06-16-22	Partial Floor Plan / CCTV / East
	A2.09	06-16-22	Floor Plan / OSL
	A3.01	06-16-22	Partial Roof Plan - West
	A3.02	06-16-22	Partial Roof Plan - East
	A3.03	06-16-22	Roof Details
	A3.04	06-16-22	Roof Details
	A3.05	06-16-22	Roof Details
	A3.06	06-16-22	Roof Details
	A3.07	06-16-22	Roof Details
	A3.08	06-16-22	Roof Details
	A3.09	06-16-22	Roof Details

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A6.03	06-16-22	Wall Sections
A6.04	06-16-22	Wall Sections
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A9.01	06-16-22	Interior Elevations
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C1.01	06-16-22	General Notes
C2.01	06-16-22	Site Demolition / Erosion Control
C3.01	06-16-22	Paving, Grading & Drainage
C4.01	06-16-22	Details
C4.02	06-16-22	Details
C4.03	06-16-22	Details
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S1.1	06-16-22	Partial Foundation Plan
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S3.1	06-16-22	Details
S3.2	06-16-22	Details
S3.3	06-16-22	Details
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E2.01	06-16-22	Partial Floor Plan – Lighting
E2.02	06-16-22	Partial Floor Plan - Lighting
E2.03	06-16-22	Partial Floor Plan – Lighting Levels
E2.04	06-16-22	Partial Floor Plan – Lighting Levels
E3.01	06-16-22	Partial Floor Plan – Power
E3.02	06-16-22	Partial Floor Plan – Power
E3.03	06-16-22	Roof Plan - Power
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M4.02	06-16-22	Details
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P2.02	06-16-22	Sanitary / Storm Water Floor Plan
P2.03	06-16-22	Plumbing Roof Plan
P3.01	06-16-22	Domestic Water / Sanitary Isometrics
P3.02	06-16-22	Storm Water Isometrics
P4.01	06-16-22	Details
P4.02	06-16-22	Details

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2021
Last revised: 9/23/2015

SECTION 012300

ALTERNATES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes: Alternates to be submitted to U.S. Postal Service with Proposal.
 - 1. Submission procedures.
 - 2. Documentation of changes to Contract Sum/Price and Contract Time.
- B. Related Documents: The Contract Documents, as defined in Section 011004 - 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 DEFINITIONS

- A. Alternate: The net amount to be added to or deducted from the Base Proposal Price for work identified in Schedule of Alternates.

1.3 SUBMISSION REQUIREMENTS

- A. Extent of Alternates:
 - 1. Determine the full extent of Work affected by proposed Alternates.
 - 2. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.
 - a. Include as part of each Alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
- B. Submission Form: Complete Schedule of Alternates below and attach to Proposal.
 - 1. Substitutions are permitted unless prohibited by a relevant specification section for that product or material. Submit a request for substitution for any manufacturer not named in accordance with Section 016000 - Product Requirements.
- C. Schedule: The Alternates consist of the items included, or attached and incorporated by reference in Section B, The Contract, B. 1500 Attachments. Specification Sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the Work described under each Alternate.
 - 1. Alternates describe environmental requirements.
 - 2. Conform to Contract Documents for requirements for performance, appearance, workmanship and materials not modified under the Alternate Bids.

1.4 SELECTION AND AWARD OF ALTERNATES

- A. Acceptance or Rejection: Alternates quoted on Schedule of Alternates and attached to Proposal will be reviewed and accepted or rejected at the USPS's option. None, any, or all Alternates may be accepted or rejected by U.S. Postal Service.
- B. Accepted Alternates will be identified in the Contract.
- C. Some Alternates and respective pricing will survive the Contract and will remain valid for the period stated in the Schedule of Alternates below.

1.5 SCHEDULE OF ALTERNATES

- A. **Alternate Number 1:** State the amount to be DEDUCTED for all work related to the Platform Expansion Scope of Work as indicated in the Construction Documents.

Deduct: _____ dollars.

- B. **Alternate Number 2:** State the amount to be DEDUCTED for all work related to the **Area “A” Parking Modifications** on the North Side existing Customer Parking composed of separating the existing parking into Customer and Employee Parking.

Deduct: _____ dollars.

- C. **Alternate Number 3:** State the amount to be DEDUCTED for all work related to the Lightning Protection System to be incorporated on the Existing Building and the Building Expansion.

Deduct: _____ dollars.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2021
Last revised: 9/16/2015

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 season between November 15 and January 5 without written permission from the COR.
- C. All work hours shall be scheduled with the Facility Postmaster and with 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.
- C. 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.
- D. 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
Customer Service Building	100
Site Work	70

- E. 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.
- F. 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.
- G. **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.
- H. **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.
- I. 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.
- J. 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.

- K. The sheet size of diagrams must be 30 inches x 42 inches. Each updated copy must show the date of the latest revision.
- L. Initial submittal and complete revisions must be submitted in three copies.
- M. Periodic reports must be submitted in two copies.
- N. 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*.
- O. 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: 10/1/2021
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 | CD – Catalog Data |
| S – Sample | PL – Spare Parts List |
| SD – Shop Drawing | 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

Schedule of Values

Facility:
Contractor:
Date:

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

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.

- 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: 10/1/2021
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</p>

	explosive or flammable atmospheres, or (d) in locations where large quantities of flammable and combustible materials are unprotected.
Powered Industrial Trucks	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. 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.
Ladders	Strictly follow all OSHA requirements regarding ladders. Barricade the ladder use area to prevent contact with mobile equipment and employees.
Lead-Based Paint	<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. <i>Proper Work Practices:</i> If LBP is present, follow proper control procedures and work practices. <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.
Lockout/Tagout	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. 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.
Machinery and Equipment	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. Do not use machine surfaces as work platforms. Contact the designated Postal Service representative concerning facility machinery.
Personal Protective Equipment	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. Wear the PPE required by the postal facility in which you are working, regardless of your perception of hazard potential.
Regulated And Prohibited Materials	<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. <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. <i>Asbestos-Free Products.</i> Install no asbestos-containing products or materials in postal facilities. <i>Lead.</i> Apply no lead-based paint in postal facilities.
Scaffolding	Follow strictly the applicable OSHA scaffolding requirements. Provide adequate barrier protection around the scaffolding to prevent hazards to postal workers.
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 communicate these to all employees.

Emergency Procedures

Preparations for Emergency	<p>Be prepared for emergency situations. Ensure that emergency telephone numbers are site specific, readily available, easily read, and communicated to all employees. 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. 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. 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. 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. 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.

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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: 10/1/2021
Last revised: 9/23/2015

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1 SUMMARY

- A. Provide all temporary facilities and services required to complete the Work and to comply with OSHA and other applicable regulations.
- B. 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 RELATED SECTIONS

- A. Section 015600 - Temporary Barriers and Enclosures

1.3 PROJECT SIGNAGE

- A. Provide and maintain a construction project sign at the location directed by the COR. The sign to conform to the Construction Sign as detailed in the Contract drawings. The information to complete the wording on the sign is provided by the COR. Erect the sign within 15 days after receiving a Notice to Proceed. The sign to be removed upon completion of the Work and destroyed, and the premises 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. Construct and erect a minimum of two hard hat signs at locations designated by the COR. Signs to be erected prior to the commencement of on-site work.
- D. Other signage: No unapproved signs, brand logos, or graphics shall be affixed to temporary walls, partitions, doors, barricades and fences.

1.4 PROJECT BULLETIN BOARD

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

1.5 CONSTRUCTION-USE UTILITIES

- A. Arrange with the local utility companies for gas, water, and electricity required for construction under this project and pay all costs in connection with them. The Contractor to, at its own expense, make all temporary connections and install distribution lines. All temporary lines to be maintained by the Contractor in a manner satisfactory to the COR and to be removed by in like manner before final acceptance of the construction.

1.6 TEMPORARY ELECTRIC

- A. **Costs:** Make arrangements with the serving utility for power, pay deposits, and install equipment, poles, wiring, switches, and outlets necessary to provide adequate supply for lighting and power for construction purposes. Pay for power used during construction and for removal of all temporary equipment.
- B. **Service Required:** Provide temporary electric power throughout the construction period so that power can be secured at any desired point with no more than a 100-foot extension cord; power centers for miscellaneous tools and equipment used in the construction work (not less than one per 2,000 square feet of floor space, consisting of a weatherproof distribution box with a minimum of four 20-amp, 120-volt grounded outlets with a circuit breaker protection for each outlet); lighting for safe and adequate working conditions throughout buildings and stairways (at least 1/4 watts of incandescent lighting per square foot, with a socket voltage of at least 110 volts and using 100 watt lamps minimum); power for construction site offices and other temporary storage and construction building; and power for testing and checking equipment welding units, and terrazzo grinders.
- C. **Safety:** Provide and maintain lights and signs to prevent damage or injury and illuminate all hazardous areas. Safety lights to be kept burning from dusk to dawn.
- D. **Requirements of Regulatory Agencies:** Obtain permits as required by local government authorities; obtain easements as required across private property other than that of the owner for temporary power service; and comply with the National Electrical Code, applicable local codes, and utility regulations.
- E. **Use of Permanent System:** Regulate all parts 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. Leave permanent electrical services in a condition as good as new.
- F. **Materials:** Materials may be new or used but will be adequate in capacity for the purposes intended and will 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.
- G. **Conductors:** 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.
- H. **Equipment:** In compliance with NEMA standards, provide an appropriate enclosure for the environment in which the equipment is used.
- I. **Installation:** 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. All work to have a neat and orderly appearance and be structurally sound throughout, and properly maintained to give continuous service and to provide safe working conditions. Modify the service as required by the progress of the Work.
- J. **Removal:** Remove all temporary equipment and materials upon completion of construction, repair all damage caused by the installation, and restore the premises to its prior condition.

1.7 TEMPORARY HEATING AND VENTILATION

- A. 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. Refer to requirements in detailed specifications for temperatures to be provided and maintained for installation and curing of work under the various trades.
- B. Provide temporary heat consisting of smokeless heating appliances satisfactory to the COR. Furnish and pay for all necessary fuel and attendants in any trade and 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 to provide all fuel, 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 to replace all filters and restore the system to a condition satisfactory to the COR.

1.8 TEMPORARY FIRE PROTECTION

- A. Install and maintain temporary fire-protection facilities and equipment of sufficient size and types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
- B. Prohibit smoking outside of areas designated by USPS.
- C. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
- D. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review requirements with USPS personnel and local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
- E. Take all precautions to prevent possibility of fire resulting from construction operations. Particularly avoid hazardous accumulations of rubbish and unsecured, flammable materials.
- F. Provide emergency fire extinguishing equipment of adequate type and quantity, readily available and properly maintained.

1.9 TEMPORARY FIRST AID FACILITIES

- A. Provide adequate first aid facilities and equipment for construction personnel.

1.10 TEMPORARY WATER

- A. 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 to be removed and the tap in the main supply properly capped.

1.11 SANITARY PROVISIONS

- A. 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.

1.12 APPROACHES AND EXITS

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

1.13 TEMPORARY BARRIERS AND ENCLOSURES

- A. All construction activities are required to be secured and separated from areas accessible to the public and USPS operations. Construct all temporary barricades, enclosures, fences and components for their specific and intended use, and to meet local code requirements, including wind load design.
- B. Coordinate the placement of barriers and enclosures that impact fire pull boxes, lighting, CCTV cameras, fire suppression systems, and exit doors with the COR and designated facility personnel at least two weeks in advance of barricade installation.
- C. Cover interior and exterior windows facing the construction with 3/4-inch exterior grade plywood. Paper and plastic coverings are not acceptable.
- D. Caution tape, plastic chain, and traffic cones are not approved barriers, and may only be used in an emergency situation, and must be replaced within 24-hours with an approved barricade.
- E. Provide dustproof temporary partitions from the floor to the underside of the deck and/or ceiling sufficient to separate construction areas from the rest of the building to reduce construction noise and prevent the migration of dust, dirt, and fumes beyond the construction area.
- F. Partition Construction: Enclose the construction area with 6-mil anti-static fire-retardant reinforced polyethylene sheeting supported by framework and be capable of resisting 0.5 pounds-per-square-foot of force applied over the entire surface of each side, separately. Overlap the sheeting at least 6 inches and seal continuously with anti-static fire-retardant reinforced tape.
- G. Partition Construction:[Metal studs at 16 inches on center braced as necessary, with 3/4-inch plywood over 6-mil anti-static fire-retardant reinforced polyethylene sheeting screwed to the studs on the non-construction side of the partition. Overlap the sheeting at least 6 inches and seal continuously with anti-static fire-retardant reinforced tape.
- H. Partition Construction: Metal studs at 16 inches on center, 8 feet high, braced as necessary, with 3/4-inch plywood over 6-mil anti-static fire-retardant reinforced polyethylene sheeting screwed to the studs on the non-construction side of the partition. From the top of the stud wall to the underside of the deck and/or ceiling, enclose the construction area with 6-mil anti-static fire-retardant reinforced polyethylene sheeting supported by framework and be capable of resisting 0.5 pounds-per-square-foot of force applied over the entire surface of each side, separately. Overlap the sheeting at least 6 inches and seal continuously with anti-static fire-retardant reinforced tape.
- I. Protect existing floor and finish flooring material beneath panels and within the construction area shall with 1/4-inch hardboard over 6-mil anti-static fire-retardant reinforced polyethylene sheeting. Overlap the sheeting at least 6 inches and seal with anti-static fire-retardant reinforced tape.

1.14 POSTAL SERVICE FIELD OFFICE

- A. Within 30 days after receiving a Notice to Proceed, furnish a building or trailer having a minimum of [] square feet of floor space to serve as a USPS temporary field office reserved for Postal Service use only. Locate where directed. Furnish and maintain drinking water facilities, adequate lighting, ventilation, heating, air-conditioning equipment, a copy machine, and a partition-enclosed chemical toilet. Provide hook-up to utility services and telephone services and pay the cost of all services except long-distance phone calls. Used field office buildings and used furniture and equipment in good condition are acceptable. Equip entrance doors with a substantial lock. Provide janitorial services. If a building is provided, it will be constructed to be easily moved, and relocate the building twice during the contract, if directed to do so. All-weather vehicle and pedestrian access and all-weather parking areas for six cars to be provided at the field office location. The temporary field office, including furniture, except for any office equipment including computers, printers, FAX machines, etc., to remain the property of the Contractor and be removed from the site after the Work is completed. The premises will be restored to its prior condition.

1.15 PROJECT PHOTOS

- A. Provide photographs of the Work with the intended purpose of illustrating, generally, the work in place at specific points in time.
1. Frequency: With every payment application.
 2. Media: Printed 8-1/2 by 11 Paper.
 3. Number: Minimum of 2 views per page.
 4. Content: General overview of the work in place.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2021
Last revised: 10/1/2021

SECTION 015600
TEMPORARY BARRIERS AND ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide barriers and enclosures to protect the Work, existing facilities, and USPS operations from unauthorized entry, vandalism, and theft, and as required to complete the Work and to comply with OSHA and other applicable regulations.
- B. Maintain temporary barriers and enclosures in a proper, safe condition for the duration of the Contract. Before completion of the Work, remove temporary work in their entirety and restore the premises to its prior condition.

1.2 RELATED SECTIONS

- A. Section 013300 - Submittal Procedures
- B. Section 015000 - Temporary Facilities and Controls.

1.3 SUBMITTALS

- A. Temporary Barrier and Enclosure Plan: Plan to include the types and positions of temporary barriers and enclosures for every phase of the work, illustrate egress pathways, and indicate the location doors and gates, fire watch windows, and required signage.
- B. Temporary Barrier and Enclosure Details: Indicate materials, construction, and anchoring systems.
- C. Modify and resubmit all plans and details should the actual placement and construction of the barriers and enclosures substantially change during construction of the Work.
- D. Product Data:
 - 1. Anti-static fire-retardant reinforced polyethylene sheeting
 - 2. Woven opaque polypropylene panels
 - 3. Temporary interior horizontal protection system.

1.4 GENERAL REQUIREMENTS

- A. All construction activities are required to be secured and separated from areas accessible to the public and USPS operations.
- B. Design and construct all temporary barricades, enclosures, fences and components for their specific and intended use, and to meet local code requirements, including wind load design.
- C. Construct temporary barriers and enclosures with the least possible obstruction and inconvenience to USPS operations and occupants, and the public.
- D. Construct and maintain temporary barriers and enclosures to be straight, clean and uniform in appearance. Inspect barriers and enclosures daily and replace or repair substantially damaged materials immediately.
- E. Coordinate the placement of barriers and enclosures that impact fire pull boxes, lighting, CCTV cameras, fire suppression systems, and exit doors with the COR and designated facility personnel at least two weeks in advance of barricade installation.
- F. Barricades and fences that are used for traffic guardrails, or to protect against falls, shall be designed to resist an overturning moment created by the force of 50 pounds per lineal foot applied horizontally at the height of 3 feet 6 inches perpendicular to the partition for the full length of the partition, or as required by code.

- G. Cover interior and exterior windows facing the construction with 3/4-inch exterior grade plywood. Paper and plastic coverings are not acceptable.
- H. Caution tape, plastic chain, and traffic cones are not approved barriers, and may only be used in an emergency situation, and must be replaced within 24-hours with an approved barricade.

1.5 TEMPORARY SITE BARRICADES AND FENCES

- A. Use exterior concrete barricades and chain link fencing to enclose the construction site. Use only easily movable barricades in locations needed for equipment, personnel, and emergency vehicle access.
- B. Barricades used to close off previously active vehicle roadways will have red flashing lights mounted 4 feet above the road surface, 5 feet on center across the width of the roadway.
- C. Provide chain link gates construction vehicles entrances and exits. Chain and padlock gates tightly at all times when not in use.
- D. Construction Fencing: 6 foot chain link with posts set in moveable bases held in place with weights sufficient to prevent overturning. Fence mesh fabric constructed of minimum 9-gauge steel wire with a maximum mesh opening of 2 inches.

1.6 TEMPORARY EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather-tight closure of exterior openings to create acceptable working conditions, protect the existing building and the Work, to contain heating and cooling, and to prevent entry of unauthorized persons.
- B. Exterior Temporary Doors: Provide doors with self-closing and self-locking hardware as appropriate to meet existing requirements required by local code. The passive leaf for double doors to have top and bottom cane bolts. Doors to remain locked at all times. When doors are open for delivery of materials, the entrance must be staffed to prevent unauthorized entry. Provide code-compliant exit signage at each door as necessary.
 - 1. Door construction: Pre-hung hollow-metal with 1-1/2 pair hinges per leaf; fire-rated as necessary.

1.7 TEMPORARY INTERIOR PARTITIONS

- A. Provide dustproof temporary partitions from the floor to the ceiling sufficient to separate construction areas from the rest of the building to reduce construction noise and prevent the migration of dust, dirt, and fumes beyond the construction area.
- B. Protect existing floor and finish flooring material beneath panels and within the construction area shall with 1/4-inch hardboard over 6-mil anti-static fire-retardant reinforced polyethylene sheeting. Overlap the sheeting at least 6 inches and seal with anti-static fire-retardant reinforced tape.
- C. Provide temporary electrical power outlets on nearby walls outside the construction area as requested by the COR to replace those outlets that are covered by temporary partitions.
- D. Adjoin temporary partitions to existing walls with no gaps in a neat and tidy manner that protects existing surfaces from damage.
- E. Partition Construction: Enclose the construction area with 6-mil anti-static fire-retardant reinforced polyethylene sheeting supported by framework and be capable of resisting 0.5 pounds-per-square-foot of force applied over the entire surface of each side, separately. Overlap the sheeting at least 6 inches and seal continuously with anti-static fire-retardant reinforced tape.
- F. Partition Construction: Metal studs at 16 inches on center braced as necessary, with 3/4-inch plywood over 6-mil anti-static fire-retardant reinforced polyethylene sheeting screwed to the studs on the non-construction side of the partition. Overlap the sheeting at least 6 inches and seal continuously with anti-static fire-retardant reinforced tape.

- G. Partition Construction: Metal studs at 16 inches on center, 8 feet high, braced as necessary, with 3/4-inch plywood over 6-mil anti-static fire-retardant reinforced polyethylene sheeting screwed to the studs on the non-construction side of the partition. From the top of the stud wall to the ceiling, enclose the construction area with 6-mil anti-static fire-retardant reinforced polyethylene sheeting supported by framework and be capable of resisting 0.5 pounds-per-square-foot of force applied over the entire surface of each side, separately. Overlap the sheeting at least 6 inches and seal continuously with anti-static fire-retardant reinforced tape.
- H. Interior Temporary Doors: Provide doors with self-closing and self-locking hardware as appropriate to meet exiting requirements required by local code. The passive leaf for double doors to have top and bottom cane bolts. Doors to remain locked at all times. When doors are open for delivery of materials, the entrance must be staffed to prevent unauthorized entry. Provide code-compliant exit signage at each door as necessary.
 - 1. Door construction: Pre-hung hollow-metal with 1-1/2 pair hinges per leaf; fire-rated as necessary

1.8 TEMPORARY INTERIOR HORIZONTAL PROTECTION

- A. Construction: Anti-static fire-retardant reinforced framework, attachment method, sheeting, and netting sufficient to resist the impact of the largest and heaviest falling debris possible, and to contain and prevent dust, dirt, and small particles from migrating to spaces below or adjacent to the construction work area.
- B. Install directly beneath the existing roof and floor deck at a height that accommodates operations below to continue and construction work to occur above.
- C. Fasten system to the existing structure in a secure manner seal seams sealed in a manner that does not allow for debris infiltration. The completed system shall be installed to provide maximum dust and debris protection during all phases of roof replacement activities.
- D. Provide sealed openings to accommodate the penetration of structure, ductwork, lighting, conduits, etc. without impeding the function of such systems.
- E. Seal and protect existing building systems that may extend horizontally between deck and the horizontal protection.
- F. If the horizontal protection blocks or prohibits the proper function of lighting fixtures, cooling, and/or heating, then provide temporary services to the affected area.
- G. At locations where continuous access may be needed, provide resealable openings. Such access points include, but are not limited to, access ladders, equipment hatches, ductwork, piping, and conduit. Prior to installation, review locations with designated facility personnel and the COR.
- H. Install horizontal protection in a manner that does not affect the proper operation of fire alarm and fire suppression systems. In areas where this is not possible, prepare, in coordination with designated facility personnel and the COR, a Fire Watch plan. It may also be necessary to remove portions, or the entire, horizontal protection system at the completion of each day's work.
- I. Daily Inspections:
 - 1. Prior to the start of work: Inspect the area above and below horizontal protection system. Prepare a written report noting the location of materials and equipment that may be impacted by the work and submit the report to designated facility personnel and the COR. Make all necessary adjustments and repairs to the protection system as directed.
 - 2. During work in progress: Maintain interior spotters beneath the work area and horizontal protection system with capability to communicate immediately with the crew members above.
 - 3. At the completion of that day's work: Inspect the area above and below horizontal protection system. Prepare a written report noting the overall integrity of the protection system and any

damage to building systems. Repair essential building systems immediately. Provide necessary repairs as needed to restore the integrity of the protection system.

- J. After completion of project work, remove the protection system in coordination with designated facility personnel and the COR. Remove the system carefully and in a manner that reduces the risk of debris, dust or moisture being released from containment. Clean the floor, all equipment and the surfaces of building systems, components, and structure.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

USPS Specification issued: 10/1/2021

Last revised: 10/1/2021

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Refer to contract provisions and clauses:
 - 1. Provision 2-7, Brand Name or Equal.
 - 2. Clause F-401, Optional Materials or Methods.
- B. Provide Products that comply with Contract Documents, which are undamaged and new at time of installation.
- C. Provide Products complete with accessories, fasteners, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.
- D. Substitutions may be considered if:
 - 1. An equal product was proposed during the solicitation and was accepted, in writing, by the Postal Service prior to award of the Contract.
 - 2. During the course of the Work a Product becomes unavailable and the Contractor:
 - a. Represents that the proposed substitute Product has been investigated and it has been determined that it is equal or superior in all respects to that specified;
 - b. Will provide the same guarantee for the substitution that he would for that specified; and
 - c. 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 to Contract Time.

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

USPS Specification issued: 10/1/2021
Last revised: 8/16/2021

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

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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:

<u>Sound Level in dB</u>	<u>Time Duration of Impact Noise</u>
70	More than 12 minutes in any hour
80	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: 10/1/2021
Last revised: 9/17/2013

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: _____

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. Roof system.
 2. Doors.
 3. Security system.
 4. Fire protection.
 5. Plumbing systems.
 6. Mechanical systems.
 7. Electrical systems.
- 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. 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
 - 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

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.
 - 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 DVD or CD-ROM format:
 - 1. Preliminary Submittal: Two draft copies of the completed manuscript for items in this outline must be submitted to the COR for review within 30 days after approval of equipment to be provided. One copy will be returned to the Contractor within 15 days after submittal and, if required, must be revised and resubmitted within 15 days.
 - 2. Final Submittal: four complete sets of manuals must be furnished to the COR not later than 30 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. Refrigeration controls.
 - 2. Heating, ventilating, and air-conditioning controls for each system..
 - 3. One-line schematic diagrams of water supply (plumbing).
 - 4. 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 period is required. Discs must be turned over to the COR after training has been completed.
- 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	1
2. Special Doors	1
3. Security Equipment	2
5. Heating Plant Covers heat-generating equipment, such as heat exchangers, boilers, and burners; electric resistance heating; and related equipment, where applicable (including combustion testing), together with associated operation and safety controls.	1
6. Cooling Plant Covers the refrigeration plant, cooling tower (including water treatment), and related equipment, together with associated operating and safety controls.	1
7. Ventilation Covers air-handling units with heating and cooling coils, fans, and all other air-handling equipment, together with associated operating and limit controls.	1
8. Overall Control System 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.	1
9. Electrical System Covers all building services, lighting, lighting controls, and intercommunications, and security system.	1
11. Piping and Plumbing Includes, but is not limited to, domestic water supply, storm and sanitary drainage systems, cold-water supply systems, sprinkler systems, and the like.	1

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.

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.

8. []

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Master Specifications, issued: 10/1/2021
Last revised: 9/17/2013

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. Removal of underground tanks and piping.
5. Filling voids in subgrade created as a result of removals or demolition.
6. 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
 2. See Geotechnical Report by Ardaman & Associates; File No, 22-6342 dated 4/13/22.
 3. Verify:
 - a. Wells onsite.
 - b. [_____].
 - c. [_____].
- 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: 10/1/2021
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. Removal of designated building equipment and fixtures.
 - 3. Salvaged items.
 - 4. Salvaged material.
 - 5. 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] [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

- A. The Contract Documents indicate the existing materials that are to be reinstalled in the new construction. The Contractor shall remove, protect and reinstall these items as indicated.
 - 1. Items for "Reinstallation" will be indicated as such within the Contract Documents.
- B. Materials scheduled for reinstallation which are damaged by the Contractor to the extent that they cannot be reinstalled shall be replaced by the Contractor with equal quality material at no additional cost to the United States Postal Service.
- C. Coordinate with the Contracting Officer on disposition of salvage items note scheduled for reinstallation, demolished materials, and equipment. Salvaged materials, not reinstalled, shall be delivered, as directed, to the United States Postal Service.

2.2 SALVAGED MATERIALS

- A. Removed and salvaged materials of value not designated for reinstallation, unless claimed as salvage by the United States Postal Service, shall become the property of the Contractor and shall be removed from the premises by the Contractor and recycled, reused or disposed of as specified in Section 013543- Environmental Procedures.
- B. The United States Postal Service will remove or, under separate contract, have all materials and equipment which the United States Postal Service requires removed prior to Work under this Section begins.

2.3 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 roof hatch and access ladder 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:
 - 1. Locate portion of existing masonry 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: 10/1/2021
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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 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Void Forms (Carton Forms): Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set. Thickness indicated on drawings.
- C. Tubular Column Type: Metal or fiberglass-reinforced plastic. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
- D. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.

2.3 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.
- F. Waterstops (Rubber/PVC): Rubber or Polyvinyl chloride, minimum 1,750 tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, width as indicated on Drawings, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

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 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 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.
- G. Install void forms in accordance with manufacturer's published instructions. Protect forms from moisture or crushing.

3.4 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.

3.5 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.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- G. Install waterstops in accordance with manufacturer's published instructions continuous without displacing reinforcement. Seal joints watertight.

3.6 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.

3.7 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.

3.8 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.

3.9 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

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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 316329 - Drilled Concrete Piers and Shafts: Reinforcement for drilled pier foundations.
 - 2. Section 031000 - Concrete Forming and Accessories: Coordination between formwork and reinforcing.
 - 3. 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.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management
 - 1. Recycled Content
 - a. Steel Products: Post-consumer recycled content plus one half of pre-consumer recycled content not less than [___] percent.

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

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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.
 3. Shop Drawings:
 - a. All shop drawings and calculations must bear the seal and signature of an engineer registered in the jurisdiction where project is being constructed.
 - b. Cast-in-place concrete shown on structural drawings, prepared under the supervision of a registered Professional Engineer, including:
 - 1) Rebar placing drawings (ACI 315, "Detailing Manual SP-66-(04)" or CRSI "Manual of Standard PracticeMSP-2-81"): Show bar sizes, bending, placing, spacing, locations, and quantities of reinforcing and wire fabric and supporting and spacing accessories. Provide steel order lists including bending and cutting details for all reinforcement shown on the structural design drawings.
 - 2) Form construction details, including jointing, special formed joints or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually.
 - 3) Calculations for any formwork, shoring and/or reshoring.
 4. Batch Plant Equipment and Procedures
 - a. Supplier of concrete and ready-mix grout. Only one source will be approved for the Contractor, including all subcontractors. All concrete and ready-mixed grout supplied to the project shall originate from the approved single facility.
 - b. The following information shall be submitted:
 - 1) Name of supplier.
 - 2) Plant location.
 - 3) Plant volume and output capacity.
 - 4) Capacity of transit equipment.

- 5) Estimated travel time from plant to jobsite.
 - c. If the Contractor elects to use an on-site concrete batching plant, the following information shall be submitted:
 - 1) Drawings and data including proposed location of the batch plant on the site.
 - 2) List of and performance data for material handling equipment.
 - 3) Procedures for processing, handling, transporting, sorting, and proportioning the materials for concrete.
 - d. All other data necessary to show the supplier's capability to produce concrete of the quality and quantity required.
5. Concrete Procedures
- a. The following information shall be submitted:
 - 1) Placement drawings for slab-on-grade shall be submitted indicating location and size, placement sequence, joint locations, and embedded items.
 - 2) Procedure for mixing and transporting concrete to the point of placement.
 - 3) Procedures for placement of concrete.
 - 4) Methods of obtaining and maintaining the required concrete temperature during placement and initial curing.
 - 5) Procedures for consolidating the concrete.
 - 6) Procedures how concrete is finished and cured (slab-on-grade concrete).
6. 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:
 - b. Submit laboratory test reports for concrete materials and mix design test, including certified copy of results of aggregate tested by ASTM C1260 or C1567. Mix designs for each strength and type of concrete proposed for use. Details to be included are found in section 2.7.
 - c. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - d. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
7. Delivery Tickets:
- a. Copies of delivery tickets for each load of concrete delivered to site.
 - b. Indicate on each ticket information required by ASTM C94 including additional information required herein.
 - c. Mix identification number on ticket shall match number on submitted and approved mix design
 - d. Indicate number of drum revolution from when water is added until concrete is discharged.
 - e. Submit copies to Testing Laboratory same day as concrete delivery.
- 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.
- B. Pre-Installation Meetings:

1. Convene a pre-installation meeting at least one week prior to commencing Work of this Section.
2. Require attendance of parties directly affecting Work of this Section including subgrade preparation formwork, reinforcement, pumping, or other means of conveying, placement, finishing, sawing, curing, joint sealing, or other pertinent portions of the work.
3. Representatives to be present are personnel who are directly involved in the project and who have authority to control the work.
4. Review conditions of operations, procedures and coordination with related Work. Agenda:
 - a. Tour, inspect, and discuss conditions of concrete work.
 - b. Review concrete testing and their requirements.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review Drawings.
 - e. Approve proposed equipment.
 - f. Review concrete batching, transporting, placement, consolidation, finishing, and curing procedures.
 - g. Review and finalize construction schedule related to concrete work and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - h. Review required inspections, testing, certifying, and material usage accounting procedures.
 - i. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
 - j. Review safety precautions relating to concrete work operations.
 - k. Environmental procedures.

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 Almeda 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, Pozzolith 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+, Pozzolith 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 Pozzolith 100XR, 200N, 220N and 322N.
 - c. Sika: Plastimet.
 - d. W.R. Grace: Daratard 17, WRDA-64, and WRDA-82.

6. High-range/water-reducing (HRWR) admixtures: Conform to ASTM C494, Type F or G super plasticizers containing 1 percent maximum chloride ions may be used with low slump (3 inches maximum) concrete to produce flowable concrete (up to 8 inches slump) with early strength gain and 28-day strengths equal to reference concrete. HRWR admixture may be used providing not more than 60 minutes is allowed from addition of admixture to final placement of concrete. HRWR admixture shall be used in concrete with a maximum water/ cement ratio of 0.50 or less and is suggested in the following:
 - a. In pumped concrete.
 - b. In concrete topping slabs
 - c. In lieu of the specified water-reducing admixture (Type A) where confinement of placing due to heavy reinforcement or narrow space requires flowable concrete.
 - d. Where more than 30 minutes is required between the addition of admixtures to final placement of the concrete, a combination of water-reducing, set controlling admixtures (ASTM C494, Types A, D, & E) as in Master Builders Company "Synergized Performance System" may be used.
 - 1) Euclid: Eucon 37 or Eucon 537.
 - 2) BASF: Rheobuild 1000, Glenium 3000 NS, and Glenium 3400NV.
 - 3) Sika: Sikament 300, Viscocrete 2100, and Sikament 686.
 - 4) W.R. Grace: Daracem 100, ADVA Cast 530, Mira 92, and ADVA Cast 575.

- 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. Submit written reports to the testing laboratory of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and approved. Include the following information for each concrete mix design:
 - 1. Method used to determine the proposed mix design.
 - 2. Gradation of fine and coarse aggregates, plus combined aggregate gradation for slabs, ACI 302.1R.
 - 3. Aggregate specific gravities and absorptions.
 - 4. Proportions of all ingredients including reported on a saturated surface dried basis all admixtures added either at the time of batching or at the job site.
 - 5. Water-cementitious ratio.
 - 6. Slump, ASTM C143.
 - 7. Certification of the chloride content of individual admixtures and of the mixes as proposed.
 - 8. Air Content: ASTM C173 (Volumetric Method).
 - 9. Unit weight of concrete, ASTM C138.
 - 10. Strength at 3, 7, and 28 days, ASTM C39.
 - 11. Method of recording batch proportions.
 - 12. Substantiating test reports.
- C. 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.

- D. Weights: All concrete shall be normal-weight concrete unless otherwise designated on the structural drawings.
- E. 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.
- F. 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.
- G. 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.
- H. 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.
- I. 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. For concrete produced on site with a central batch plant, mixing shall be done in an approved batch mixer.
 - a. The Contractor shall maintain and operate the on-site batch plant and transportation equipment in a manner that will produce the results specified in this section.
 - b. The Engineer reserves the right to reject the proposed on-site plant if, in his/her opinion, the on-site plant will interfere with other operations or impair the quality of the concrete.
 - c. The quantities of cement, pozzolanic materials, and aggregates used in each batch shall be determined by automatic weighing. The quantity of water shall be determined by weighing or volumetric measurement.
 - d. The weighing equipment for aggregates shall be readily adjustable both to compensate for variation in moisture content of the aggregates and for changing mix proportions. Moisture-sensing devices shall automatically compensate the aggregate weights for changes in moisture content. The charging of weigh hoppers directly from aggregate handling equipment such as front-end loaders will not be permitted.
 - e. Mixers in centralized batching and mixing plants shall be arranged so that mixing actions can be observed from a location convenient to the mixing-plant operator's station.
 - f. Equipment shall be provided that discharges pozzolanic material into the cement hopper only after the addition of the Portland cement. Pozzolanic materials shall be stored in such a manner as to permit ready access for the purpose of inspection and sampling and be suitably protected against contamination of moisture. Should any pozzolan show evidence of contamination or be otherwise unsuitable, the Engineer will reject it and require that it be removed from the site.
 - g. Dispensers for admixtures shall have the capacity of the full quantity of the properly diluted solution required for each batch. They shall be maintained in a clean and freely operating condition. Admixtures shall be added to the premeasured water for the batch or shall be discharged into the batch by flowing automatically and uniformly into the stream of mixing water from the beginning to end of its flow into the mixer. Equipment for measurement shall give visual confirmation of the accuracy of the measurement for each batch.

- h. The central batch mixer shall be rotated at a speed recommended by the manufacturer and mixing shall be continued for a minimum of 1-1/2 minutes after all materials are in the drum.
 - i. Each stationary mixer shall be equipped with a mechanically operated timing and signaling device that will indicate and ensure the completion of the required mixing period and will count the batches.
 - j. All concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.
- 9. 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.
 - 10. 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.
 - 11. Water shall be introduced prior to, during, and following mixer-charging operations.
 - 12. When a mixer produces unsatisfactory results, it shall be repaired promptly and effectively, or it shall be replaced.
 - 13. Mixers shall not be loaded in excess of their rated capacity.
 - 14. Overmixing, such as to require addition of water to preserve the required consistency or to reduce slump, will not be permitted.
 - 15. All other concrete: Conform to ACI 301
 - 16. Use of accelerating admixtures in cold weather and retarding admixtures in hot weather shall not relax placement requirements specified herein.
 - 17. 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.
 - 18. All concrete placed at ambient temperatures above 80 degrees F is to contain an approved retarder.
 - 19. All concrete required to be air-entrained is to contain an approved air-entraining admixture.
 - 20. 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.
 - 21. Ensure air content for slabs with steel trowel finish is less than 3.0 percent.
 - 22. 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.
 - 23. 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.
 - 24. 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 of 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. Suspended Floor Slab:
 - a. Minimum surface tolerances: FF25 & FL20 overall and FF20 & FL15 local.
 - 3. 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 ¼ 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. Apply curing compound to all interior and exterior flat slab and vertical surfaces. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
2. 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.
3. 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.
4. 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.
5. 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

C. Hardner

1. Apply liquid densifier/sealer/hardener to all workroom, interior and exterior mail platform, and dock, BMEU, and similar floor surfaces.
2. Apply in accordance with manufacturer instructions.

D. Exterior Sealer

1. Apply to all exterior horizontal traffic and pedestrian surfaces that are exposed to salts, deicer chemicals, and moisture, including parking decks.
2. Apply in accordance with manufacturers instructions.

- E. 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.
- F. All floor slabs shall be cured using products and methods compatible with selected floor adhesives, toppings, and other finish materials.
- G. 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.

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.
3. Testing and Evaluation:
 - a. Furnish and pay for the services of an independent Testing Laboratory satisfactory to the Contracting Officer. The testing laboratory shall have prime responsibility for review, verification inspection, and testing of the concrete producer's materials, operations, facilities, and quality control procedures and evaluating the results for conformance with these specifications complying with ACI 121R.
 - b. The Testing Laboratory will be required to provide evidence of recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards (NBS) and to show that any deficiencies have been corrected.
 - c. In addition to the requirements and duties in ACI 301 the testing laboratory shall provide the following:
 - 1) One or more additional test cylinders shall be taken during cold weather concrete placement and cured on the job site under conditions of concrete represented to determine safe form-stripping period.
 - 2) Sample (and test when directed by the contracting officer) each shipment of cement and aggregates and verify approved admixtures. Store samples in a protected place until authorized to dispose of them.
 - 3) Inspect concrete batching, mixing, and delivery operations periodically or as directed by the Contracting Officer.
 - 4) Review manufacturer's reports and/or certification for each shipment of cement and reinforcing steel and/or conduct laboratory tests or spot checks of the materials as received for compliance with specifications.
 - 5) Submit to the Contracting Officer and concrete producer, during construction, the results of concrete tests.
 - 6) Include the following information:
 - i. Date of placement.
 - ii. Structure and relative location.
 - iii. The concrete mix design.
 - iv. Unit weight of concrete - ASTM C138
 - v. Slump - ASTM C143
 - vi. Air content of freshly-mixed concrete by the pressure method, ASTM C231 or the volumetric method, ASTM C173.
 - vii. Concrete temperature (at placement time).
 - viii. Air temperature (at placement time).
 - ix. Strength determined in accordance with ASTM C39.
 - x. Other testing or inspection as required.
 - d. The Testing Laboratory shall assess and report floor flatness and levelness in accordance with ASTM E1155.
 - e. Field and concrete plant inspections are to be made by a competent representative of the Testing Laboratory during all structural concreting operations including periodic audit and spot check of the Producer's and/or Contractor's quality control procedures to assure

proper and adequate control. When it appears that any material furnished fails to fulfill specification requirements, the Testing Laboratory is to report such deficiency immediately to the Contracting Officer and appropriately record it in his report.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
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SECTION 035216

LIGHTWEIGHT INSULATING CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place cellular foam lightweight insulating concrete.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For lightweight insulating concrete.
 - 1. Include plans, sections, and details showing roof slopes, thicknesses, and embedded insulation board.
 - 2. Indicate locations of penetrations, perimeter terminations and curbs, control and expansion joints, and drains.
- C. Design Mixtures: For each lightweight insulating concrete mixture.
- D. Warranty: Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the roof system manufacturer's 20 year labor and materials roof system guarantee. The roof system guarantee shall include both the roofing and lightweight insulating concrete system. The guarantee shall be a term type, without deductible or limitations on coverage amount, and be issued at no additional cost to the Owner.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Certificates: For the following:
 - 1. Cementitious materials.
 - 2. Lightweight aggregates.

3. Foaming agents.
4. Admixtures.
5. Molded-polystyrene insulation board.

C. Evaluation Reports: For lightweight insulating concrete, from ICC-ES.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. NRDCA Installer Qualifications: A firm that has been evaluated by UL and found to comply with requirements of NRDCA's Lightweight Insulating Concrete Roof Deck Contractors Accreditation Program.

C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.7 FIELD CONDITIONS

A. Do not place lightweight insulating concrete unless ambient temperature is at least 40 deg F (4.4 deg C) and rising.

1. When air temperature has fallen or is expected to fall below 40 deg F (4.4 deg C), heat water to a maximum 120 deg F (49 deg C) before mixing so lightweight insulating concrete, at point of placement, reaches a temperature of 50 deg F (10 deg C) minimum and 80 deg F (27 deg C) maximum.

B. Do not place lightweight insulating concrete during rain or snow or on surfaces covered with standing water.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

B. FM Global Listing: Lightweight insulating concrete along with other roofing components shall comply with requirements in FM Global 4454 as part of a roof assembly, and shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable.

2.2 CELLULAR LIGHTWEIGHT INSULATING CONCRETE

- A. Produce cellular lightweight insulating concrete with the following minimum physical properties using cementitious materials, air-producing liquid-foaming agents complying with ASTM C 869/C 869M, and the minimum amount of water necessary to produce a workable mix:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Siplast, Inc.
 - b. Celcore Incorporated.
 - c. Elastizell Corporation of America.
 2. As-Cast Unit Weight: 34 to 48 lb/cu. ft. (545 to 673 kg/cu. m) at point of placement, when tested according to ASTM C 138/C 138M.
 3. Oven-Dry Unit Weight: 26 to 32 lb/cu. ft. (416 to 513 kg/cu. m), when tested according to ASTM C 495.
 4. Compressive Strength: Minimum 300 psi (1310 kPa), when tested according to ASTM C 495.

2.3 MATERIALS

- A. Cementitious Material: Portland cement, ASTM C 150/C 150M, Type I, Type II, Type III.
- B. Water: Clean, potable.
- C. Joint Filler: ASTM C 612, Class 2, glass-fiber type; compressing to one-half thickness under a load of 25 psi (172 kPa).
- D. Steel Wire Mesh: Cold-drawn steel wire, galvanized, 0.041-inch (1.04-mm) diameter, woven into 2-inch (50-mm) hexagonal mesh, and reinforced with a longitudinal 0.062-inch- (1.57-mm-) diameter wire spaced 3 inches (75 mm) apart.
- E. Galvanized Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, 2 by 2 inches (50 by 50 mm), W0.5 by W0.5, fabricated from galvanized-steel wire into flat sheets.
- F. Molded-Polystyrene Insulation Board: ASTM C 578, Type I, 0.90-lb/cu. ft. (14.4-kg/cu. m) minimum density.
1. Provide units with manufacturer's standard keying slots or holes of 3 to 4 percent of board's gross surface area.

2.4 DESIGN MIXTURES

- A. Prepare design mixtures for each type and strength of lightweight insulating concrete by laboratory trial batch method or by field-test data method. For trial batch method, use a qualified independent testing agency for preparing and reporting proposed mixture designs.
1. Limit use of fly ash to not exceed 25 percent of portland cement by weight.

- B. Limit water-soluble chloride ions to the maximum percentage by weight of cement or cementitious material permitted by ACI 301 (ACI 301M).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Control Joints: Install control joints at perimeter of roof deck and at junctures with vertical surfaces, including curbs, walls, and vents, for full depth of lightweight insulating concrete. Fill control joints with joint filler.
 - 1. Provide 1-inch- (25-mm-) wide control joints for roof dimensions up to 100 feet (30 m) in length; 1-1/2-inch- (38-mm-) wide control joints for roof dimensions exceeding 100 feet (30 m).
- B. Wire Mesh: Place steel wire mesh with longest dimension perpendicular to steel deck ribs. Cut mesh to fit around roof openings and projections. Terminate mesh at control joints. Lap sides and ends of mesh at least 6 inches (150 mm).
- C. Welded Wire Reinforcement: Place steel welded wire reinforcement with longest dimension perpendicular to steel deck ribs. Cut reinforcement to fit around roof openings and projections. Terminate reinforcement at control joints. Lap sides and ends of reinforcement at least 6 inches (150 mm).

3.2 MIXING AND PLACING

- A. Mix and place lightweight insulating concrete according to manufacturer's written instructions, using equipment and procedures to avoid segregation of mixture and loss of air content.
- B. Install insulation board according to lightweight insulating concrete manufacturer's written instructions. Place insulation board in wet, lightweight insulating concrete slurry poured a minimum of 1/8 inch (3 mm) over the structural substrate. Ensure full contact of insulation board with slurry. Stagger joints and tightly butt insulation boards. Allow slurry coat to set prior to placing remaining thickness of lightweight insulating concrete.
 - 1. Install insulation board in a stair-step configuration with a maximum step-down of 1 inch (25 mm).
- C. Deposit and screed lightweight insulating concrete in a continuous operation until an entire panel or section of roof area is completed. Do not vibrate or work mix except for screeding or floating. Place to depths and slopes indicated.
- D. Finish top surface smooth, free of ridges and depressions, and maintain surface in condition to receive subsequent roofing system.
- E. Begin curing operations immediately after placement, and air cure for not less than three days, according to manufacturer's written instructions.
- F. If ambient temperature falls below 32 deg F (0 deg C), protect lightweight insulating concrete from freezing and maintain temperature recommended by manufacturer for 72 hours after placement.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to sample materials and perform tests and inspections.
- B. Testing of samples of lightweight insulating concrete obtained according to ASTM C 172/C 172M, except as modified by ASTM C 495, shall be performed according to the following requirements:
 - 1. Determine as-cast unit weight during each hour of placement, according to ASTM C 138/C 138M.
 - 2. Determine oven-dry unit weight and compressive strength according to ASTM C 495. Make a set of at least six molds for each day's placement, but not less than one set of molds for each 5000 sq. ft. (465 sq. m) of roof area.
 - 3. Perform additional tests when test results indicate that as-cast unit weight, oven-dry unit weight, compressive strength, or other requirements have not been met.
 - a. Retest cast-in-place lightweight insulating concrete for oven-dry unit weight and compressive strength.
- C. Prepare test and inspection reports.

END OF SECTION 035216

SECTION 040514

MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mortar and for unit masonry.
 - 2. Grout for unit masonry.
- B. Related Sections:
 - 1. Section 042200 - Concrete Unit Masonry: Installation of mortar and grout, reinforcement and anchorages.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 94 - Specification for Ready-Mixed Concrete.
 - 2. ASTM C 143 - Test Method for Slump of Hydraulic Cement Concrete.
 - 3. ASTM C 144 - Specification for Aggregate for Masonry Mortar.
 - 4. ASTM C 150 - Specification for Portland Cement.
 - 5. ASTM C 207 - Specification for Hydrated Lime for Masonry Purposes.
 - 6. ASTM C 270 - Specification for Mortar for Unit Masonry.
 - 7. ASTM C 387 - Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
 - 8. ASTM C 404 - Specification for Aggregates for Masonry Grout.
 - 9. ASTM C 476 - Specification for Grout for Masonry.
 - 10. ASTM C 1019 - Method of Sampling and Testing Grout.
 - 11. ASTM C 1142 - Specification for Extended Life Mortar for Unit Masonry.
- B. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Samples: Submit two samples 3 inch x 3 inch in size illustrating mortar color and color range.
 - 2. Assurance/Control Submittals:
 - a. Design Data: Design mix in accordance with the Proportion specification of ASTM C 270 and required environmental conditions.
 - 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) Conformance to Proportion specification of ASTM C 270.
 - 2) Test and evaluation reports to ASTM C 780.
 - c. Certificates: Submit manufacturer's certificate that Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. 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.
- B. Store sand for mortar on plastic sheeting to prevent contamination by extraneous chemicals in earth beneath.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
 - 2. Specific Cold Weather Requirements: When the ambient air temperature is below 40 degrees F, heat mixing water to maintain mortar temperature between 40 degrees F and 120 degrees F until placed. When the ambient air temperature is below 32 degrees F, heat the sand and water to maintain this mortar temperature.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C 150, normal-Type I or Type II; gray color. Fly ash, slag, and pozzolans not permitted as substitutes for Portland cement.
- B. Mortar Aggregate: ASTM C 144, standard masonry type; clean, dry, protected against dampness, freezing, and foreign matter.
- C. Grout Aggregate: ASTM C 404; use of blast furnace slag is not permitted. Maximum coarse aggregate size, 3/8 inch.
- D. Calcium chloride is not permitted in mortar or grout. Admixtures or other chemicals containing Thiocyanates, Calcium Chloride or more than 0.1 percent chloride ions are not permitted.
- E. Hydrated Lime: ASTM C 207, Type S.
- F. Water: Potable.
- G. Admixtures: Not permitted unless approved by Contracting Officer prior to construction.

2.2 MIXES - MORTAR

- A. Mortar: Type "N" or Type "S", as recommended by manufacturer, in accordance with the Proportion specification of ASTM C 270.
 - 1. Mixing of components on-site is acceptable.
 - 2. Mixing on-site water and packaged dry blended mix for mortar (ASTM C 387), that contains no masonry cement, is acceptable.

- B. Pointing Mortar: Duplicate original mortar proportions. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 Percent of Portland cement weight.
- C. Mortar Color: Grey

2.3 MIXING - MORTAR

- A. Thoroughly mix mortar ingredients in accordance with ASTM C 270, in quantities needed for immediate use.
 - 1. Maintain sand uniformly damp immediately before the mixing process.
 - 2. Provide uniformity of mix and coloration.
 - 3. Do not use anti-freeze compounds.
 - 4. If water is lost by evaporation, retemper only within 2 hours of mixing. Do not retemper mortar more than 2 hours after mixing.

2.4 MIXES - GROUT FILL

- A. Grout fill is for concrete masonry unit bond beams, lintels, and reinforced cells with reinforcing bars and embedded plates.
 - 1. Compressive Strength: 2000 psi minimum at 28 days, as determined in accordance with the provisions of ASTM C 1019.
 - 2. Slump: 8 inches, minimum; 10 inches, maximum, taken in accordance with ASTM C 143.
 - 3. Use coarse grout when grout space is equal to or greater than 4 inches in both directions.
 - 4. Use fine grout when grout space is smaller than 4 inches in either direction.
 - 5. Do not use air-entrainment admixtures.

2.5 MIXING - GROUT

- A. Grout: Batch and mix grout in accordance with ASTM C 94 or ASTM C476 for site batched and mixed grout. Do not use anti-freeze compounds to lower the freezing point of grout.

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. After reinforcing of masonry is securely tied in place, plug cleanout holes with masonry units. Brace against wet grout pressure.
- B. Install mortar and grout under provisions of Section 042200.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Procedures for testing.
- B. Testing - Masonry Grout: Conduct strength tests in accordance with ASTM C 1019.
 - 1. Take two strength samples for each 5000 square feet of masonry wall surface for each type of grout placed each day.
 - 2. Create test samples by forming with wood surface on bottom and concrete block on sides. The samples shall be 3 inches square and 6 inches high.
 - 3. Initial cure during first 48 hours. Protect samples from loss of moisture by covering with wet cloth and keeping moist. Protect from freezing and variations in temperature. Record maximum and minimum temperatures by using a max/min thermometer.
 - 4. Remove masonry units that form samples after 48 hours and transport grout samples to laboratory. Keep samples protected from vibration, freezing, and moisture loss during transportation.
 - 5. Test samples with test method ASTM C 39 at 28 days. Compressive strength shall be the average of the two samples and shall be adequate if it equals the designated compression strength as defined on the Drawings, but not less than 2000 psi.
- C. Testing - Masonry Mortar: Conduct strength tests in accordance with the following:
 - 1. Spread mortar on the masonry units 1/2 inch to 5/8 inch thick, and allow to stand for one minute.
 - 2. Remove mortar and place in a 2-inch by 4-inch cylinder in two layers, compressing the mortar into the cylinder using a flat-end stick or fingers. Lightly tap mold on opposite sides, level off and immediately cover molds and keep them damp until taken to the laboratory.
 - 3. After 48 hours' set, have the laboratory remove molds and place them in the fog room until tested in damp condition.

END OF SECTION

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SECTION 042200

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete unit masonry veneer.
- 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 040514 - Masonry Mortaring and Grouting: Mortar and grout.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 530 - Building Code Requirements for Masonry Structures.
 - 2. ACI 530.1 - Specifications for Masonry Structures.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 2. ASTM C 55 - Specification for Concrete Brick.
 - 3. ASTM C 129 - Specification for Non-Load Bearing Concrete Masonry Units
- C. International Masonry Industry All- Weather Council (IMIAC): Recommended Practices and Guide Specifications for Cold Weather Masonry construction.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data for each masonry unit type, accessory, and other manufactured products indicated.
 - 2. Shop Drawings: Precast inserts and keys showing sizes, profiles, and locations of each precast unit required.
 - 3. Samples: Two samples of each masonry unit type to illustrate color, texture, and extremes of color range.
 - 4. 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.
 - 5. Submit layout of control joint placement for Contracting Officer's approval prior to starting any work.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 and ACI 530.1.
- 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.
- C. Mock-Up:
 - 1. Construct a sample wall panel of block masonry which will be exposed to view in the finished project, for approval by the Contracting Officer. Mock-up shall be as follows:
 - a. Approximately 4 feet long by 3 feet (high, showing the proposed color range, texture, bond, mortar and workmanship. All block shipped for the sample shall be included in the panel.
 - b. Erect panel in the presence of the Contracting Officer before installation of materials.
 - c. When required, provide a separate panel for each type of block or mortar.
 - d. Do not start work until Contracting Officer has accepted sample panel.
 - e. Use panel as standard of comparison for all masonry work built of same material.
 - f. Do not destroy or move panel until work is completed and accepted by Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Materials shall be delivered and stored so as to avoid damage from breakage, moisture, staining or damage of any kind.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
 - 2. Hot Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Lightweight units used for non-load bearing walls, meeting requirements of ASTM C129, Type I. Provide units meeting fire resistance ratings.
- B. Lightweight units used for load bearing walls, meeting requirements of ASTM C90, Grade N, Type I. Provide units meeting fire resistance ratings.
- C. Units to be high precision block or split face block. Sizes as designated on Drawings. Colors selected from standard manufacturer's colors.
- D. Special shaped units, U-blocks, etc., shall meet same specifications as adjacent units.

2.2 CONCRETE BUILDING BRICK

- A. Concrete brick shall be solid units meeting ASTM C55, Type I, Grade N.

2.3 MORTAR

- A. Specified in Section 040514.

2.4 REINFORCING

- A. Horizontal reinforcing for concrete masonry units shall be mill galvanized, ladder type with 9 gauge parallel wires in each face and 9 gauge cross members a maximum of 24 inches on center, butt welded to side rods. Provide prefabricated corners and tees.
- B. Reinforcing bars for lintels shall meet ASTM A615, Grade 60.

2.5 CONTROL JOINTS

- A. Joint filler shall be preformed neoprene or poly-vinyl chloride.
- B. Control joint placement in non-reinforced masonry:
 - 1. Vertical control joints shall be generally be located:
 - a. At major changes in wall height.
 - b. At changes in wall thickness.
 - c. At control joints in foundations, in roof, and in floors.
 - d. At chases and recesses for piping, columns, fixtures, etc.
 - e. At one or both sides of wall openings.
 - f. Near wall intersections.
 - g. Near return angles in L, T, and U-shaped structures.
 - 2. Maximum spacing of control joints shall be in no case exceed 24 feet.

2.6 CAVITY DRAINAGE PROTECTION MESH

- A. Recycled polyester/polyethylene trapezoidal-shaped 90% open mesh. Thicknesses to fit wall in accordance with the manufacturer's recommendations. Height as recommended by manufacturer, but not to exceed height of the top of the flashing. Product as manufactured by Mortar Net USA, Limited or equal.

2.7 WEEP-HOLE VENT FILLER

- A. Three dimensional, ultraviolet resistant, weave of polyester. Size matching full head joint size of the masonry unit unless shown otherwise. Gray color. Product as manufactured by Mortar Net USA, Limited.

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. Provide temporary bracing during installation of masonry Work. Maintain in place until building structure provides permanent bracing.
- B. Lay out work to avoid use of less than 8 inch x 8 inch faced units at jambs in exposed work.
- C. Lintel block shall extend into side walls at jambs, at least 8 inches.

3.3 INSTALLATION

- A. CMU Base Drainage Course: Lay base drainage course of CMU, consisting of 2 wythes separated by a cavity sized to accommodate through-wall flashing and mesh.
- B. Weep-Vents: Set weep-hole vent filler in place, aligning front of weep vent with exterior face of CMU. Apply adequate mortar to remainder of head joint, carefully removing excess mortar to prevent plugging of weep vent with mortar.
 - 1. Install weep-hole vent filler at drainage courses at base of wall and at all lintels and bond beams where through-wall flashing is required.
 - 2. Install weep-hole vent filler at top of wall and below lintels and bond beams to provide continuous air ventilation within wall.
- C. Mesh
 - 1. Select correct thickness of mesh for size of single-wythe CMU wall and thickness of cavity formed by drainage course units.
 - 2. Set mesh in cavity of drainage base course on either side of vertical reinforcing approximately 3 inches (7.5 cm) from the reinforcing on both sides. Set mesh against outside wythe units. No fasteners, adhesives are required, and mortar need not have set.
 - 3. Construct single-wythe CMU wall above the drainage course. Web-bed and face shell-bed the vertical grout cell to prevent migration of grout to adjoining cells.
 - 4. Grout reinforcing bar in place to within 1 inch (2.5 cm) of the top of the drainage course cavity. Install grout at reinforced cells in vertical lifts not to exceed 5 feet (1.5 m).
 - 5. Set mesh in similarly constructed drainage course at lintels and bond beams.
 - 6. Mesh may be compressed to allow insertion into cavities slightly smaller than its nominal thickness without affecting mesh or wall performance.
 - 7. When forcing mesh into a tight-fitting cavity, ensure that mortar has set sufficiently to allow masonry units to resist outward pressure from product.
 - 8. Protect installed product from damage during construction.
- D. Mortar shall be thoroughly mixed and kept moist but shall not be retempered for use after initial set.
- E. Lay only dry masonry units.
- F. Use masonry saw for cutting exposed surfaces. Cut units to provide 1/8 inch clearance around electrical boxes and similar items.

- G. Do not use chipped, cracked or broken units.
- H. Set units plumb, true to line, and level.
- I. Adjust units to final position while mortar is soft and plastic. If unit is displaced after mortar has stiffened, remove unit, clean joints and unit of mortar and reset with fresh mortar.
- J. When joining fresh work to set or partially set masonry clean exposed surface and remove loose mortar before laying fresh masonry.
- K. When necessary to stop a horizontal, run rack back one-half block length in each course, do not tooth.
- L. Unless indicated otherwise partitions shall extend from floor to bottom of floor or roof construction above.
- M. Where rated partitions run perpendicular to deck, fill voids at deck with grout.

3.4 BOND

- A. Lay units in running bond with vertical joints centered on unit in course below unless indicated otherwise on drawings.

3.5 MORTAR BEDS

- A. Lay hollow units with full mortar coverage on horizontal and vertical face shells. Provide full mortar coverage on horizontal and vertical face shells and webs where adjacent to cells or cavities to be filled with grout and on starting courses.
- B. Lay block with full horizontal and vertical joints.

3.6 WIRE REINFORCEMENT

- A. Wire Reinforcements shall be placed as follows:
 1. Four inch concrete block walls with ends adjoining other partitions.
 - a. Concrete block on slab on grade - continuous horizontal reinforcements 24 inches on center vertically (every third course).
 - b. Concrete block on slabs above grade - Continuous horizontal reinforcement 16 inches on center vertically (every other course).
 2. Eight inch concrete block walls
 - a. Concrete block walls on slab on grade - continuous horizontal reinforcement 16 inches on center vertically (every other course).
 - b. Concrete block walls on slabs above grade - continuous horizontal reinforcements 24 inches on center vertically (every third course).
 3. Wire reinforcement shall be completely embedded in mortar or grout. Joints with wire reinforcement shall be at least the thickness of the wire.
 4. Wire reinforcement shall be lapped at least 8 inches at splices and shall contain at least one cross wire of each piece of reinforcement in the lapped distance.

3.7 JOINTS

- A. Nominal thickness shall be 3/8 inch (9 mm) and uniform.

- B. Shove vertical joints tight.
- C. Strike joints flush in surfaces to be exposed or painted.
- D. Tool joints slightly concave in surfaces to be exposed or painted.

3.8 BUILT-UP WORK

- A. Cooperate with other trades in building in items in masonry work.
- B. Grout solid around built-in items and in door frames.

3.9 LINTELS

- A. Install rebars and grout solid as indicated. Provide temporary shoring for openings wider than 36 inches.
- B. Lintel blocks shall extend into side walls at jambs, minimum at 8 inches.

3.10 CLEANING AND POINTING

- A. Dry brush masonry surfaces after mortar has set, at end of each day's work and after final points.
- B. Cut out and repaint defective joints.
- C. At final completion of masonry work fill holes in joints and tool to match adjacent work.
- D. Leave work and surrounding surfaces clean and free of mortar spots and droppings.

END OF SECTION

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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. Base plates.
 3. 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 052100 - Steel Joist Framing: Steel bracing for joists and joist girders.
 3. Section 053100 - Steel Decking: Support framing for small openings in deck.
 4. 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 052100
STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Open web steel joists, with extended ends, and extended bottom chords.
 - 2. Bridging and bridging anchors.
 - 3. Headers and loose bearing plates.

- 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 051200 - Structural Steel Framing: Building structural frame.
 - 2. Section 099100 - Painting: Field painting of exposed joists and roof deck.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 36 - Specification for Carbon Structural Steel.
 - 2. ASTM A 307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
 - 3. ASTM A 325 - Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

- B. American Welding Society (AWS):
 - 1. AWS D1.1 - Structural Welding Code.

- C. Steel Joist Institute (SJI):
 - 1. SJI - Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders.

- D. Steel Structures Painting Council (SSPC):
 - 1. SSPC SP 2 - Hand Tool Cleaning.
 - 2. SSPC Paint 15 - Steel Joist Shop Paint.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Indicate joist types using standard SJI designations, spacing, location, bridging, anchorages, and special conditions.
 - b. Indicate welded field connections using standard AWS welding symbols.
 - c. Indicate paint primer type, accessories, and installation details.
 - d. Joist setting plans.
 - 2. 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) Welding inspection.
 - 2) Bolted connection inspection.
- b. Certificate: Manufacturer certificate, signed and sealed by a registered structural engineer, certifying that joists are designed in accordance to and comply with SJI specifications and are certified by SJI.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with SJI, Load Tables and Weight Tables.
- B. Qualifications:
1. Fabricator: Company specializing in performing Work of this Section with minimum 5 years documented experience.
 2. Erector: Company specializing in performing Work of this Section with minimum 5 years documented experience, certified by AISC Quality Certification Program.
 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 recertification of welders is required, provide without additional cost to United States Postal Service.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Comply with recommendations of SJI Specifications.
- C. Protect from corrosion, deformation, and other damage.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Open Web Joist Members: SJI Type K Open Web.
- B. Bridging: ASTM A 36.
- C. Welding Materials: AWS D1.1; type required for materials being welded.
1. Open Web Steel Joists: Conform to SJI Specifications for Open Web Steel Joists and to SJI Technical Digest No. 8, Welding of Open Web Steel Joists.
 2. Longspan and Deep Longspan Steel Joists and Joist Girders: Conform to applicable Welding Electrodes section in SJI Specifications.
- D. Anchor Bolts, Nuts, and Washers: ASTM A 307 and ASTM A 325.
- E. Primer: SSPC 15, Type 1, red oxide.
- F. Accessories: Provide anchors and fasteners required for installation and attachment of joists and bridging.
- G. Structural Steel Building Framing: Specified in Section 051200.

2.2 FABRICATION

- A. Design and fabricate joists, including headers and other supporting framing, in accordance with SJI Standard Specifications.
 - 1. Verify Drawing dimensions and field conditions before beginning fabrication.
 - 2. Provide for concentrated loads indicated on Drawings.
- B. Bottom Chord Extensions: Provide joist bottom chord extensions at columns, not framed in minimum two directions, with structural steel members. Connect to columns as indicated on Drawings.
- C. Extended Ends: Provide extended joist ends at locations indicated on Drawings. Comply with load tables and design loads indicated on Drawings.
- D. Bridging: Provide horizontal or diagonal type bridging for open web joists, including bridging anchors for ends of bridging lines ending at walls or beams.
- E. End Anchorage: Provide anchorages to connect joists to adjacent construction.
- F. Header Units: Provide header units to support tail joists at openings in roof system not framed with steel shapes.

2.3 FINISH

- A. Prepare joist component surfaces in accordance with SSPC SP 2.
- B. Shop prime joists. Do not prime surfaces that will be field welded and in contact with concrete.
 - 1. Apply one shop coat of primer to joists and joist accessories to provide a continuous dry film thickness of 0.50 mils.
- C. Field Painting: Field paint joists, indicated on Drawings to receive paint finish, as specified in Section 099100.

2.4 SOURCE QUALITY CONTROL

- A. Inspection: Contracting Officer reserves the right to have Contracting Officer's Representative make a visual inspection of joists at fabricators' shop before shipment.

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 ERECTION

- A. Erect steel joists, joist girders, and bridging in accordance with SJI Standard Specifications and SJI Technical Digest No. 9 - Handling and Erection of Steel Joists and Girders.
- B. Do not start erection of joists until supporting Work is in place and connections made.
- C. Erect and bear joists on supports.
- D. Allow for erection loads. Provide temporary bracing to maintain joists safe, plumb, and in true alignment.
- E. Install bridging simultaneously with joist erection, before construction loads are applied. Connect ends of bridging lines at top and bottom chords terminating at walls or beams.
- F. After joist alignment and installation of framing, field weld joist seat to bearing member.
- G. Position and field weld joist chord extensions and wall attachments.
- H. Do not permit installation of roof decking until joists are braced, bridged, and secured or until completion of erection and installation of permanent bridging and bracing.
- I. Do not field cut or alter joists.
- J. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.3 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate placement of anchorages in concrete and masonry construction for making connections to joists and joist girders, and for securing bearing plates.
 - 2. Furnish anchor bolts and other devices built into concrete and masonry construction to appropriate installer for installation.
- B. Site Tolerances:
 - 1. Minimum Variation From Plumb: 1/4 inch.
 - 2. Maximum Offset From True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Testing laboratory will inspect bolted connections and field welds.
 - 1. Bolted: Visually inspected.
 - 2. Welded: Visually inspected.

END OF SECTION

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SECTION 053100

STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel roof deck and accessories.
 - 2. Framed openings up to 10 inches by 10 inches.
 - 3. Welding, fasteners, and accessories for attachment of deck.
- 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 051200 - Structural Steel Framing: Support framing for openings larger than 10 inches x 10 inches.
 - 2. Section 052100 - Steel Joist Framing: Support framing for steel decking.

1.2 REFERENCES

- A. American Iron and Steel Institute (AISI):
 - 1. Specification for the Design of Cold-Formed Steel Structural Members.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 1008 - Specification for Structural Steel, Sheet, Carbon, Cold-Rolled.
 - 2. ASTM A 653 - Specification for Steel Sheet, Zinc Coated, Galvanized.
- C. American Welding Society (AWS):
 - 1. AWS D1.1 - Structural Welding Code.
 - 2. AWS D1.3 - Structural Welding Code - Sheet Steel.
- D. Steel Deck Institute (SDI):
 - 1. Design Manual for Composite Decks, Form Decks, Roof Decks, (Publication No. 25).
 - a. Code of Recommended Standard Practice.
 - b. Specifications and Commentary for Steel Roof Deck.
 - 2. SDI Diaphragm Design Manual 1st Edition.
- E. Steel Structures Painting Council (SSPC):
 - 1. SSPC-Paint 20 Type II - Zinc Rich Primers - Organic.
 - 2. SSPC-Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil, and Alkyd Primer.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Deck profile characteristics and dimensions, structural properties, and finishes.
 - 2. Shop Drawings: Indicate deck plan, support locations, projections, openings and reinforcement, pertinent details, and accessories.
 - 3. Assurance/Control Submittals:

- a. Certificates: Certify welders employed on Work, verifying AWS qualification within previous 12 months.
- b. Qualification Documentation: Submit documentation of 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: Company specializing in performing the work of this section with minimum 5 years documented experience, certified by AISC Quality Certification Program.
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 recertification of welders is required, provide without additional cost to United States Postal Service.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Prevent damage to edges, ends and surfaces.
- C. Cut plastic wrap to encourage ventilation. Keep materials dry.
- D. Separate sheets and store materials on dry wood sleepers off ground or concrete; slope for positive drainage.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Sheet Steel:
 1. ASTM A 1008 structural quality; with G60 galvanized coating conforming to ASTM A 653.
- B. Bearing Plates and Angles: ASTM A 36 steel.
- C. Welding Materials: AWS D1.1.
- D. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC 20, Type 1, inorganic.
- F. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to decking.
- G. Closure Strips, Cover Plates, and related Accessories: Fabricated of metal of same type and finish as deck.

- H. Screw Fasteners: Self-drilling, self tapping No. 12 HWH Teks, by ITW-Buildex Corp., Itasca, IL, (800) 323-0720.
 - 1. Substitutions: Permitted
- I. Powder Actuated Fasteners: Minimum 0.145 inch diameter knurled hardened steel shank; minimum 0.5625 inch diameter washer; meet SDI design requirements.
 - 1. ENP2-21-L15, by Hilti, Inc., Tulsa, Oklahoma, (918) 252-6000, (800) 879-8000.
 - 2. Substitutions: Permitted.
- J. Air Actuated Fasteners: Minimum 0.130 inch diameter knurled hardened steel shank; minimum 0.500 inch diameter steel washer or head; meet SDI design requirements.
 - 1. X-EDNK22 HSN or X-EDN19 HSN, by Hilti, Inc., Tulsa, Oklahoma, (918) 252-6000.
 - 2. K-65056 or SDK-63075, by Pneutek, Inc., Hudson, New Hampshire, (603) 883-1660, (800) 431-8665.
 - 3. Substitutions: Permitted.
- K. Side Lap Fasteners: Self-drilling screws; #10-16 TEKS/1, by ITW-Buildex Corp., Itasca, IL, (800) 323-0720, or acceptable substitute.

2.2 FABRICATION

- A. Steel Roof Deck: Minimum gage sheet steel as indicated on Drawings, 1-1/2 inch high, fluted profile to SDI WR; multiple span; lapped joints.
- B. Fabricate metal decking in accordance with the SDI Design Manual for Composite Decks, Form Decks, Roof Decks, and AISI, to accommodate maximum working stress of 20,000 psi and maximum span deflection of 1/240.
- C. Fabricate roof sump pan of 14 gage sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

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. Erect metal decking and connect to structure in accordance with SDI Design Manual for Composite Decks, Form Decks, Roof Decks. Coordinate attachment sequence and procedure with placing of units; show on shop drawings.

- B. On steel support members provide 1-1/2 inch minimum bearing. On masonry support surfaces provide 3 inch minimum bearing.
- C. Align and level deck on supports.
- D. Provide welds, fasteners, and side lap connectors of size, spacing, and location as indicated on Drawings.
- E. Install Hilti powder actuated fasteners using the DX-450 or DX-750 decking system, by Hilti. Installed pin height shall be in accordance with manufacturer's recommendations, and verified with manufacturer approved inspection gage. Determine power level by jobsite testing.
- F. Install Hilti air actuated fasteners using the R4x12 decking system, by Hilti. Installed pin height shall be in accordance with manufacturer's recommendations, and verified with manufacturer approved inspection gage. Determine power level by jobsite testing.
- G. Install Pneutek air actuated fasteners using decking system, by Pneutek. Install pins in accordance with manufacturer's recommendations. Pin head shall clamp deck tightly to supporting member without gaps between underside of head and top side of deck. Pin shall not cause excessive dimpling of the deck greater than 1/2 the thickness of the pin head.
- H. Powder and air actuated fasteners shall be installed by a tool operator licensed by the pin manufacturer. A representative of the pin manufacturer shall be on site to verify proper installation of fasteners, and shall submit written verification to Owner.
- I. Welding: In accordance with AWS D1.1 and D1.3. Provide welding washers when welding 26 gauge or lighter steel deck.
- J. Install 6 inch wide sheet steel cover plates where deck changes direction. Spot weld in place 12 inches on center maximum. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.
- K. Position roof sump pans with flange bearing on top surface of deck. Weld at each deck flute.
- L. Immediately after welding deck in place, touch-up welds, burned areas, and surface coating damage with compatible primer paint.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspection:
 - 1. Select 6 random sheets for each type of deck used. Inspect for deck thickness, type, and material.
 - 2. Inspect 10 percent of deck welds over entire roof area for size and spacing (CWI to perform inspection).
 - 3. Inspect 10 percent of side lap connectors over entire roof area for type, size, and spacing of side lap connectors.

END OF SECTION

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SECTION 054000

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Load-bearing and metal stud wall and partition framing, with anchorage and bracing.
- 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 Iron and Steel Institute (AISI)
 - 1. Specification for the Design of Cold-Formed Steel Structural Members .
 - 2. Cold-Formed Steel Design Manual (Latest).
- B. American National Standards Institute (ANSI)
 - 1. ANSI A58.1 - Roof, Wind and Snow Loads.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A653 - Standard Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A1101- Hot-Rolled Carbon Steel Sheet & Strip, Carbon Hot-Rolled Structural Quality.
 - 3. ASTM A1008- Standard Specification for Structural Steel Sheet, Carbon, Cold-Rolled.
 - 4. ASTM C955 - Standard Specification for Load Bearing Steel Studs, Runners (Track), Bracing, and Bridging for Screw Application of Gypsum Panel Products.
- D. American Welding Society (AWS):
 - 1. AWS D1.1 - Structural Welding Code and D1.3 - Specifications for Welding Sheet Steel in Structures.
 - 2. AWS - Standard Qualification Procedure.
- E. Federal Specification.
 - 1. FS TT-P-636C - Rust-Inhibitive Paint.
- F. Metal Lath/Steel Framing Association (ML/SFA) - Lightweight Steel Framing Systems Manual, Latest Edition.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: The supplier shall design and/or verify the size and strength of all light gauge cold-formed Metal Framing members and connections in accordance with the ML/SFA Lightweight Steel Framing Systems Manual.
 - 1. Design shall use the superimposed design loads specified in the Design Criteria section of the Structural General Notes in the Contract Drawings.
 - 2. Design shall be based upon information shown on the drawings and specified herein.
 - 3. Additional Design Criteria - ANSI A58.1 or:

- a. Load-bearing live loads:
 - 1) Load-bearing partitions:
 - i. Lateral pressures: 5 psf
 - 2) Non-load-bearing partitions:
 - i. Lateral pressures: 5 psf
 - ii. Wind loads based on wind speeds of 150 MPH.
 - 3) 4) Maximum allowable deflection with brick veneer:
 - i. Calculated on 18 ga. stud capacity alone: 1/600.
- 4. Design shall conform to: AISI Specification for the Design of Cold-Formed Steel Structural Members. Wall bridging shall be designed to provide resistance to minor axis bending and rotation of wall studs. Designated selected exterior and/or interior walls shall be designed to provide frame stability and lateral load resistance. All connections (member to member, and member to structure) shall be designed and detailed.
- 5. Qualification of Field Welding: Qualify welding process and welding operators in accordance with AWS Standard Qualification Procedure.
- 6. Design non-axial load-bearing framing to accommodate 1/2 inch (13 mm) vertical deflection.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. All shop drawings and calculations must bear the seal and signature of an engineer registered in the jurisdiction where project is being constructed.
 - 2. Product Data:
 - a. Manufacturers' literature containing product and installation specifications and details.
 - 3. Shop Drawings:
 - a. Documents illustrating materials, shop coatings, steel thickness, details of fabrication and erection, details of attachment, spacing of fasteners, required accessories and critical installation procedures.
 - 4. Calculations:
 - a. Engineering calculations or data verifying the framing assembly's ability to meet or exceed design requirements as stated here-in and required by local codes, prepared under the supervision of a Professional Engineer.
 - 5. 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) Testing/Inspection reports conducted on shop and field-bolted and welded connections. Include data on type(s) of tests conducted and test results. Note inspection findings.
 - 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.

1.5 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.
- B. Pre-Installation Meetings:

1. Convene a pre-installation meeting one week prior to commencing Work of this Section. Notify the Architect and Contracting Officer of the meeting date and time at least 7 days prior.
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 installation of other work including door and window frames and mechanical and electrical work.
 - b. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review Drawings.
 - e. Review and finalize construction schedule related to cold formed metal framing installation 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.
 - g. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
 - h. Review safety precautions relating to operations.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Protect metal framing units from rusting and damage. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade. Store off ground in a dry ventilated space or protect with suitable waterproof coverings and protect against mechanical damage to units. Store materials on a flat plane. Any damaged materials shall be removed from the site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All studs and/or joists and accessories shall be of the type, size, gauge and spacing shown on the plans or as required by manufacturer design, if called for. Studs, runners (track), bracing, and bridging shall be manufactured per ASTM Specification C-955.
- B. All painted studs, joists and accessories shall be formed from steel that conforms to the requirements of ASTM A570 or A611, as set forth in Section 1.2 of the AISI Specification for the Design of Cold-Formed Steel Structural Members (latest edition).
- C. All galvanized studs, joists and accessories shall be formed from steel that conforms to the requirements of ASTM A653, as set forth in Section 1.2 of the AISI Specification for Design of Cold-Formed Steel Structural Members (latest edition).
- D. All painted studs, joists and accessories shall be prime-painted with a rust-inhibitive paint, FS TT-P-636C.
- E. All galvanized studs, joists and accessories shall have a minimum G-60 coating.
- F. All section properties shall be calculated in accordance with the AISI Specification for the Design of Cold-Formed Steel Structural Members (latest edition).

G. Framing Accessories:

1. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - a. B&D Industries, LLC, Albany, NY (800) 924-4807.
 - b. Deitrich, Pittsburgh, PA (800) 873-2443.
 - c. The Steel Network, Incorporated., Raleigh, NC (888) 474-4876.
2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
3. Interior or Exterior non-axial-load-bearing Wall Head Condition Deflection Accessories:
 - a. Deitrich: Double-Deep-Leg Track.
 - b. The Steel Network: VertiClip® SLD (interior), SL (exterior).
4. Exterior non-axial-load-bearing Wall Slab Bypass Deflection Accessories:
 - a. B&D: Quick Clip®.
 - b. The Steel Network: VertiClip® SLB or SLS Series.

2.2 FABRICATION

- A. General: Framing components may be prefabricated prior to erection. Fabricate components plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated components in a manner to prevent damage or distortion.
- B. Fastenings: Attach similar components by welding. Attach dissimilar components by bolting, or screw fasteners, as standard with manufacturer.
- C. Cutting of steel framing members may be accomplished with a saw or shear. Torch cutting of load carrying members is not permitted.
- D. Wire tying of framing components is not 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.
- 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 AND STUDWALLS

- A. Manufacturer's Instructions: Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations, unless otherwise indicated.
- B. Stud Walls:

1. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24 inches on center spacing for nail or power-driven fasteners, or 16 inches on center for other types of attachment. Provide fasteners at corners and ends of tracks.
2. Position studs plumb in runners and space no greater than 16 inches and not more than 2 inches from abutting walls and at each side of openings. Connect studs to upper and lower tracks using self-drilling screws or welding in accordance with Manufacturer's recommendations such that the connection meets or exceeds the design loads required at that connection.
3. Brace all studs at mid-height for added strength, stiffness, and fire-stopping.
4. Construct corners using minimum of three studs. Double studs at door, window, and sidelight jambs. Install intermediate studs above and below openings to match wall stud spacing.
5. Provide deflection allowance below supported horizontal building framing in ceiling or head track for non-load-bearing framing in a method recommended by stud manufacturer.
 - a. Where walls and partitions must close out against the deck for smoke and fire separation provide a top track rigidly attached to vertical studs but free to move vertically in a 14 gauge break-formed deep leg track rigidly attached to deck with slack to accommodate structural live load deflections noted on drawings; or head condition vertical slide clips in coordination with alignment track (20 gage at exterior walls, 25 gage at interior walls).
 - b. Where wall or partition studs pass by the structural deck provide vertical slide clips welded or screw attached to the structural support but do not attach rigidly to studs.

3.3 INSTALLATION: PRE-FABRICATED AND PANELIZED CONSTRUCTION

- A. Panels shall be designed to resist construction and handling loads as well as service loads.

3.4 INSTALLATION: NON-PANELIZED (STICK-BUILT) MEMBERS

- A. Align track accurately at supporting structure and fasten to structure as shown on shop drawings.
- B. Track intersections shall butt evenly.
- C. Studs shall be plumbed, aligned, and securely attached to flanges or webs of upper and lower tracks. Axially loaded studs shall be seated squarely in both top and bottom tracks.

3.5 INSTALLATION: JOISTS

- A. Joist shall be located directly over bearing studs or a load distribution member shall be provided to transfer loads.
- B. Provide web stiffeners where necessary at reaction points, and at points of concentrated loads, as shown on the shop drawings.
- C. Bridging, either strap or solid, shall be provided as shown on the shop drawings.
- D. Provide additional joists under parallel partitions where the partition length exceeds 1/2 of the joist span.
- E. Provide additional joists around all floor/roof openings which are larger than the joist spacing and as noted on the shop drawings.
- F. End blocking shall be provided where joist ends are not otherwise restrained from rotation.

3.6 FASTENINGS AND ATTACHMENTS

- A. Anchorage of the tracks to the structure shall be with methods designed for the specific application of sheet to that surface. Size, penetration, type and spacing shall be determined by design.
- B. Welds shall conform to the requirements of AWS D1.1, AWS D1.3, and AISI Manual Section 4.2. Welds may be butt, fillet, spot, or groove type, the appropriateness of which shall be determined by, and within the design calculations. All welds shall be touched-up using zinc rich paint to galvanized members, and paint similar to that used by the manufacturer for painted members.
- C. Steel drill screws shall be of the minimum diameter indicated by the design of that particular attachment detail. Penetration through joined materials shall not be less than 3 exposed threads.
- D. Wire tying in structural applications is not permitted.

3.7 CONSTRUCTION

- A. Site Tolerances:
 - 1. Vertical alignment (plumbness) of studs shall be within 1/960th (1/8 inch in 10.0 inches) of the span.
 - 2. Horizontal alignment (levelness) of walls shall be within 1/960th (1/8 inch in 10.0 inches) of their respective lengths.
 - 3. Spacing of studs shall not be more than $\pm 1/8$ inch from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.
 - 4. Squareness - Prefabricated panels shall not be more than 1/8 inch out of square within the length of that panel.

3.8 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
 - 1. Inspect all work in order to assure strict conformance to the shop drawings at all phases of construction.
 - 2. All members shall be checked for proper alignment, bearing, completeness of attachments, proper placement, reinforcement, etc.
 - 3. All attachments shall be checked for conformance with the shop drawings. All welds shall be touched-up as specified herein.
 - 4. General Inspection of structure shall be completed prior to applying loads to those members.
 - 5. Inspections where and as required by local codes shall be controlled inspections.

END OF SECTION

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SECTION 055000
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Steel lintels for masonry openings.
 2. Miscellaneous framing and supports.
 3. Security grilles for ductwork over 8 inches square penetrating the roof or wall structure.
 4. Pipe Bollards.
 5. Pipe bollard plastic covers.
 6. Access Ladders.
 7. Angular steel floor guides for the Bulk Mail Containers or General Post Mail Containers, (where applicable).
 8. Alternating tread stair
- 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. Extruded Aluminum: ASTM B221.
- H. Anchors and Fasteners for Aluminum: Stainless steel.
- I. Welding Materials: AWS D1.1; type required for materials being welded.
- J. 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.
- K. 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.

L. Security Grilles:

1. All grilles are to be factory fabricated of 1/2 inch (1.25 cm) diameter tool-resistant, round steel bars spaced a maximum eight inches (20 cm) on center each direction. The bars are to be framed with a minimum 1/8 inch (0.625 cm) by 1 inch (2.5 cm) flat steel.
2. Grilles must be securely fastened to the structural framing around the opening with welded or non-removable fasteners at a maximum 6 inches (15.25 cm) on center.

M. Primers:

1. Primer for Painting: One of following:
 - a. Tnemec, Kansas City, MO, (816) 474-3400: No. 99 red primer.
 - b. Chessman-Elliott 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 LOOSE STEEL LINTELS

- C. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- D. Weld adjoining members together to form a single unit where indicated.
- E. Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.
- F. Galvanize all surfaces of loose steel lintels located in exterior walls.

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 SHELF AND RELIEVING ANGLES

- A. Fabricate shelf and relieving angles from steel angles of sizes indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4 inch bolts, spaced not more than 6 inches from ends and not more than 24 inches on center, unless otherwise indicated.
- B. Galvanize shelf angles to be installed on exterior concrete framing.

2.7

2.8 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 sleeves for bollard anchorage from steel pipe with 1/4 inch thick steel plate welded to bottom of sleeve. Exterior sleeves are to be galvanized.

2.9 PIPE BOLLARD PLASTIC COVERS

- A. Exterior shell cover of low density polyethylene and interior steel sleeve. Covers are to be 1/4 inch nominal wall thickness with ultraviolet and anti-static additives and a dome top. Install over steel pipe posts as indicated on Drawings. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Ideal Shield, L.L.C., Detroit, MI (313) 842-7290, (800) 731-1722.
 - 2. Liberty Equipment Sales, Houston, TX (281) 987-8708, (888) 987-8708.

2.10 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.

2.11 ALTERNATING STAIRS

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Basis of Design: Lapeyre Stair, Inc., (800) 535-7631
 - 2. Section 016000 – Product Substitutions. Substitutions: Permitted.
- B. Performance Requirements:
 - 1. Stair Treads: Treads shall be capable of withstanding a concentrated load of 1000 lbs. without deformation.
 - 2. Handrail: Handrails shall be capable of withstanding a load of 200 lbs. applied in any direction at any point on the rail.

- C. Material: Carbon Steel
- D. Finish: Safety Yellow powder coat finish
- E. Angle of Incline: 56 deg or 68 deg from horizontal, to be determined by Architect.

2.12 FINISHES, GENERAL

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

2.13 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.

2.14 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.
- G. Install pipe bollard plastic covers per manufacturer's recommendation.

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

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SECTION 055213

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel pipe handrails.
- 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 099100 - Painting: Field paint finish.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 53 - Specification for Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
 - 2. ASTM 123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM E 894 - Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
 - 4. ASTM E 935 - Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
 - 5. ASTM E 985 - Permanent Metal Railing Systems and Rails for Buildings.
- B. Steel Structures Painting council (SSPC):
 - 1. SSPC Paint 15 - Type 1, Red Oxide.
 - 2. SSPC Paint 20 - Type 1 Inorganic Zinc Rich.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Design, engineer, fabricate and install handrails and railing systems to comply with requirements of ASTM E 985 for structural performance based on testing performed in accordance with ASTM E 894 and E 935.
 - 2. Railing assembly, wall rails, and attachments to comply with local code requirements and to resist minimum lateral force according to IBC or more stringent local building code at any point without damage or permanent set.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipe: ASTM A 53, Grade B Schedule 80.
- B. Rails and Posts: Steel pipe; with welded joints, of sizes and shapes as indicated on Drawings.
- C. Fittings: Elbows, T-shapes, wall brackets, escutcheons; machined steel.
- D. Mounting on Concrete Floor: Steel sleeves, sized to receive railing post with 1/4 inch clearance.
- E. Mounting on Masonry or Concrete Walls: Brackets with anchors for building in masonry.
- F. Mounting on Stud Walls: Brackets and anchor plates, predrilled to receive bolts.
- G. Splice Connectors: Steel threaded collars.

2.2 FABRICATION

- A. Fit and shop assemble sections in largest practical sizes, for delivery to site and installation.
- B. Supply components required for secure anchorage of handrails and railings.
- C. Fully weld joints. Grind exposed welds smooth and flush with adjacent surfaces.
- D. Wake exposed joint butt tight, flush, and hairline.
- E. Accurately form components required for anchorage of railings to each other and to building structure.
- F. Prime railings which will be exposed.

2.3 FINISH

- A. At Building Exterior:
 - 1. Galvanizing: ASTM A123; provide minimum 2.0 ounces per square foot.
 - 2. Touch-Up Primer for Galvanized Surfaces: SSPC 20 Type I Inorganic zinc rich.
- B. At Building Interior: SSPC 15, Type 1, red oxide.
- C. Field paint as specified in Section 099100.

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 field dimensions prior to shop fabrication.
- 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. Furnish items required to be cast into concrete, embedded in masonry, placed in partitions with setting templates, to appropriate Sections.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's published instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Anchor railings to structure with anchors in conformance with ASTM E 985.
- D. Field weld anchors as indicated on Drawings. Touch-up welds with primer. Grind welds smooth.
- E. Insert railing posts in sleeves and pack sleeves with non-shrink grout.

3.4 CONSTRUCTION

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

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect railings and handrail installation and attachment to structure.
- C. Inspect paint finish applied to surfaces.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
Last revised: 3/5/2012

SECTION 061000
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concealed blocking behind wall mounted items.
 - 2. Sheathing material.
 - 3. Wood treatment.
 - 4. Building paper.

- 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 061753 - Shop-Fabricated Wood Trusses: Roof trusses.

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.
 4. All wood products to be FSC Certified.

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 BUILDING PAPER

- A. Asphalt saturated felt, non-perforated.

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, meeting ASTM-A153, 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.
 - b. Arch Wood Protection, Inc., Smyrna, GA (770) 801-6600
 - c. Kippers Performance Chemicals., Griffin, GA, (770) 233-4200
2. Products:
 - a. CSI: "Preserve".
 - b. Arch Wood: "Natural Select"
 - c. Koppers: "Nature Wood"
3. Impregnate lumber with preservative treatment conforming to AWWPA Standard C1 and P5. Apply the preservative in a closed cylinder by pressure process in accordance with AWWPA 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 AWWPA 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. Fire Retardant Treatment:

1. Manufacturers:
 - a. Chemical Specialties, Incorporated, Charlotte, NC (800) 421-8661.
 - b. Hickson Corporation, Smyrna, GA: (770) 801-6600.
 - c. Hoover Treated Wood Products, Incorporated, Thomson, GA: (800) 832-9663.
2. Products:
 - a. CSI: "D-Blaze".
 - b. Hickson: "Dricon".
 - c. Hoover: "Pyro-Guard".
3. Lumber and plywood shall be treated as follows:
 - a. Each piece of treated material shall bear the UL FR-S rating (flamespread and smoke developed less than 25) indicating compliance with an extended 30 minute tunnel test in accordance with ASTM E84 or UL 723.
 - b. After treatment, all lumber shall be dried to an average moisture content of 19 percent or less.
 - c. After treatment, all plywood, shall be dried to an average moisture content of 15 percent or less.
 - d. All treated material shall meet interior Type A requirements in AWWPA standard C-20 for lumber and C-27 for plywood.
 - e. Chemicals used to treat material shall be free of halogens, sulfates and formaldehyde.

C. 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.

2. Lumber, Fire Retardant Treated: Interior framing, furring, blocking, nailers, and miscellaneous exposed wood. Do not treat furring in contact with masonry or concrete.
3. Interior Plywood, Fire Retardant Treated: Exterior type plywood backing for electrical and telephone equipment.

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 INSTALLATION - AIR INFILTRATION SEAL

- A. Place material horizontally over wall sheathing, minimum 2 inch (5 cm) overlap and 6 inch (15 cm) endlap; weather lap edges and ends; fasten to sheathing with corrosion resistant fasteners.

3.5 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.

3.6 CONSTRUCTION

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

3.7 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.

3.8 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

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SECTION 062000
FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior running and standing trim.
 - 2. Adjustable shelving, shelf standards, and 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.
- 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.
 - 2. All wood products to be FSC Certified.

1.6 SITE ENVIRONMENTAL PROCEDURES

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

PART 2 - PRODUCTS

2.1 ADJUSTABLE SHELVING

- A. Standards: adjustable, flush mount shelf standards.
- B. Standards: Brackets. Style
- C. Sheathing for Shelves: 3/4 inch thick x 24 inches deep in maximum possible length. Formaldehyde free board product sanded smooth and painted each side and each 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.
- D. Fasteners: Size and type to suit application.

2.2 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.

2.3 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

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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 finish 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 a 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 mills.
- 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 apply 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

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SECTION 071900
WATER REPELLENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Zero VOC water repellent coating applied to exterior masonry surfaces.
- B. Related Sections:
 - 1. Section 042200 - Concrete Unit Masonry: Substrate for application of water repellent.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Product description, tests performed, limitations to coating, and VOC content.
 - 2. Assurance/Control Submittals:
 - a. Test Reports: Manufacturer's Material Safety Data Sheets (MSDS).
 - b. Certificates: Manufacturer certificate that Products meet or exceed specified requirements.
 - c. Manufacturer's Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.
 - d. Qualification Documentation: Submit manufacturer and applicator documentation of experience indicating compliance with specified qualification requirements.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Applicator: Company specializing in performing the work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements: Comply with applicable rules and regulations of Pollution-Control Regulatory Agency having jurisdiction regarding volatile organic compounds (VOC) and use of hydrocarbon solvents.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Protect coating liquid from freezing.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements: Do not apply Product during the following conditions;
 - 1. Ambient temperature below 40 degrees F.
 - 2. Substrate surfaces have cured less than 30 days.
 - 3. Rain or temperatures below 40 degrees F are predicted for a period of 24 hours.
 - 4. Surfaces not dry for minimum 24 hours.
 - 5. Substrate frozen or surface temperature is below 40 degrees F.

1.6 WARRANTY

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Warranty:
 - 1. Submit written warranty signed by water repellent manufacturer and applicator agreeing to repair or reapply materials that fail to provide water repellency because of failure of Product or improper application.
 - 2. Warranty Period: 3 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. The Euclid Chemical Company, Cleveland, OH (216) 531-9222, (800) 321-7628
 - 2. H&C Concrete Protection, Cleveland, OH, (800) 867-8246.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Siloxane: Clear penetrating water repellent. Alkylalkoxysiloxanes that are oligomeric with alcohol, ethanol, water, or other proprietary carrier.
- B. Products:
 - 1. Euclid: Loxon Siloxane.
 - 2. H&C: SX-7.

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 joint sealants are installed and cured.
 - 2. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.
- 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. Remove loose particles and foreign matter. Remove oil or foreign substance with a cleaning agent which will not affect coating.
- B. Scrub and rinse surfaces with water, and let dry.
- C. Protect adjacent surfaces not scheduled to receive coating. If applied on unscheduled surfaces, remove immediately, by approved method.
- D. Protect landscaping, property, and vehicles from over spray and drift.

3.3 APPLICATION

- A. Delay work until masonry mortar is cured for seven days.
- B. Apply coating in accordance with manufacturer's published instructions, using appropriate method and coverage rate.

END OF SECTION

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SECTION 072100
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Batt Insulation..
 - 2. Rigid Wall 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.

- B. Certification: For projects California provide Products certified by manufacturer that meet California Quality Standards for Insulating Materials.

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: Amifoam.
 - b. Owens Corning: Foamular 250.
 - 2. Thickness:
 - a. Refer to Drawings for Thickness and R-Value

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 AIR INFILTRATION SEAL

- A. Manufacturer:
 - 1. Tenneco Building Products, Smyrna, GA (800) 241-4402.
 - 2. DuPont, Wilmington, DE (800) 448-9835.
 - 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Materials: One of the following two types of materials:
 - 1. 15 pound, type 1, grade D, 10 minute unperforated asphalt saturated organic felt in accordance with ASTM D22.
 - 2. Coated, cross-woven polyethylene or polypropylene fabric:
 - a. Tenneco: Amowrap Housewrap.
 - b. DuPont: Tyvek Housewrap.
 - c. Air Infiltration Seal Tape: Pressure sensitive of type recommended by vapor retardant manufacturer for sealing joints and penetrations in air infiltration seal.

2.5 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.

END OF SECTION

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SECTION 075200

SBS MODIFIED BITUMEN ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements related to the installation of SBS (Styrene-Butadiene-Styrene) modified bitumen roofing membrane and flashings, DOE Energy Star compliant reflective surfacing, related accessories, and warranty and guarantee requirements.

1.2 RELATED SECTIONS

- A. Section 013300 – Submittal Procedures
- B. Section 016000 – Product Requirements
- C. Section 035200 – Lightweight Insulating Concrete System
- D. Section 076203 – Sheet Metal Flashings and Trim
- E. 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.

1.3 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 6163 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements
 - b. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
 - 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

1.4 SUBMITTALS

- A. Prior to the start of work, submit the following to the Owner for approval:
 - 1. Product submittals required within Section 013300.
 - 2. Letter from the proposed primary roofing manufacturer confirming that the bidder is an acceptable Contractor authorized to install the proposed system.
 - 3. Letter from the primary roofing manufacturer stating that the proposed application will comply with the manufacturer's requirements in order to qualify the project for the specified guarantee.
- B. Submittals Prior to Project Close-out:

1. Certificate Of Analysis from the testing laboratory of the primary roofing materials manufacturer, confirming the physical and mechanical properties of the roofing membrane components. Testing shall be in accordance with the parameters published in ASTM D 5147 and ASTM D 7051 and indicate Quality Assurance/Quality Control data as required to meet the specified properties. A separate Certificate Of Analysis for each production run of material shall indicate the following information:
 - a. Material type
 - b. Lot number
 - c. Production date
 - d. Dimensions and Mass (indicate the lowest values recorded during the production run);
 - i. Roll length
 - ii. Roll width
 - iii. Selvage width
 - iv. Total thickness
 - v. Thickness at selvage (coating thickness)
 - vi. Weight
 - e. Physical and Mechanical Properties;
 - i. Low temperature flexibility
 - ii. Peak load
 - iii. Ultimate Elongation
 - iv. Dimensional stability
 - v. Compound Stability
 - vi. Granule embedment
 - vii. Resistance to thermal shock (foil faced products)
 2. Manufacturer's printed recommendations for proper maintenance of the specified roof system including inspection frequencies, penetration addition policies, temporary repairs, and leak call procedures.
- C. 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. **Acceptable Products:** Primary roofing products, including type of sheet, all manufactured in the United States, shall be supplied by a single manufacturer which has been successfully producing the specified type of primary products for not less than 10 years. The primary roofing products shall have maintained a consistent composition for a minimum of five years.
- C. **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.
- D. **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.

- E. 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.
- F. 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.
- G. **Manufacturer Requirements:** Ensure that the primary roofing materials manufacturer provides direct trained company personnel to attend necessary job meetings, perform periodic inspections as necessary and conduct a final inspection upon successful completion of the project.

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. Material provided to be in quantities required to allow continuity of application.
- 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. For roof-top storage, avoid overloading of deck and building structure. Factory packaging is not intended for job site protection. Store flammable or temperature sensitive materials away from open flame, ignition sources or excessive heat.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.
- E. **Damaged Material:** Any material that area found to be damaged or stored in any manner other than stated above will be automatically rejected, removed and replaced at the Contractor's expense.

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. **NOTE:** Do not install SBS modified bitumen roofing at temperatures below 50°F (10°C).
 - 2. When the outside temperature is forecast to fall below 50°F (10°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.
 - 3. Refer to the SBS modified bitumen 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.

D. Protection Requirements:

1. Torch Safety: Crew members handling torches shall be trained by an Authorized Certified Roofing Torch Applicator (CERTA) Trainer, be certified according to CERTA torch safety guidelines as published by the National Roofing Contractor's Association (NRCA), and follow torch safety practices as required by the contractor's insurance carrier. Designate one person on each crew to smoldering materials on all areas during roof construction activity, and for the minimum period required by CERTA guidelines after roofing material application has been suspended for the day.
2. Debris Removal: Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.
3. Site Condition: Complete, to the owner's satisfaction, all job site clean-up including building interior, exterior and landscaping where affected by the construction.

1.9 MANUFACTURER WARRANTY AND CONTRACTOR GUARANTEE

A. Provide a manufacturer 20-Year Total System, Non-Pro-Rated Warranty (including light weight insulating concrete, 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 SBS Modified Bitumen 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 MODIFIED BITUMEN ROOFING SYSTEM SUMMARY

- A. The complete roofing membrane system assembly shall consist of an SBS surfacing ply over an SBS base ply over SBA base sheet, meeting or exceeding the requirements listed in paragraphs 2.2A and 2.2B. Basis of design: Paradiene 20/30 by Siplast.
- B. The complete roofing system assembly shall resist uplift pressures calculated according to ASCE 7-05 for the field, perimeters and corners. The specified approval rating must incorporate a safety

factor of 2 over the maximum calculated uplift pressure in foot-pound units.

- C. The complete roofing system assembly shall achieve an FM or UL Class A fire rating.
- D. Acceptable roofing membrane manufacturers include those manufacturing both a modified bitumen base ply and surfacing ply meeting the requirements listed in Articles 2.2 and 2.3. Roofing membrane manufacturers offering a surfacing ply meeting the requirements listed in Articles 2.2 and 2.3, but not offering a base ply meeting the requirement are acceptable with the following restrictions:
 - 1. The submitted system shall include a base ply meeting the requirements of ASTM D 6163, Type I, Grade S.
 - 2. A letter, signed by authorized representatives of the modified bitumen surfacing ply and base ply manufacturers, indicating the completed system meets the requirements listed in Article 2.1., shall be submitted to the Owner for review.
 - 3. The completed system shall be capable of meeting the warranty and guarantee requirements outlined in Article 1.9. The total system warranty described shall be the responsibility of a single roofing supplier/manufacturer.

2.2 MODIFIED BITUMEN ROOFING MEMBRANE

- A. Base ply:
 - 1. Modified bitumen base sheet, fiberglass reinforced, minimum nominal 110 mil thickness; ASTM D 6163, Type I, Grade S.
- B. Surfacing ply:
 - 1. Modified bitumen granule-surfaced surfacing sheet, fiberglass reinforced, fire-rated, thickness (avg.) 135 mils, minimum nominal 110 mil thickness; ASTM D 6163, Type I, Grade G.
 - a. Color: Bright White, or as determined by Owner.
 - b. Initial Solar Reflectance: 0.65 or greater.

2.3 MODIFIED BITUMEN ROOFING FLASHING

- A. Base ply
 - 1. Modified bitumen base sheet, fiberglass reinforced, minimum nominal 98 mil thickness; ASTM D 6163, Type I, Grade S.
- B. Surfacing ply:
 - 1. Modified bitumen granule-surfaced surfacing sheet, fiberglass reinforced, fire-rated, minimum nominal 138 mil thickness; ASTM D 6298.
 - a. Certified by Energy Star Roof Products.

2.4 LIQUID-APPLIED FLASHING

- A. Base and top coats:
 - 1. Dual component, catalyzed base and top coat. Product approved by the roofing membrane manufacturer for use in the specified configuration.
- B. Reinforcing fabric:
 - 1. Non-woven polyester-reinforced fabric. Product approved by the roofing membrane manufacturer for use in the specified configuration.

2.5 ADHESIVES, CEMENTS AND PRIMERS

- A. Asphalt: ASTM D 4586, Type II.
- B. Flashing cement and roofing cement: Product compatible with SBS Modified bitumen roofing and approved by the roofing membrane manufacturer.
- C. Asphalt primer: A quick drying, low-VOC, water-based, high-tack primer specifically designed to promote adhesion of roofing and waterproofing sheets to approved substrates.

2.6 FASTENERS

- A. Roofing membrane and flashing fasteners: Unless otherwise indicated, types as required by the roofing membrane manufacturer.

2.7 MISCELLANEOUS MATERIALS

- A. Walkway pads: Product approved by the roofing manufacturer.
- B. Splashblocks: Concrete; size as necessary to accommodate existing condition.
- C. Conduit and pipe supports:
 - 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.
- D. 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.
 - 4. High temperature rated assembly.
- E. Roof hatch:
 - 1. Roof hatch, "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.
- F. 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 new roof hatch.
 - 2. Product approved by the roofing manufacturer for this application.

- G. Sealant: A moisture-curing, elastomeric sealant designed for roofing applications. The sealant shall be approved by the roof membrane manufacturer for use in conjunction with the roof membrane materials.
- H. Base Sheet Fasteners: Base sheet fasteners shall be approved by the manufacturer of the primary roofing products. Acceptable base sheet fasteners for specific substrate types are listed below:
 - 1. Zono-tite Fasteners
 - 2. 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.
- B. Sweep or vacuum all surfaces, removing all loose aggregate and foreign substances prior to commencement of roofing.

3.2 Substrate Preparation

- A. Lightweight Insulating Concrete Roof System: See Specification Section 03 52 00.
- B. Base Sheet Securement to Prepared Substrate: Lay the base sheet over entire area to be roofed, lapping sides 3 inches and ends 6 inches. Using the specified fasteners, fasten each sheet every 7 inches through laps and stagger fasten the remainder of the sheet in 3 rows on nominal 9 inch centers with fasteners in each row on 10 inch centers. Increase the fastening pattern by 70% at the perimeter of the roof and 160% at the corners.

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. Membrane Application: Apply roofing in accordance with roofing system manufacturer's instructions and the following requirements. Application of roofing membrane components shall immediately follow application of base sheet and/or insulation as a continuous operation.
- C. Aesthetic Considerations: Construction of an aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this project. Make necessary preparations, utilize recommended application techniques, apply the specified materials including granules, and exercise care in ensuring that the finished application is acceptable to the Owner.
- D. Bitumen Consistency: Cutting or alterations of bitumen, primer, and sealants will not be permitted.
- E. Field Membrane Application: Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets.
 - 1. Apply all layers of roofing perpendicular to the slope of the deck.

2. Fully bond the base ply to the prepared substrate, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the torch applicator. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger end laps a minimum of 3 feet.
 3. Fully bond the finish ply to the base ply, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the torch applicator. Stagger end laps of the finish ply a minimum 3 feet. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger side laps of the finish ply a minimum 12 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum 3 feet from end laps in the underlying base ply.
 4. Maximum sheet lengths and special fastening of the specified roof membrane system may be required at various slope increments where the roof deck slope exceeds 1/2 inch per foot. The manufacturer shall provide acceptable sheet lengths and the required fastening schedule for all roofing sheet applications to applicable roof slopes.
- F. Granule Embedment: Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot or the adhesive is soft, to ensure a monolithic surface color.
- G. Flashing Application: Cut the cant backing sheet into 12 inch widths and peel the release film from the back of the sheet. Set the sheet into place over the primed substrate extending 6 inches onto the field of the roof area and 6 inches up the vertical surface utilizing minimum 3 inch laps. Set the non-combustible cant into place dry prior to installation of the roof membrane base ply. Flash walls and curbs using the reinforcing sheet and the metal foil flashing membrane. After the base ply has been applied to the top of the cant, prime the base ply surfaces to receive the reinforcing sheet. Fully adhere the reinforcing sheet, utilizing minimum 3 inch side laps onto the primed base ply surface and up the primed wall or curb to the desired flashing height. After the final roofing ply has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces or by application of asphalt primer; allowing primer to dry thoroughly. Torch apply the metal foil-faced flashing into place using three foot widths (cut off the end of roll) always lapping the factory selvage edge. Stagger the laps of the metal foil flashing layer from lap seams in the reinforcing layer. Extend the flashing sheet a minimum of 4 inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall or curb to the desired flashing height. Exert pressure on the flashing sheet during application to ensure complete contact with the vertical/horizontal surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Check and seal all loose laps and edges. Nail the top edge of the flashing on 9 inch centers. (See manufacturer's schematic for visual interpretation).
- G. Catalyzed Acrylic Resin Flashing System: Install the liquid-applied primer and flashing system in accordance with the membrane system manufacturer's printed installer's guidelines and other applicable written recommendations as provided by the manufacturer.
- H. Water Cut-Off: At end of day's work, or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to the resumption of roofing.

3.5 ROOF SYSTEM INTERFACE WITH RELATED COMPONENTS

- A. Roof Moisture Relief Vents: The installation of the topside vents must be completed daily, immediately following the application of the base ply. Completely prime the metal flanges and allow to dry prior to installation. After the base ply has been applied, mark the venting designations. Cut

a 2 diameter core from the roof assembly down to the top surface of the embedded Insulperm expanded polystyrene panels. Fill the resulting void with fiberglass insulation. Set the vent flange in mastic, centered over the core cut. Strip-in the flange using the stripping-ply material, extending a minimum of 4 inches beyond the edge of the flange. Terminate the finish ply at the flange-throat juncture of the vent.

- B. Walktread: Cut the walktread into maximum 5 foot lengths and allow to relax until flat. Adhere the sheet using the specified plastic cement. Apply the specified cement in a 3/8 inch thickness to the back of the product in 5 inch by 5 inch spots in accordance with the pattern as supplied by the walktread manufacturer. Walk-in each sheet after application to ensure proper adhesion. Use a minimum spacing of 2 inches between sheets to allow for proper drainage.
- C. Sealant: Apply a smooth continuous bead of the specified sealant at the exposed finish ply edge transition to metal flashings incorporated into the roof system.

3.6 FIELD QUALITY CONTROL AND INSPECTIONS

- A. Site Condition: Leave all areas around job site free of debris, roofing materials, equipment and related items after completion of job.
- B. Notification Of Completion: Notify the manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.
- C. Final Inspection
 - 1. Post-Installation Meeting: Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters.
- D. Issuance Of The Guarantee: Complete all post installation procedures and meet the manufacturer's final endorsement for issuance of the specified guarantee.

END OF SECTION

SECTION 076113

STANDING SEAM SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements related to the installation of standing seam sheet metal roofing, flashings, and related accessories.

1.2 RELATED SECTIONS

- A. Section 013300 – Submittal Procedures
- B. Section 016000 – Product Requirements
- C. Section 079200 – Sealants
- 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.

1.3 ALTERNATES

- A. Provide an alternate price for the 20-Year Total System Warranty described in paragraph 1.9A.

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 Architectural Manufacturers Association
 - a. AAMA 621 – Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates
 - 2. American Society for Testing and Materials (ASTM)
 - a. ASTM A 792/A 792M – Standard Specification for Sheet Steel, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process
 - b. ASTM D 1970 – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - c. ASTM B 209 – Aluminum and Aluminum Alloy Sheet and Plate
 - d. ASTM F 1667 – Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
 - 3. National Roofing Contractors Association (NRCA)
 - a. NRCA Roofing and Waterproofing Manual, 5th Edition
 - 4. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).
 - a. SMACNA Architectural Sheet Metal Manual, 7th Edition
 - 5. Underwriters Laboratories, Inc. (UL)
 - a. UL 2218 - Impact Resistance of Prepared Roof Covering Materials
 - b. UL 580 - Tests for Uplift Resistance of Roof Assemblies

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.
- F. Refer to manufacturer minimum slope requirements for the standing seam sheet metal system selected for use. Do not install standing seam sheet metal roof systems on slopes less than 2-inches per foot.

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.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.
- E. Panels to be stored in a manner per manufacturer's instructions to prevent warping or damage of panels.

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. NOTE: Do not install standing seam sheet metal roofing at temperatures below 32°F (0°C).
 - 2. When the outside temperature is forecast to fall below 40°F (5°C), store unused materials in a heated location. Remove these materials only when ready for installation.
 - 3. Do not install self-adhering membrane when the temperature of the outside air, self-adhering membrane, or roof deck are below 40°F (5°C).
 - 4. Refer to the sheet metal roofing panel manufacturer and NRCA requirements and recommendations for additional cold weather application requirements 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 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:
 - a. Roofing inspection by a technical representative of the roofing membrane manufacturer 22-24 months after date of Final Acceptance.
 - b. Roofing manufacturer will provide unlimited repairs during warranty period with no cost limitation.
 - c. Temporary emergency repairs may be made by United States Postal Service without voiding any warranty provisions.
 - d. Attach copy of Record Document Roof Plan Drawings, Roof Detail Drawings, and Record Standing Seam Sheet Metal Roofing Specification Section to Warranty.
 - e. Provide wind rider for 135 wind speed.
- 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 STANDING SEAM SHEET METAL ROOFING SYSTEM SUMMARY

- A. Acceptable sheet metal roofing panel manufacturers who can meet the panel requirements per item 2.3:
 - 1. Merchant & Evans
 - 2. Englert, Inc.
 - 3. Pac-Clad; Peterson Aluminum Corporation.

- B. Selected products, when used within the specified roof assembly, must be capable of meeting the warranty requirements listed in Article 1.9.

2.2 UNDERLAYMENT

- A. Self-adhering membrane: Product approved for use in high-temperature conditions by the underlayment manufacturer and sheet metal panel 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.
 - 4. Thermal Stability: Stable after testing at 240 deg F.

2.3 SHEET METAL ROOF PANELS

- A. Product type: Factory-formed, prefinished galvanized steel, minimum 22-gauge architectural sheet metal roof panels; conforming to ASTM A 792/A 792M. Fabricated to allow for a minimum 1-3/4 inch high standing seams 16-inches o.c. maximum, or as recommended by the sheet metal roofing panel manufacturer for this application. Panels to be fabricated matching existing roof panels.
- B. Panel finish: Kynar 500 coated, with a factory-applied top side film thickness of .70 to .90 mil over a .25 to .30 mil prime coat to provide a total dry film thickness of .95 to 1.25 mil, to meet AAMA 621. Underside of panel shall be coated with a primer with a dry film thickness of .25 mil. Finish shall conform to all tests for adhesions, flexibility and longevity as specified by Kynar 500 supplier. Standard color as determined by the Owner.
- C. Impact Resistance: Conforming to the requirements of UL 2218.
- D. Wind uplift: Conforming to the requirements of UL 580, and capable of obtaining the required wind uplift rating for the project. See drawings for required wind uplift pressures and specification requirements.

2.4 CLIPS

- A. System clips: Concealed; size, type, and configuration as necessary to match roof system type. Product manufactured by or approved by the sheet metal panel manufacturer.

2.5 FASTENERS

- A. For fastening of sheet metal clips:
 - 1. Fastener type compatible with the substrate encountered, and approved for use in this application by the sheet metal panel manufacturer.
- B. For fastening of other sheet metal accessories:
 - 1. Fastener type compatible with the substrate encountered, and approved for use in this application by the sheet metal panel manufacturer. Provide neoprene washers where shown on drawings.

2.6 SHEET METAL AND FLASHING ACCESSORIES

- A. Rake edges, perimeter fascia, fascia extensions, hip and ridge flashings, expansion joints and counterflashing: Prefinished galvanized steel: Kynar 500 coating, 24-gauge; color as selected by Owner.
 - 1. Fabricate to the dimensions and configurations indicated on the drawings.
- B. Continuous cleats: Galvanized steel; G 90, hot-dipped zinc-coated sheet steel, 22-gauge, minimum.
- C. Gutters: Prefinished galvanized steel, 24-gauge, with Kynar 500 coating. Fabricate gutters to match dimensions indicated on the drawings; fabricate in 10-foot sections, with a 4-inch flange with a 1/2-inch hug at the inner edge of the gutter flange.
 - 1. Gutter spacers: Painted galvanized steel, 1-inch wide by 1/8-inch thick; seal and secure to gutter as shown on drawings. Paint color to match gutter.
- D. Scuppers:
 - 1. Scupper liners: Stainless steel, 22-gauge. Fabricate scupper flashings in accordance with the "SMACNA Architectural Sheet Metal Manual, 7th Edition", Figures 1-26, 1-28, 1-29 and 1-30. Provide a 4-inch flange with a 1/2-inch hug at the inner edge of the scupper flange. Solder all seams watertight.
 - 2. Conductor boxes and scupper closure plates: Stainless steel, 22-gauge. Solder all seams watertight. Fabricate these components in accordance with the drawings, and the requirements outlined in the "SMACNA Architectural Sheet Metal Manual, 7th Edition".
- E. Conductor box fascia covers: Prefinished galvanized steel, 24-gauge, with Kynar 500 coating; standard prefinished color as selected by the Owner.
- F. Downspouts, associated with gutters and scuppers: Prefinished galvanized steel, 24-gauge, with Kynar 500 coating; standard prefinished color as selected by Owner. Fabricate downspouts with a "Pittsburgh Lock" seam, and in accordance with the drawings and "SMACNA Architectural Sheet Metal Manual, 7th Edition", Figures 1-32B and 1-32F; size the hangers to match downspouts.
- G. Apron, wall and cricket flashing (related to rooftop curbs, chimneys and other square penetrations): Prefinished galvanized steel: Kynar 500 coating, 24-gauge; color as selected by Owner.
 - 1. Fabricate to the dimensions and configurations indicated on the drawings.
- H. Plumbing vent and tubular penetration flashings: Metal flashing with flanged sleeve with hood, prefabricated flashing with elastomeric collar, or other product type manufactured by, or approved by the sheet metal panel manufacturer.
 - 1. For sheet metal plumbing vent and tubular penetration flashings with flange and sleeve and hood:
 - a. Clamp: Stainless steel plumbers clamp, size as necessary to tightly secure hood.

2.7 MISCELLANEOUS MATERIALS

- A. Ventilation accessories, including ridge vents, soffit vents and other rooftop vents:
 - 1. Provide accessories manufactured by, or approved by, the sheet metal roofing manufacturer, if required.
- B. For use at sheet metal flashing strip-ins, and where indicated on drawings:
 - 1. Pressure-sensitive EPDM flashing material; non-reinforced, nominal 60-mil thickness, black color. Type acceptable to asphalt shingle roofing manufacturer for specific flashing conditions encountered. Minimum 5-inch width.

2. Primer: Type compatible with pressure-sensitive EPDM flashing and acceptable to the sheet metal panel manufacturer.
- C. Butyl tape: for use behind counterflashing flanges and other locations indicated where indicated on the drawings. Width and thickness as necessary to create a seal between the existing substrate and secured counterflashing.

2.8 SEALANT

- A. Refer to Section 079200.

PART 3 - EXECUTION

3.1 GENERAL

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

3.2 UNDELAYMENT INSTALLATION

- A. Install self-adhering membrane: Follow installation requirements of the underlayment manufacturer.

3.3 STANDING SEAM SHEET METAL ROOFING INSTALLATION

- A. Roof system general installation instructions:
 1. Except as may be modified by these specifications and drawings, install the specified sheet metal roof panel system, including underlayments, in accordance with the requirements and recommendations of the manufacturer, using the manufacturer's current printed instructions, the recommendations outlined in the NRCA "Roofing and Waterproofing Manual, 5th Edition", and the recommendations outlined in the "SMACNA Architectural Sheet Metal Manual, 7th Edition".
 2. Panels shall be installed plumb and true in a proper alignment and in relation to the existing structural framing. If necessary, use chalk lines as visible guides to ensure the proper alignment of the panels.
 3. Install sheet metal panel clips as required to secure the standing seam sheet metal panel system to the underlying substrate, and to allow movement of the roof system. Follow the requirements and recommendations of the sheet metal panel manufacturer. Install a minimum of two fasteners per clip.

3.4 SHEET METAL FLASHING INSTALLATION

- A. Rake edges perimeter fascias and fascia extensions:
 1. Continuous cleats: Provide continuous cleats where indicated on drawings. Secure the horizontal flange and vertical face of the continuous cleat with ring shank coated nails 12-inches o.c., max. Decrease fastener spacing to 6-inches o.c., max. within 10-feet of a building corner.
 2. Drip edges, fascia and fascia extensions: Place the drip edge, fascia or fascia extension. Hook the fascia to the underlying continuous cleat. Secure the flange with nails 3-inches o.c. in two staggered rows as indicated on the drawings.
- B. Hip and ridge flashings:
 1. Fabricate and install hip and ridge caps as indicated on the drawings. Follow the recommendations and requirements of the sheet metal panel manufacturer.

- C. Expansion joints:
1. Fabricate and install expansion joint flashings as per manufacturer's requirements. Metal panels should have thermal expansion capabilities and should only be pinned in one direction or per manufacturer's requirements to allow for this movement.
- D. Counterflashings: Install counterflashings at locations indicated on the drawings as follows:
1. Install continuous butyl tape behind vertical face of counterflashing.
 2. Secure counterflashings with fasteners spaced as indicated on drawings.
 3. Provide a continuous bead of sealant along the top edge of surface-mounted counterflashings to shed water and provide a watertight seal.
- E. Slip counterflashings: Install slip counterflashings at locations where existing sheet metal counterflashings cannot be lifted or removed, and at other locations indicated on the drawings as follows:
1. Install continuous butyl tape behind vertical face of counterflashing.
 2. Secure counterflashings with fasteners spaced as indicated on drawings.
- F. Gutters and downspouts:
1. Install the specified gutter spacers 24-inches o.c. Seal and secure the spacers to the gutter assembly as indicated on the drawings.
 2. Overlap individual gutter sections 1-1/2 inches. Seal overlap, and pop-rievet sections together with two rows of pop rivets. Space pop rivets 1/2-inch min., and 3/4-inches max. in each row. Completed gutter sections shall not exceed 50-feet in length.
 3. Secure the flange with nails 3-inches o.c. in two staggered rows.
 4. Gutter expansion joints: Provide gutter expansion joints at locations recommended by SMACNA; fabricated following the recommendations of SMACNA.
 5. Downspouts: Install downspouts at locations indicated on drawings. Secure downspouts in accordance with the "SMACNA Architectural Sheet Metal Manual, 7th Edition", Figure 1-35A, using fasteners appropriate for the substrate encountered.
 - a. Terminate the base of downspouts to match existing condition, unless indicated otherwise on the drawings.
- G. Scupper liners, closure plates, conductor boxes and downspouts:
1. Scupper liners: Install scupper liners at through-fascia, through-wall, and overflow scupper locations indicated on the drawings. Install scupper liners following the requirements and recommendations of SMACNA.
 2. Cover plates: At the exterior face of the scupper, install cover plates. Install scupper cover plates as indicated on the drawings, and following the requirements and recommendations of SMACNA.
 3. Conductor boxes: Where indicated on the drawings, install conductor boxes as indicated on the drawings, and following the requirements and recommendations of SMACNA.
 4. Downspouts: Install downspouts at conductor boxes. Secure downspouts in accordance with the "SMACNA Architectural Sheet Metal Manual, 7th Edition", Figure 1-35A, using fasteners appropriate for the substrate encountered.
 - a. Terminate the base of downspouts to match existing condition, unless indicated otherwise on the drawings.
 5. Install conductor box fascia covers as indicated on the drawings. Fully clip fascia covers to stainless steel conductor boxes, or secure to substrate with fasteners appropriate for the substrate encountered.
- H. Apron, side, and cricket flashings:
1. Install apron and backer/cricket flashings at roof curbs, chimneys, wall terminations, locations indicated on drawings, and at locations recommended by the sheet metal panel manufacturer.

- a. At penetrations greater than 24-inches, roof slopes greater than 6:12 (27 degrees), when a large volume on snow or ice could accumulate behind a roof penetration or when the average January temperature is 30°F (-1°C) or lower, install cricket flashings in lieu of backer flashings behind roof penetrations.
 - b. Where cricket widths exceed 18-inches, provide wood framing and plywood support beneath sheet metal cricket flashing.
 - c. Secure apron and backer/cricket flashings to the underlying substrate with fasteners appropriate to the substrate.
- I. Tubular penetration flashing: Flash round pipe penetrations with a manufacturer recommended pipe flashing boot and specified watertight hood.
- 1. Flash tubular penetration where indicated on drawings. Follow asphalt shingle manufacturer recommendations and requirements.
 - 2. Hood and drawband: Where a flanged sleeve sheet metal flashing is used, install a stainless steel hood over the fanged sleeve; solder all seams watertight. Secure a stainless steel drawband around the top of each hood to secure the hood to the penetration. Seal the top of the drawband and hood.

3.5 MISCELLANEOUS INSTALLATIONS/TREATMENTS

- A. Install ventilation accessories, including ridge vents, soffit vents and other rooftop vents at locations indicated on the drawings, or recommended by the sheet metal panel manufacturer following the printed instructions of the manufacturer.
- B. Sheet metal flashing strip-ins:
 - 1. Install specified strip-in where indicated on drawings.
- C. Butyl tape:
 - 1. Install specified butyl tape behind counterflashings where indicated on drawings.

END OF SECTION

SECTION 076203

SHEET METAL FOR MODIFIED BITUMEN ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements related to sheet metal fabrication and installation related to modified bitumen roofing.

1.2 RELATED SECTIONS

- A. Section 013300 – Submittal Procedures
- B. Section 016000 – Product Requirements
- C. Section 075200 – SBS Modified Bitumen Roofing
- D. Section 079200 – Sealants
- F. 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.

1.3 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 A 653/653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - b. ASTM D 41/D 41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
 - 2. American National Standard Institute (ANSI)
 - 3. Factory Mutual Global (FM)
 - 4. National Roofing Contractors Association (NRCA)
 - 5. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
 - a. SMACNA Architectural Sheet Metal Manual, 7th Edition
 - 6. Single Ply Roofing Industry (SPRI)
 - a. ANSI/SPRI/FM 4435/ES-1 – Wind Design for Edge Systems Used with Low Slope Roofing Systems

1.4 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.

1.5 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.

1.6 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.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.7 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. NOTE: Do not install sealants, adhesives or primers associated with sheet metal flashing at temperatures below 50°F (10°C).
 - 2. When the outside temperature is forecast to fall below 50°F (10°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.
 - 3. Refer to the SBS modified bitumen 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.

PART 2 – PRODUCTS

2.1 SHEET METAL ACCESSORIES

- A. Perimeter parapet cap metal flashing system: Parapet cap sheet metal flashing system consisting of a continuous inner clip and outer fascia piece, designed in accordance with the requirements of ANSI/SPRI/FM 4435/ES-1.
 - 1. Inner clip/retention system and continuous cleats associated with perimeter edge metal flashing systems: Galvanized steel, minimum 22-gauge, ASTM A 653/653M; G-90, maximum section length of 10-feet.
 - 2. Parapet cap associated with perimeter parapet cap metal flashing systems: Prefinished galvanized steel, 24-gauge, with Kynar 500 coating; maximum section lengths of 10-feet; standard prefinished color as selected by the Owner.
- B. Curb caps: Galvanized steel, 18-gauge, ASTM A 653/653M; G-90. Fabricate to match dimensions of curbed cap, and as indicated on the drawings. Fabricate top with a cross-break, providing four-way slope to the outer edges of the cap adequate to remove the potential for standing water at the top of cap.
- C. Gutters: Prefinished galvanized steel, 24-gauge, with Kynar 500 coating. Fabricate gutters to match dimensions indicated on the drawings; fabricate in 10-foot sections, with a 4-inch flange with a 1/2-inch hug at the inner edge of the gutter flange.
 - 1. Gutter spacers: Painted galvanized steel, 1-inch wide by 1/8-inch thick; seal and secure to gutter as shown on drawings. Paint color to match gutter.
- D. Through-wall and overflow scuppers:
 - 1. Scupper liners: Stainless steel, 22-gauge. Fabricate scupper flashings in accordance with the “SMACNA Architectural Sheet Metal Manual, 7th Edition”, Figures 1-26, 1-28, 1-29 and 1-30. Provide a 4-inch flange with a 1/2-inch hug at the inner edge of the scupper flange. Solder all seams watertight.
 - 2. Conductor boxes and scupper closure plates: Stainless steel, 22-gauge. Solder all seams watertight. Fabricate these components in accordance with the drawings, and the requirements outlined in the “SMACNA Architectural Sheet Metal Manual, 7th Edition”.
- E. Conductor box fascia covers: Prefinished galvanized steel, 24-gauge, with Kynar 500 coating; standard prefinished color as selected by the Owner.
- F. Downspouts, associated with gutters and scuppers: Prefinished galvanized steel, 24-gauge, with Kynar 500 coating; standard prefinished color as selected by Owner. Fabricate downspouts with a “Pittsburgh Lock” seam, and in accordance with the drawings and “SMACNA Architectural Sheet Metal Manual, 7th Edition”, Figures 1-32B and 1-32F; size the hangers to match downspouts.

2.2 ADHESIVES, CEMENTS AND PRIMERS

- A. Flashing cement and roofing cement: Product compatible with flashing sheet used and approved by the roofing membrane manufacturer for the situation encountered.
- B. Asphalt primer: ASTM D 41/ D 41M.

2.3 FASTENERS

- A. For securing sheet metal flashings: Fasteners indicated on the drawings, or appropriate and approved by the Owner for the substrate encountered, and compatible with the sheet metal type to be secured. Where fastener heads are exposed, provide neoprene gaskets/washers.
- B. For stainless steel: Stainless steel fasteners.
- D. For securing aluminum anchor bar: Fasteners appropriate for, and approved by the Owner and roofing manufacturer for the substrate encountered.

2.4 SEALANT

- A. Refer to Section 079200.

PART 3 - EXECUTION

3.1 SHEET METAL FLASHING INSTALLATION

- A. Parapet edge cap metal flashing system:
 1. For pre-fabricated parapet cap metal systems: Install in accordance with the metal system manufacturer to meet the requirements of ANSI/SPRI/FM 4435/ES-1. Provide a system matching the dimensions indicated on the drawings.
 2. For shop-fabricated parapet cap metal systems:
 - a. Fabricate inner clips/continuous cleats with a kick-up, creating a minimum 1/2-inch per foot slope toward the roof.
 - b. Secure the horizontal flange and vertical face of the inner clip/continuous cleat with ring shank coated nails 6-inches o.c., max.
 - c. Place the cap sections. At the outer face, hook the fascia to the underlying continuous cleat. At the inner face, secure the flange with #12 fasteners, fitted with neoprene gaskets/washers 18-inches o.c., max., and within 2-inches of each end.
 - d. Join adjacent parapet cap sections using a standing seam, with a 1" height. Where upturned standing seam ends meet, apply continuous sealant to the joint. Cut outer edges of upturned seams at a 45-degree angle. Fold ear over end, and crimp in place.
 - e. Where parapet caps terminate at walls, turn self-adhering membrane 1-inch, minimum, up wall. Turn coping cap piece 2-inches, minimum, up wall. Seal and secure as indicated on the drawings. Install regletted counterflashing over exposed end piece.
- B. Curb caps, area divider and expansion joint covers:
 1. Install caps, covers, and related continuous cleats and backer pieces, as detailed, at locations indicated on the drawings.
 2. Fabricate with seam type indicated on drawings to dimensions indicated on drawings. Provide a 3/4-inch hemmed drip edge.
 3. Fastening: Secure faces of curb caps, area divider covers, and expansion joint covers with specified fasteners appropriate for the substrate encountered, fitted with neoprene gaskets/washers, spaced 18-inches o.c. max., and within 2-inches of each end.
 4. Join adjacent area divider and expansion joint cover sections using a standing seam, with a 1" height. Where upturned standing seam ends meet, apply continuous sealant to the joint. Cut outer edges of upturned seams at a 45-degree angle. Fold ear over end, and crimp in place.
 5. Where area divider and expansion joint covers terminate at walls, turn self-adhering membrane 1-inch, minimum, up wall. Turn coping cap piece 2-inches, minimum, up wall. Seal and secure as indicated on the drawings. Install regletted counterflashing over exposed end piece.

- C. Fascia extensions:
1. Secure fascia extensions with ring shank coated nails 12-inches o.c., max., or fasteners appropriate for, and approved by the Owner for, the substrate condition encountered, 12-inches o.c. max.
- D. Reglet-mounted and slip counterflashings: Provide counterflashings, as detailed, at locations indicated on the drawings:
1. At locations indicated on the drawings, install butyl tape to the backside of counterflashing flanges at the flange interface with the substrate.
 2. Cut reglets into masonry walls to accommodate reglet-mounted counterflashing.
 3. Fabricate counterflashing to dimensions indicated on drawings. Fabricate the counterflashing with a 3/4-inch hemmed drip edge, and on surface mounted counterflashing, a 1/2-inch 45-degree angle sealant slot. Fabricate slip counterflashings to dimensions necessary to accommodate existing conditions, and as shown on drawings. Provide a minimum 4-inch face if conditions allow.
 4. Secure counterflashings with specified fasteners appropriate for substrate condition encountered, fitted with neoprene gaskets/washers. Space fasteners 12-inches o.c. max., and within 2-inches of each end.
- E. Gutters and downspouts:
1. Install the specified gutter spacers 24-inches o.c. Seal and secure the spacers to the gutter assembly as indicated on the drawings.
 2. Overlap individual gutter sections 1-1/2 inches. Seal overlap, and pop-rivet sections together with two rows of pop rivets. Space pop rivets 1/2-inch min., and 3/4-inches max. in each row. Completed gutter sections shall not exceed 50-feet in length.
 3. Prime both sides of gutter flange and set in a full bed of roofing cement. Secure the flange with nails 3-inches o.c. in two staggered rows.
 4. Gutter expansion joints: Provide gutter expansion joints at locations recommended by SMACNA; fabricated following the recommendations of SMACNA.
 5. Downspouts: Install downspouts at locations indicated on drawings. Secure downspouts in accordance with the "SMACNA Architectural Sheet Metal Manual, 7th Edition", Figure 1-35A, using fasteners appropriate for the substrate encountered.
 - a. Terminate the base of downspouts to match existing condition, unless indicated otherwise on the drawings.
- F. Scupper liners, closure plates, conductor boxes and downspouts:
1. Scupper liners: Install scupper liners at through-fascia, through-wall, and overflow scupper locations indicated on the drawings. Install scupper liners following the requirements and recommendations of SMACNA.
 2. Cover plates: At the exterior face of the scupper, install cover plates. Install scupper cover plates as indicated on the drawings, and following the requirements and recommendations of SMACNA.
 3. Conductor boxes: Where indicated on the drawings, install conductor boxes as indicated on the drawings, and following the requirements and recommendations of SMACNA.
 4. Downspouts: Install downspouts at conductor boxes. Secure downspouts in accordance with the "SMACNA Architectural Sheet Metal Manual, 7th Edition", Figure 1-35A, using fasteners appropriate for the substrate encountered.
 - a. Terminate the base of downspouts to match existing condition, unless indicated otherwise on the drawings.
 5. Install conductor box fascia covers as indicated on the drawings. Fully clip fascia covers to stainless steel conductor boxes, or secure to substrate with fasteners appropriate for the substrate encountered.
- G. Anchor bar: Fasten the upper edges of modified bitumen flashings with an anchor bar installed in accordance with the requirements of the roofing membrane manufacturer.

END OF SECTION

SECTION 077213

MANUFACTURED CURBS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Prefabricated structural metal roof curbs.
2. Prefabricated non-structural metal roof curbs.

B. Related Sections:

1. Section 051200 - Structural Steel Framing: Roof opening frames and headers.
2. Section 052100 - Steel Joist Framing: Joists supporting roof curbs.
3. Section 075200 - Modified Bituminous Membrane Roofing: Board insulation for roof curbs.
4. Section 238100 - Decentralized Unitary HVAC Equipment.

1.2 REFERENCES

A. American Welding Society (AWS):

1. AWS D1.1 - Structural Welding Code.

B. American Society of Testing and Materials (ASTM):

1. ASTM A653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process.
2. ASTM A463 - Specification for Steel Sheet, Cold Rolled, Aluminum Coated Type 1 and Type 2.
3. ASTM A792 - Specification for Steel Sheet, Fifty-Five Percent Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

C. Steel Structures Painting Council (SSPC):

1. SSPC-Paint 20 Type II - Zinc Rich Primers - Organic.

1.3 DEFINITIONS

A. Structural Roof Curbs: Manufactured roof curbs bearing on structural steel; designed for equipment dead load and roof dead and live loads.

B. Non-Structural Roof Curbs: Manufactured roof curbs bearing on top of metal deck; not used for support of equipment or roof.

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Procedures for submittals.

1. Product Data: Curb profile characteristics, dimensions, structural properties, and finishes.
2. Shop Drawings: Indicate configurations, dimensions, locations, construction, and installation details.
3. Assurance/Control Submittals:
 - a. Design Data: Calculations indicating curb structural design complying with design criteria specified in this Section and indicated on Drawings.

- b. Certificates: Submit manufacturer's certificate that Products meet or exceed specified requirements.
- c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

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.
 - 3. Welder: Qualify field welding operators in accordance with AWS Standard Qualification Procedures. Provide certification that field welders have satisfactorily passed AWS qualification tests within previous 12 months.
- B. Furnish and install prefabricated metal roof curbs designed by a professional engineer licensed in State where project is located. Meet or exceed Live Loads and Dead Loads as specified in this Section and as indicated on Drawings. Coordinate curb dimensions with shop drawings of equipment to be supported.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Ship curbs to Project Site palletized and banded.
- C. Clearly identify each curb. Stack curbs at site to prevent twisting, bending or permanent deformation.

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. Custom Curb, Incorporated, Chattanooga, TN (800) 251-3001.
 - 2. Kentuckiana Curb Company, Louisville, KY (800) 382-2872.
 - 3. Roof Products, Incorporated, Chattanooga, TN (800) 262-6669.
 - 4. The Pate Company, Broadview, IL (800) 243-3018.
 - 5. Thycurb Corporation, Addison, IL (800) 666-2872.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Sheet Steel: One of the following at Contractor's option:
 - 1. Galvanized Steel Sheet: ASTM A446 and ASTM A525, Grade A, G90 hot-dip zinc coating.
 - 2. Aluminum-Coated Steel Sheet: ASTM A463, Type 2, T2 100 aluminum coating.
 - 3. Aluminum Zinc Alloy-Coated Steel Sheet (GAVALUME): ASTM A792, AZ55 aluminum zinc alloy coating.
- B. Board Insulation: Specified in Section 072100.

- C. Wood Nailers: CCA Pressure Treated Lumber Type C, "Standard" grade lumber of any species.
- D. Zinc-Rich Primer: SSPC-Paint 20 Type II.

2.3 STRUCTURAL ROOF CURBS

- A. Coated steel sheet curb sections, corners fully mitered and welded; 2 inch by 2 inch (nominal dimension) pressure treated continuous wood nailers mechanically fastened at 12 inches on center to exterior face of curb. Shop prime welded connections with zinc-rich paint complying with SSPC-Paint 20.
- B. Profile:
 - 1. Bottom Flange Width: 2 inches.
 - 2. Web Height: Comply with local code requirements for minimum curb height, but in no case shall top of curb be less than 18 inches above the surface of the roof.
 - 3. Top Flange Width: 1 1/2 inches.
 - 4. Insulation: 1 1/2 inches thick, 3 lb high density fiberglass.
- C. Sheet Metal Gage:
 - 1. Heating, Ventilating and Air Conditioning Units: 14 gage.
 - 2. Other Structural Roof Curbs: 18 gage.
- D. Reinforce curb sections as required for design loads indicated on Drawings.
- E. Construct curbs to match slope of roof structure (verify roof slope with Drawings); provide level top surface for mounting of equipment.
- F. Welding: AWS D1.1.

2.4 NON-STRUCTURAL ROOF CURBS

- A. Coated steel sheet curb sections, corners fully mitered and welded; 2 inch by 2 inch (nominal dimension) pressure treated continuous wood nailers mechanically fastened at 12 inches on center to exterior face of curb. Shop prime welded connections with zinc-rich paint complying with SSPC-Paint 20.
- B. Profile:
 - 1. Bottom Flange Width: 2 inches.
 - 2. Web Height: Comply with local code requirements for minimum curb height, but in no case shall curb height be less than 18 inches as measured from top of roof insulation to top of curb.
 - 3. Top Flange Width: 1-1/2 inches.
 - 4. Insulation: 1 1/2 inches thick, 3 lb high density fiberglass.
- C. Sheet Metal Gage: 18 gage.

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 curbs in accordance with manufacturer's instructions and as indicated on Drawings.
- B. Structural Roof Curbs:
 - 1. Set units in place and secure base to roof structure by welding to top chord of structural member.
 - 2. Secure metal deck to perimeter of curb as indicated on Drawings.
- C. Non-Structural Roof Curbs: Set units in place and secure base to steel roof deck by self-tapping screw fasteners spaced at a maximum of 12 inches on center, staggered.

3.3 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate project requirements for custom adapting and connecting to roof curbs with manufacturers and suppliers of curb mounted items and equipment.
 - 2. Coordinate installation with roof membrane installation requirements specified under other Sections.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspect structural curb placement and attachment to building steel structural members.
- C. Inspect non-structural curb placement and attachment to steel roof deck.
- D. Verify curb heights, and that top of curb is level.

END OF SECTION

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SECTION 077233

ROOF HATCHES

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.

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. 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

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.
 - 7. Specified Technologies, Inc., Somerville, NJ (800) 992-1180.
- 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. Fire Rated Cable Pathway Devise for low voltage and optical fiber cabling.
1. EZ-Path Firestop System by Specified Technologies, Inc.
- J. 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

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 Last revised: 8/4/2020

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 076200 - 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 C920 - Specification for Elastomeric Joint Sealants.
 - 3. 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.
- C. Testing: Submit pull tests for each unique substrate. Provide primers as necessary to ensure adhesion per manufacturer's requirements.

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 Urethane, 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. Urethane 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 Urexpam, 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.
- C. Color to be submitted for review and approval to architect and owner.

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, water closets, 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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SECTION 081100

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel doors and frames.
 - 2. Steel door louvers.
 - 3. Steel frames for wood doors.
- 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 081400 - Wood Doors: Doors installed in steel frames.
 - 2. Section 087100 - Door Hardware: Hardware coordination.
 - 3. 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, 18 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: 16 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 security partition.

- E. 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. Louvers:
 - 1. Material and Finish: Roll formed 20 gauge steel with wipe coat of zinc.
 - 2. Blade: Inverted Y blade, sight proof.
- C. 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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SECTION 081400

WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flush wood doors.
 - 2. Wood wicket doors.
- 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 081100 - Metal Doors and Frames: Metal frames for wood doors.
 - 2. Section 087100 - Door Hardware: Hardware coordination.
 - 3. Section 099100 - Painting: Field painting of doors and frames.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM E 152 - Methods of Fire Tests of Door Assemblies.
- B. Architectural Woodwork Institute (AWI):
 - 1. AWI 1300 - Flush Hollow and Solid Core Doors.
- C. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA LD-3 - High Pressure Decorative Laminates.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 80 - Specification for Fire Doors and Windows.
- E. Window and Door Manufacturers Association (WDMA):
 - 1. WDMA I.S. 1A-97 - Architectural Wood Flush Doors.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, special blocking for hardware, and factory machining criteria. Indicate cutouts for door louvers.
 - 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. Special Warranty: Submit written special warranty forms completed in United States Postal Service name and registered with manufacturer as specified in this Section.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with AWI 1300 for Custom Grade.
- 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. Fire Door Construction: Conform to ASTM E 152.
 - 2. Installed Fire Rated Door Assembly: Conform to NFPA 80.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Package, deliver, and store doors in accordance with AWI Section 013300.

1.6 WARRANTY

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Special Warranty:
 - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
 - 2. Warranty Period: Full life of installation.

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. Algoma Hardwoods, Inc., Algoma, WI, (800) 678-8910.
 - 2. Eggers Industries, Neena, WI, (920) 722-6444.
 - 3. Mohawk Flush Doors, Inc., Northumberland, PA (717) 473-3557.
 - 4. Marshfield DoorSystems, Incorporated, Marshfield, WI (800) 869-3667.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Solid Core Wood Doors (Interior Use): AWI 1300.
 - 1. Thickness: Indicated on Drawings.
 - 2. Veneer: AWI 1300-S-9 SLC-5 ME.
 - 3. Face Veneer: AWI Custom quality rotary cut birch for paint finish.
 - 4. Core Construction:
 - a. Non Fire-Rated: SLC solid stave lumber.
 - b. Fire-Rated: Type FD 1-1/2 solid stave lumber.

5. Grade: AWI Custom.
- B. Solid Core Wicket Doors (Interior Use): AWI 1300.
 1. Thickness: Indicated on Drawings.
 2. Face Veneer: AWI Custom quality rotary cut birch for paint finish.
 3. Core Construction: SCL Structural Composite Lumber
 4. Grade: AWI Custom.
 - C. Louvers: Roll formed steel, inverted V blade, sight proof, primed for paint finish, size as indicated on Drawings.
 - D. Provide fire-rated labeled doors where indicated on Drawings.

2.3 FABRICATION

- A. Fabricate non fire-rated doors in accordance with AWI 1300.
- B. Fabricate fire-rated doors to AWI 1300 and to Underwriters Laboratories Incorporated requirements. Attach fire rating label to doors.
- C. Furnish and install lock blocks at lock edge, and top of door closer for hardware reinforcement.
- D. Vertical Exposed Edge of Stiles:
 1. Wicket Door: Paint same as door facing.
 2. Other Wood Doors: Of same species as veneer facing.
- E. Bond edge banding to cores.
- F. Factory machine door for door hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- G. Factory fit doors for frame opening dimensions identified on approved shop drawings.
- H. Doors may be provided pre-hung set in frames and ready for installation in rough openings. Metal door frames specified in Section 081100.

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 non fire-rated doors in accordance with AWI Quality Standards requirements.
- B. Install fire-rated doors in accordance with AWI Quality Standard and NFPA 80 requirements.
- C. Machine cut for hardware. Install door hardware specified in Section 087100.
- D. Install door louvers plumb and level.
- E. Field paint doors and door louvers as specified in Section 099100, color as indicated on Drawings.

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. Conform to AWI requirements for fit and clearance tolerances.
 - 2. Conform to AWI 1300 requirements for maximum diagonal warp.

3.4 FIELD QUALITY CONTROL

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

3.5 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth and balanced door movement.

3.6 PROTECTION

- A. Section 017300 - Execution: Protecting installed work.
- B. Protect finished Work from damage.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
Last revised: 09/22/2015

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SECTION 083113

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire-resistive rated access door and frame units.
 - 2. Non fire-resistive rated access door and frame units.
 - 3. Wall and ceiling locations.
- 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: Sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
 - 2. Shop Drawings: Indicate exact position of all access door units.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Actual locations of all access units.

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.

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. J.L. Industries, Bloomington, MN (612) 835-6850. (800) 554-6077.
 - 2. Karp, Maspeth, NY (800) 888-4212.
 - 3. Larsen's Manufacturing Company, Minneapolis, MN (800) 527-7367.

4. Milcor, Holland, OH (800) 861-6452.

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

2.2 ACCESS DOORS

A. Non Fire-Rated: 20 gauge recessed steel panel doors to accept field finish of drywall.

B. Fire-Rated Models: 14 gauge recessed steel panel doors to accept field finish of drywall.

2.3 FABRICATION

A. Fabricate frames and flanges of 16 gauge (0.058 inch) steel.

B. Fabricate door panels of 20 gauge (0.359 inch) single thickness steel sheet for non fire rated doors and 14 gauge (0.070 inch) single thickness steel sheet for fire rated doors.

C. Weld, fill, and grind joints to ensure flush and square unit.

D. Hardware:

1. Hinge: 175 degree stainless steel piano hinge concealed constant force closure spring type.[]

2. Lock: Screw driver slot for quarter turn cam lock unit.

2.4 FINISHES

A. Base Metal Protection: Prime coat units with alkyd 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.

1. Verify that rough openings for door and frame 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 units in accordance with manufacturer's published instructions where indicated on Drawings and required for access.

B. Install frames plumb and level in opening. Secure rigidly in place.

C. Position unit to provide convenient access to concealed work requiring access.

3.3 CONSTRUCTION

A. Interface with Other Work: Coordinate with mechanical, electrical, and other Work requiring access units.

END OF SECTION

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Last revised: 4/12/2011

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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

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SECTION 084113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum windows (fixed and operable)
 - 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 084229 - Automatic Entrances.
 - 2. Section 087100 - Door Hardware: Hardware for same, and coordination.
 - 3. 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.
3. Samples:
 - a. Aluminum Extrusions: Submit one sample 12 inches (300 mm) long in size illustrating finished aluminum surface.
 - b. Glazing: Submit one sample 12 x 12 inches (300 x 300 mm) in size illustrating finished aluminum glass units, and glazing materials.
4. 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. 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 COMPONENTS

- A. Framing System: Trifab 451T, by Kawneer, 2 x 4-1/2 inch (50mm x 113mm) nominal dimension, minimum wall thickness of 0.080 inches, extruded aluminum flush glazed framing system with thermal break.
 - 1. Operable window to include:
 - a. Limiters, allowing 4 inch (10 cm) maximum opening at leading edge of window.
 - b. Insect screen installed with security fasteners.
 - c. Locking devices installed with security fasteners. Awning type and hopper type windows require two locking devices, one on each side of the window.
- B. Column Covers: 0.040 inch aluminum, by Kawneer Company, Inc. Finish to match that of storefront system.
- C. Receptor Channel: Model No. 450-038 and 65-025, by Kawneer Company, Inc. Finish to match that of storefront system.

2.4 ENTRANCE DOORS

- 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.

2.5 GLASS AND GLAZING MATERIALS

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

2.6 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.

2.7 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: Match Existing Finishes..
- 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.

2.8 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 wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of mastic and secure.
- J. Install hardware using templates provided. Refer to Section 087100 for installation requirements.
- K. Install glass in accordance with Section 088000.
- L. Install perimeter sealant, backing materials, and installation criteria in accordance with Section 079200.
- M. Install automatic door operators and actuators in accordance with Section 084229.

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

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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 083500 - Folding Doors and Grilles: Lockable closures.
2. Section 083613 - Sectional Doors.
3. Section 084113 - Aluminum-Framed Entrances and Storefronts: Hardware for same, and coordination.
4. Section 084229 - Automatic Entrances.
5. 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 project acceptance and final inspection, the General Contractor shall provide a detailed written report shall be made to the Contracting Officer covering application and condition of the Finish Hardware. A report shall be made for each door indicating what was installed, that it matches what was indicated in the door hardware schedule, that it was installed correctly and that it functions properly. The report shall be submitted to the CO with a copy to the COR (the project manager). The A/E or the project manager may choose to verify the report by verifying every door or a random number of them.

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. | Best Access Systems, Indianapolis, IN | (800) 311-1705 |
| 4. | Corbin Russwin, Berlin, CT | (800) 543-3658 |
| 5. | Detex Corporation, New Brannfels, TX | (800) 729-3839 |
| 6. | Door Controls International, Dexter, MI | (800) 742-3634 |
| 7. | Folger Adam Company, Lemont, IL | (800) 260-9001 |
| 8. | Glynn-Johnson, Indianapolis, IN | (877) 613-8766 |
| 9. | Hager Companies, St. Louis, MO | (800) 255-3590 |
| 10. | Hiawatha, Inc., Bloomington, MN | (800) 777-1686 |
| 11. | H. B. Ives, Wallingford, CT | (888) 371-7331 |
| 12. | Knape & Vogt Manufacturing Co., Grand Rapids, MI | (800) 253-1561 |
| 13. | LCN Closers, Princeton, IL | (800) 526-2400 |
| 14. | McKinney Hinge, Scranton, PA | (800) 346-7707 |
| 15. | National Guard Products, Incorporated, Memphis, TN | (800) 647-7874 |
| 16. | Norton, Charlotte, NC | (800) 393-1097 |
| 17. | Pemko, Ventura, CA | (800) 824-3018 |
| 18. | Precision Hardware, Romulus, MI | (317) 849-2250 |
| 19. | Reese Enterprises, Incorporated, Rosemount, MN | (800) 328-0953 |
| 20. | Rixson-Firemark, Franklin Park, IL | (866) 474-9766 |
| 21. | Rockwood Manufacturing, Rockwood, PA | (800) 458-2424 |
| 22. | Sargent, New Haven, CT | (800) 727-5477 |
| 23. | Sargent & Greenleaf, Nicholasville, KY | (800) 826-7652 |
| 24. | Schlage, Colorado Springs, CO | (800) 847-1864 |
| 25. | Securitech Group Incorporated, Maspeth, NY | (800) 622-5625 |
| 26. | Simplex Access Controls | (800) 746-7539 |

27.	Soss, Pioneer, OH	(800) 922-6957
28.	Stanley, New Britain, CT	(877) 334-6791
29.	Trimco, Los Angeles, CA	(323) 262-4191
30.	Von Duprin, Indianapolis, IN	(317) 613-8302
31.	Wooster Products Incorporated, Wooster, OH	(800) 321-4936
32.	Yale, Charlotte, NC	(800) 438-1951
33.	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	TA2714	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	TA2714	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
b.	Hinge	MK80		626	McKinney
4. Type H-4: Medium weight door, average frequency, steel. (Continuous Piano hinge)

a.	Hinge	STS314 1/4		626	Stanley
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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	TA2714	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. D111 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

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. Sargent.
- 6. Securitech 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
- 4. Type E-4EM: Electromechanical Access Control Device (For use at CSFs 6,501 to 60,000 SF, including Carrier Annexes.)
 - a. Centurion 8155-DX2 Series Securitech
 - b. Trilogy DL 3500 SERIES 628 Alarm Lock
 - c. Yale Nextouch NTB 630 Series 626 Yale
- 5. Type E-5: Time Lock Exit Device system (For entrance doors)
 - a. USPSTL-FA-200 or approved equal (outswing) 628 Securitech
(includes exit device, power supply, timer, power transfer)
 - b. USPSTL-FA-300 or approved equal (inswing) 628 Securitech
(includes exit device, power supply, timer, power transformer)

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 |
| | c. | 409 | 630 Rockwood |

2. Type S-2: Floor Stop - Install with appropriate anchors for substrate encountered.
 - a. 1201 626 Trimco
 - b. FS444 626 Ives
 - c. 471 626 Rockwood

3. Type S-3: Floor Stop - Install with appropriate anchors for substrate encountered.
 - a. W1211 630 Trimco
 - b. FS436 630 Ives
 - c. 440/442 626 Rockwood

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

271	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
 - b. 303AS Pemko
 - c. 160VS NGP

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. 379 APK | 628 | Pemko |
| 2. | Type M-2: Dead Lock, (ANSI E0191) - w/ No exposed trim on lobby side. | | |
| | a. D200 series 630 | | Yale |
| 3. | Type M-3: Security Viewer. Mounted/installed, centered at 5'-0" AFF. | | |
| | a. 1756 | 630 | Hager |
| | b. 627 | 626 | Rockwood |
| 4. | Type M-4: Astragal | | |
| | a. 184A | 628 | Reese |
| | b. 359A | 628 | Pemko |
| 5. | Type M-5: Silencers | | |
| | a. 1229A | Gray | Trimco |
| | b. SR64 | | Ives |
| | c. 608 | Gray | Rockwood |
| 6. | Type M-6: Flushbolts | | |
| | a. 3917 | 626 | Trimco |
| | b. 555 | 626 | Rockwood |
| 7. | Type M-7: Astragal | | |
| | a. 276C | 628 | Reese |
| | b. 355CS | 628 | Pemko |
| 8. | Type M-8: Kick Plates | | |
| | a. K0050 8 x 34 | 630 | Trimco |
| | b. KP1050 8 x 34 | 630 | Rockwood |
| 9. | Type M-9: Armor Plate; 40" H x 46" W (both sides of door) | 630 | |
| | a. Trimco or Rockwood | | |
| 10. | Type M-10: Emergency Exit Alarm w/ Contacts: | | |
| | a. SDA103 | | Securitech Group Incorporated |
| | 1) Provide concealed door contacts and a separate alarm unit with keyed reset switch. Alarm unit will have local 110 db (min) audible alarm and a 75 cd visual alarm (strobe light) and shall be fed from an independent 120 Volt power supply equipped with backup battery to 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) Exit alarm shall be equipped with a keyed reset station mounted top at 60 inches AFF. | | |
| | 3) 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". | | |
| | 4) In facilities equipped with an Enterprise Physical Access Control System (ePACS), the exit door alarm is to be rated at 12 VDC and provided as part of the ePACS system. | | |
| 11. | Type M-11: Reinforcing Pivot Hinges | | |
| | a. 253 | 652 | Hager |
| | b. B1923 | 652 | McKinney |
| 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 | | |

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

Carrier Admin entrance (120)
 CSF Medium Box Lobby exit (301A)
 BMEU Lobby Exterior Entry (701B)
 Carrier Admin: Mail Pick-up to exterior (CA101A)
 Each set to have:

- 3 ea. Hinges – by Storefront Manufacturer
- 1 ea. Exit Device – by Storefront Manufacturer
- 1 ea. (B-1) Rim Cylinder
- 1 ea. (B-3) Cylinder Guard
- 1 ea. Threshold – by Storefront Manufacturer

- 1 ea. Closer – by Storefront Manufacturer
- 1 ea. Weatherstripping – by Storefront Manufacturer
- 1 ea. Pulls – by Storefront Manufacturer

SET 1 A

CSF Medium Time Lock Lobby Exterior Entry
 BMEU Lobby Time Lock Lobby Exterior Entry
 Each set to have:

- 3 ea. Hinges – by Storefront Manufacturer
- 1 ea. (E-5) Time Lock Exit Device System
- 1 ea. (B-1) Rim Cylinder
- 1 ea. (B-3) Cylinder Guard
- 1 ea. Threshold – by Storefront Manufacturer
- 1 ea. Closer – by Storefront Manufacturer
- 1 ea. Weatherstripping – by Storefront Manufacturer
- 1 ea. Pull – by Storefront Manufacturer

SET 2

Not Used

SET 3

Automatic Storefront Doors (201A and B) (202A and B):
 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

Admin Corridor to Lobby (100B)
 Workroom to Self Service (301B)
 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 4A

Admin Corridor to Lobby (100B)

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
- 1 ea. Request to Exit Motion Sensor – provided as part of the ePACS system
- 1 ea. Electric Strike – provided as part of the ePACS system
- 2 ea. Card Reader – provided as part of the ePACS system
- 1 ea. Door Contact – provided as part of the ePACS system

SET 5

Toilet - single occupancy (111)

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

Admin to Full Service (100C)

Admin to Workroom (100D)

Carrier Vestibule Personnel to Workroom (401F)

Lunchroom (601)

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 6A

Admin to Workroom (100D)

Each set to have:

- 3 ea. (H-2) Hinges
- 1 ea. (L-1) Hotel Lock (Similar to F15)
- 1 ea. Door Stop
- 1 ea. Closer
- 1 ea. Electric Strike – provided as part of the ePACS system
- 1 ea. Card Reader – provided as part of the ePACS system

- 1 ea. Door Contact – provided as part of the ePACS system
- 1 ea. Request to Exit Motion Sensor – provided as part of the ePACS system
- 1 ea. Door Release Push Button – provided as part of the ePACS system

SET 7

Not Used

SET 8

BMEU to Scale room and to Workroom (701A)
 BMEU Customer Service to Workroom (702)
 Each set to have:

- 3 ea. (H-2) Hinges
- 1 ea. (L-3) Entrance Lock (ANSI F20)
- 1 ea. (T-2) Threshold
- 1 ea. (M-13) Door Bottom Shoe
- 1 ea. Door Stop (interior doors only)
- 1 ea. Closer

SET 8A

Mail Vestibule Personnel to Exterior
 Buildings and Grounds Room to Exterior
 Enclosed Platform Carrier Vestibule Personnel to Exterior
 Each to Have:

- 3 ea. (H-2) Hinges
- 1 ea. (E-1) Exit Device
- 1 ea. (T-2) Threshold
- 1 ea. (M-13) Door Bottom Shoe
- 1 ea. Closer
- 1 ea. Electric Strike – provided as part of the ePACS system
- 2 ea. Card Reader – provided as part of the ePACS system
- 1 ea. Door Contact – provided as part of the ePACS system

SET 9

Carrier Vestibule Personnel to Exterior (411C)
 Enclosed Platform: Platform to Dock Stairs (501C)
 Mail Vestibule Personnel to Exterior (502C) and to Workroom (502F)
 Each set to have:

- 3 ea. (H-2) Hinges
- (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 (411A, B, D, E) (502 A, B, D, E)
All hardware furnished by Impact Door supplier as specified in Section 083800.

SET 11

Stamped Envelope Room (206)
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

Electrical Room to Workroom (113) (603A)
Equipment Room to Workroom (114) (604)
Storage Room to Admin Corridor (107)
Folding Grille Closet Access Door (205C)
Storage Room to Workroom (207) (614)
Custodial Supplies (610)
Postal Equipment Room - single door (611)
Postal Records (612)
Postal Supplies (613)
Recycling Room to Workroom (615B)
BMEU Storage to Workroom (705)
Each set to have:

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

SET 12A

Main Mechanical Room to Workroom
Main Electrical Room to Workroom
Equipment Room to Workroom
Storage with ePACS controller
Each set to have:

- 3 ea. (H-1) Hinges
- 1 ea. (L-4) Storeroom Lock (F86)
- 1 ea. Door Stop
- 1 ea. Closer
- 1 ea. Electric Strike – provided as part of the ePACS system
- 1 ea. Card Reader – provided as part of the ePACS system
- 1 ea. Request to Exit Motion Sensor - provided as part of the ePACS system
- 1 ea. Door Contact – provided as part of the ePACS system

SET 13

Full Service to Workroom
Postmaster's Office to Admin Corridor (101)
Carrier Admin: Admin Area to Workroom (103A, B)
CS Manager's Office to Admin Corridor (104)
Conference Room to Admin Corridor (106)
Janitor's Closet to Workroom (112) (602)
Carrier Admin: Meeting Room (121)
Carrier Admin: Closet (122) (123)
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 (204B and C) (205B)
Each set to have:

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

SET 15

Folding Closure (204A) (205A)
Each set to have:

2 ea. (B-2) Rim Cylinder

All other hardware furnished by Folding Closure Door Supplier as specified in Section 083500.

Note: Provide cylinder at each end of each 8-foot-long folding closure section, and any intermediate openings.

SET 16

Not Used

SET 17

Workroom to Self-Service or Box Lobby
Wicket Door (202C) (CA101)
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 (501D, E, F, G, H, I): All hardware furnished by Sectional Overhead Door supplier as specified in Section 083613.

SET 19

CIO to Workroom
CIO to Workroom (CIO1A)
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 (CIO1)

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. Closer
- 1 ea. Rain Drip

SET 21

Electrical to Exterior (603B)
Recycling to Exterior (615A)
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
- 1 ea. Rain Drip

SET 21A

Electrical 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
- 1 ea. Rain Drip
- 1 ea. Electrical Strike – provided as part of the ePACS system
- 1 ea. Card Reader – provided as part of the ePACS system
- 1 ea. Request to Exit Motion Sensor – provided as part of the ePACS system
- 1 ea. Door Contact – provided as part of the ePACS system

SET 22

Admin to Exterior Exit (100A)
Each set to have:

- 3 ea. (H-2) Hinges
- 1 ea. (E-1) Exit Device
- 1 ea. (T-3) Threshold
- 1 ea. (W-1) Door Gaskets
- 1 ea. Closer
- 1 ea. Rain Drip
- 1 ea. (M-10) Alarm System

SET 22A

Admin to Exterior Exit
Workroom 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
- 1 set (W-1) Door Gaskets
- 1 ea. Rain Drip
- 2 ea. Card Reader – provided as part of the ePACS system
- 1 ea. Door Contact – provided as part of the ePACS system
- 1 ea. Door alarm – provided as part of the ePACS system.

SET 23

Workroom to Exterior Exit (401A, B, C)

Each set to have:

3 ea. (H-2) Hinges
1 ea. (E-1) Exit Device
1 ea. (T-3) Threshold
1 set (W-1) Door Gaskets
1 ea. (M-10) Alarm System
1 ea. Closer
1 ea. Rain Drip

SET 24

Enclosed Platform to Exterior (double-doors) (501A and B)

Building and Grounds Room (double-doors) (609)

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
1 ea. (S-1) Door Stop (Doors 501A and B only)
1 ea. Closer

SET 24A

Enclosed Platform to Exterior (double-doors)

Building and Grounds Room (double-doors)

Each set to have:

6 ea. (H-2) Hinges
1 ea. (T-3) Threshold
1 ea. (W-1) Door Gaskets
1 ea. (M-7) Astragal
1 ea. (S-1) Door Stop
2 ea. Closers
1 ea. Rain Drip
1 ea. Request to Exit Motion Sensor – provided as part of the ePACS system
2 ea. Magnetic Locks – provided as part of the ePACS system
2 ea. Door Contacts – provided as part of the ePACS system
1 ea. Door Release Push Button – provided as part of the ePACS system
1 ea. Card Reader – provided as part of the ePACS system

SET 25

Postal Equipment to Workroom (double-doors) (611)

Each set to have:

6 ea. (H-1) Hinges
1 ea. (L-4) Storeroom Lock (F86)
1 ea. (M-6) Flushbolts
1 ea. (M-7) Astragal
2 ea. Door Stop
1 ea. Closer

SET 25A

Postal Equipment to Workroom (double-doors)

Each set to have:

6 ea. (H-2) Hinges
1 ea. (M-7) Astragal
1 ea. (S-1) Door Stop
2 ea. Closers
1 ea. Request to Exit Motion Sensor – provided as part of the ePACS system
2 ea. Magnetic Locks – provided as part of the ePACS system
2 ea. Door Contacts – provided as part of the ePACS system
1 ea. Door Release Push Button – provided as part of the ePACS system
1 ea. Card Reader – provided as part of the ePACS system

SET 26

BMEU Lobby to Mail Platform (701C)

Each set to have:

3 ea. (H-2) Hinges
1 ea. (L-3) Entrance Lock (F20)
1 ea. (T-3) Threshold
1 set (W-1) Door Gaskets
1 ea. (M-13) Door Bottom Shoe
1 ea. Closer

SET 27

BMEU Scale Room to Staging Area in Workroom (703)

Each set to have:

3 ea. (H-5) Hinges (5-inch)
1 ea. (L-4) Storeroom Lock (F86)
1 ea. Door Stop
1 ea. Closer

SET 28

BMEU Scale Room to Mail Platform (double-doors) (704)

Each set to have:

6 ea.	(H-2)	Hinges
1 ea.	(L-1)	Hotel Lock
1 ea.	(T-3)	Threshold
1 set	(W-1)	Door Gaskets
1 ea.	(M-6)	Flushbolts
1 ea.	(M-7)	Astragal
2 ea.	(M-13)	Door Bottom Shoe
1 ea.		Closer

SET 29

Full Service to Workroom

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

END OF SECTION

USPS CSF Specifications issued: 10/01/2021
Last revised: 8/9/2021

SECTION 089000
LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fixed aluminum wall louvers.
 - 2. Fixed steel wall louvers.
 - 3. Insect screening.

- 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 089200 - Joint Sealants: Perimeter sealant at louver frames.
 - 2. Section 055000 - Metal Fabrications: Security grille at louvers.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
 - 2. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
 - 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.

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.

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. The Arolite Company, Marietta, OH (740) 373-7676..
 - 2. Airoline.
 - 3. Construction Specialties, Incorporated, Cranford, NJ (908) 272-5200.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 ALUMINUM LOUVERS

- A. Type: 4 inch deep with blades on 45 degree slope. ASTM B221, extruded shape, prefinished with shop applied flouropolymer polyvinylidene fluoride finish. Coordinate color finish with Architect.
- B. Fabrication: Material thickness of 0.081 inch minimum, integral and lateral rain water stops positioned on blade.
- C. Frame: Channel shape, mechanically fastened corner joints, material thickness of 0.081 inch minimum.

2.3 STEEL LOUVERS

- A. Type: 6 inch deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake.
- B. Fabrication: 16 gage thick galvanized steel or welded assembly, with factory baked enamel finish as scheduled on Drawings. Coordinate color finish with Architect.
- C. Mounting: Furnish with exterior flat flange for installation.

2.4 INSECT SCREENS

- A. 18 x 16 size aluminum mesh, set in aluminum frame.
- B. Install screen mesh in shaped frame, reinforce corner construction, shop install to louver with fasteners.

2.5 ACCESSORIES

- A. Fasteners and Anchors: Stainless steel type.
- B. Flashings: Of same material as louver frame. Extruded to required shape, single length in one piece per location.
- C. Sealants: Specified in 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 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's published instructions.
- B. Install louvers level and plumb.
- C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- D. Secure louvers in opening framing with concealed fasteners.
- E. Install perimeter sealant in accordance with Section 079200.
- F. Install security grille in accordance with Section 055000.

END OF SECTION

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Last revised: 5/24/2011

SECTION 092216

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior non load-bearing steel stud framing and furring 20 gage and lighter.
 - 2. Metal furring.
 - 3. Wood blocking.
- 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 A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM C 645 - Specification for Non-Structural Steel Framing Members.
 - 3. ASTM C 754 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
 - 4. ASTM C 954 - Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 inches to 0.112 inches in Thickness.
- B. United States Department of Commerce Product Standard (PS):
 - 1. PS 20 - American Softwood Lumber Standard.
- C. Southern Pine Inspection Bureau (SPIB):
 - 1. Grading Rules.
- D. Western Wood Products Association (WWPA):
 - 1. Western Lumber Grading Rules.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Framing Members: Standard materials and finish, product criteria, sizes and lengths, load charts, and limitations.
 - b. Fasteners and Anchorage Devices: Standard materials and finish, sizes, and load charts.
 - 2. Shop Drawings:
 - a. Indicate prefabricated work, component details, framing layout, framed openings, anchorage to structure, type and location of fasteners, and accessories or items required of other related work.
 - b. Indicate methods of securing studs and framing to tracks, splicing, suspension, and for blocking and reinforcement to framing connections.

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. Protect metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- C. Store and protect metal framing with weatherproof covering, and ventilate to avoid condensation.
- D. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Manufacturers: Subject to compliance with project requirements, alternate manufacturers offering specified items which may be incorporated in the Work include the following:
 - a. Dale/Incor, Dearborn, MI (800) 882-7883.
 - b. National Gypsum Company, Gold Bond Building Products, Charlotte, NC. (800) 628-4662.
 - c. Clark Steel Framing Systems, Middletown, OH (800) 543-7140.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Interior Nonload-Bearing Partition Framing: ASTM A 653 and ASTM C 645; galvanized sheet steel, channel shaped, punched for utility access, depth as indicated on Drawings, gauges as indicated below unless indicated on Drawings.
 1. 2-1/2 Inch Studs - Unbraced Length 13 Feet or Less: Minimum 20 gauge.
 2. 3-5/8 Inch Studs - Unbraced Length 17 Feet or Less: Minimum 20 gauge.
 3. 6 Inch Studs - Unbraced Length 25 Feet or Less: Minimum 20 gauge.
 4. Limiting heights are for 5/8 inch thick gypsum board panels on each side of partition and 5 pounds per square foot uniform load perpendicular to partition.
 5. For heights greater than listed above provide framing in conformance with ASTM C754 Limiting Height Tables, except no framing shall be less than 20 gauge.
- B. Partition Floor Tracks and Runners: ASTM A 653 and ASTM C 645; galvanized sheet steel, channel shaped, same depth and gauge as studs, tight fit; solid web.
- C. Wall Furring and Partition Bracing: ASTM A 653 and ASTM C 645; galvanized sheet steel.
 1. Studs: 2-1/2 inch deep, 20 gage.
 2. Studs: 3-5/8 inch deep, 20 gauge.
 3. Hat-Shaped Channels: 7/8 inch deep x 1-1/2 inch wide, 20 gauge.
 4. Cold-Rolled Channels: 3/4 x 1/2 inch and 1-1/2 x 17/32 inch, 16 gauge.

5. Z Furring Channel: 1-1/2 inch deep, 20 gauge.
 6. Clip Angles: 2 inches x 2 inches x 16 gauge x 1/4 inch less than stud width.
- D. Partition Framing Fasteners: Corrosion-resistant self-drilling self-tapping steel screws.
1. 20 Gauge and Heavier Framing: ASTM C 954; 5/8 inch Type S-12 low-profile head.
- E. Partition Floor Track Anchorage Device: Low velocity powder-actuated drive pins; minimum 0.140 inch shank diameter x 1-1/2 inch shank length with 7/8 inch diameter washer.
1. DX 451 System using X-DNI Pins with R23 washers, by Hilti, Tulsa, OK. (800) 879-8000.
 2. Ramset/Red Head System using 4700SD Pins, by ITW Ramset/Redhead, Wood Dale, IL (708) 350-1858.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- F. Wall Furring to Concrete or Masonry Wall Fasteners: Hex head sleeve anchors; minimum 1/4 inch diameter x minimum 1-1/8 inch embedment.
1. Slv Anch HX 5/16X2-1/2, by Hilti, Tulsa, OK (800) 879-8000.
 2. Dynabolt HN-1413, by ITW Ramset/Redhead, Wood Dale, IL (708) 350-1558.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- G. Furring Channel to Masonry or Concrete Surface Fasteners: Low velocity powder-actuated drive pins of size to suit application.
- H. Flat Straps and Plates: ASTM A 653; galvanized sheet steel, gage, shape, and configuration as indicated on Drawings.
- I. Wood Blocking Attached to Partition Framing:
1. PS 20; S4S. Maximum of 19 percent moisture content, surfaced dry, No. 2 any species graded under WWPA grading rules or No. 3 Grade Southern Pine graded under SPIB grading rules.
 2. Full sized, sound lumber without splits, warps, wane, or loose knots.
- J. Security Mesh: 1/2 inch #16 galvanized carbon steel flattened expanded metal sheets or 22ga. sheet metal.

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 building framing components are ready to receive Work.
 2. Verify that rough-in utilities are in-place and located where required.
- 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 studs and fasteners in accordance with manufacturer's published instructions and ASTM C 754.
- B. Metal Stud Spacing: 16 inches on center, maximum.
- C. Align stud web openings horizontally.
- D. Splice studs with minimum 8 inch nested lap, fasten each stud flange with minimum two screws.
- E. Construct corners using minimum three studs.
- F. Double stud at wall openings and door jambs, maximum 2 inches from each side of openings.
- G. Place studs as indicated on Drawings, minimum 2 inches from abutting walls.
- H. Install framing between studs for attachment of mechanical and electrical items.
- I. Install intermediate studs above and below openings to match wall stud spacing.
- J. Fasten studs adjacent to door frames, partition intersections, and corners to top and bottom runner flanges in double-stud fashion with metal lock fastener tools.
 - 1. Securely fasten studs to jamb and head anchor clips of door and borrowed-light frames.
 - 2. Place horizontally a cut-to-length section of runner with web-flange bend at each end, fasten with minimum one screw per flange.
 - 3. Position a cut-to-length stud (extending to top runner) at vertical panel joints over door frame header.
- K. Blocking: Screw attach wood blocking between studs for support of surface mounted items.
 - 1. Plumbing fixtures.
 - 2. Toilet partitions.
 - 3. Wall cabinets.
 - 4. Toilet accessories
 - 5. Hardware.
 - 6. Architectural woodwork.
 - 7. Grab bars.
 - 8. Handrails and railings.
 - 9. Signage.
 - 10. Other items requiring backing for attachment.
- L. Install batt insulation in walls, where indicated on Drawings, as specified in Section 072100.
- M. Framing Fastening: Fasten framing in accordance with manufacturer's published instructions and schedule below, unless indicated otherwise on Drawings.

CONNECTION

FASTENER

Floor and Top Track to Concrete	1 - Pin at 32 inches on center.
Partition Stud to Floor Track	1 - Screw each side at each flange.
Plates and Straps to Studs	2 - Screws.
Stud Web to Stud Web	2 - Screws.
Runner to Header	1 - Screw at 16 inches on center, max. 6 inches from each end.

3.3 INSTALLATION - SECURITY MESH

- A. Attach security mesh to metal framing, where indicated on Drawings, with modified truss head screws and washers spaced at 12 inches on center.

3.4 INSTALLATION - FURRING

- A. Furring Channels:
 - 1. Attach vertically spaced at maximum 16 inches on center, to masonry and concrete surfaces with hammer set or powder driven fasteners staggered 24 inches on center on opposite flanges.
 - 2. Nest channels 8 inches at splices and anchor with 2 fasteners in each wing.
- B. Wall Furring:
 - 1. Secure top and bottom runners to structure.
 - 2. Space metal studs at maximum 16 inches on center.

3.5 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate erection of studs at openings and with hollow metal door frames.
 - 2. Coordinate installation of anchors, supports, and blocking for mechanical, electrical, and building accessory items installed within framing.
- B. Site Tolerances:
 - 1. Maximum Variation From True Position: 3 mm in 3 m.
 - 2. Maximum Variation From Plumb: 3 mm in 3 m.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect metal framing erection, placement, spacing, fasteners, and connections to building.
- C. Inspect security mesh installation, fastener type, spacing, and attachment to metal framing.

END OF SECTION

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SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Gypsum board and joint treatment.
 - 2. Gypsum sheathing.
 - 3. Cementitious backer board.
 - 4. Sound attenuation blankets.
 - 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 092216 - Non-Structural Metal Framing: Metal framing for attachment of gypsum board.
 - 3. 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.

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

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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 210000 - Fire Suppression: Sprinkler heads in ceiling system.
 - 2. Section 233713 - Diffusers Registers and Grilles: Air diffusion devices in ceiling system.
 - 3. 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 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. Products:
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. Recycled content: Minimum 20%
 3. Accessories: Stabilizer bars, clips, and splices.
 4. Grid Finish: White.
 5. Support System: Hot or cold rolled steel channels; galvanized hanger wire, minimum 12 gage.
 6. Edge Moldings: Metal channel with exposed flange to match suspension system.

2.3 ACOUSTICAL PANELS

- A. Acoustical Panels (Standard Application):
1. Products:
 - a. Armstrong: Fine Fissured #1729.
 - b. Certainteed : HHF – 197
 - c. USG: Auratone, Radar #2310.
 2. Description:
 - a. Size: 24 x 48 x 5/8 inches.
 - b. Texture: Fine Fissured
 - c. Edge: Square lay-in.
 - d. Weight: minimum 0.60 pounds per square foot.
 - e. Surface Finish: Factory-applied vinyl latex paint, perforated, and scored.
 - f. Color: White.
 - g. Recycled Content: Minimum 25%
- B. Acoustical Panels (Telecommunications Room (TR))
1. Products:
 - a. Armstrong: Clean Room VL.
 - b. CertainTeed: Envirogard
 - c. USG: Clean Room Acoustical Panels.
 2. Description:
 - a. Size: 24 x 48 inches.
 - b. Thickness: 5/8 inches.
 - c. Edge: Square
 - d. Surface Finish: Vinyl faced unperforated, impervious.
 - e. Recycled Content: minimum 50%.
 - f. Clean Room Class 5 (Class 100).

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 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.

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

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SECTION 096500
RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient tile flooring.
 - 2. 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.
 - 3. Section 123504 - Postal Casework.

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. Mannington Guide for Installation/Maintenance 151209.
 - 3. Johnsonite Installation and Maintenance Instructions 050212.

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.
- B. Extra Materials:
 - 1. Provide 1 box of extra floor tiles for each tile type, panel, and color.
 - 2. Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tile: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Armstrong World Industries, Lancaster, PA Representative Contact: Lien Chu (800) 356-9301, ext. 8274.
 - 2. Mannington Commercial, Calhoun, GA (800) 241-2262
 - 3. Johnsonite, Donna Heffernan Sission (703) 250-0714
- B. 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. Mannington Commercial, Calhoun, GA (800) 241-2262.
 - 4. Johnsonite, Donna Heffernan Sission (703) 250-0714
 - 5. Vinyl Plastics, Inc., Sheboygan, WI (800) 874-4240.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Floor Tile
 - 1. Armstrong Excelon VCT, ASTM F1066 Class 2
 - a. Size: 12 inch x 12 inch
 - b. Thickness: 1/8 inch (3.1750 mm)
 - c. Style and Color:
 - 1) RFT-1: #51915 Charcoal
 - 2) RFT-2: #51904 Sterling
 - 2. Mannington Commercial Essentials - VCT
 - a. Size: 12 inch x 12 inch
 - b. Thickness: 0.080 in (2.0 mm).
 - c. Style and Color:
 - 1) RFT-1: #179 Dark Bark
 - 2) RFT-2: #102 Stone Gray
 - 3. Johnsonite / Tarkett – Azrock Collection - VCT
 - a. Size: 12 inch x 12 inch
 - b. Thickness: 0.080 in (2.0 mm)
 - c. Style and Color:
 - 1) RFT-1: #V228 Peppery
 - 2) RFT-2: #V220 Cast Pewter

- B. Wall Base:
 - 1. Height: 4 inches
 - 2. Thickness: 1/8 inch.
 - 3. Coved.
 - 4. Length: Roll.
 - 5. Material Color: Black.

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.
- B. Surface Preparation:
 - 1. General: Prepare floor substrate in accordance with manufacturer's instructions.

2. Floor Substrate: Prepare floor substrate to be smooth, rigid, flat, level, permanently dry, clean and free of foreign materials such as dust, paint, grease, oils, solvent, curing and hardening compounds, sealers, asphalt and old adhesive residue.
 3. Concrete Floor Substrate: Concrete floor substrate shall have a minimum compressive strength of 3500 psi. Refer to Division 3 Concrete sections for patching and repairing crack materials, and leveling compounds with Portland cement based compounds. Do not use or install flooring over gypsum based leveling or patching materials
 4. Reference Standard: Comply with ASTM F 710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
- C. Concrete Moisture Test:
1. ASTM F1869-98 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub floor Using Anhydrous Calcium Chloride: The moisture emission from the concrete shall not exceed 5.0 lbs. per 1000 sq. ft. in 24 hrs (verify using the calcium chloride test as per ASTM F 1869-98). A diagram of the area showing the location and results of each test shall be submitted to the Contracting Officer. If the test results exceed the limitations, the installation shall not proceed until the problem has been corrected.
 2. ASTM F2170-02 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes. The relative humidity measured from the center of the concrete slab should not exceed 75%. If the test results exceed the limitations, the installation must not proceed until the problem has been corrected.
 3. The test area shall be conditioned 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 testing.
- D. Concrete pH Test: Perform pH tests on concrete floors regardless of the age or grade level. If the pH is greater than 10, it must be neutralized prior to beginning the installation.
- E. Prohibit traffic until filler is cured.
- F. Vacuum clean substrate.

3.3 INSTALLATION - TILE FLOORING

- A. Install resilient tile flooring in accordance with manufacturer's published instructions referenced above.
1. Installation environment should be conditioned to a constant temperature and humidity conditions. Site should have permanent windows and doors, fully enclosed, weather tight with permanent HVAC system (not temporary) set at a uniform temperature of at least 68 degrees F (20 degrees C) for 72 hours prior to, during, and 72 hours after installation.
- B. Open number of floor tile cartons to provide quantity of flooring material required to cover each area; mix tile pieces to ensure shade variations do not occur within any one area.
- C. Spread only enough adhesive to permit installation of floor materials before initial set.
- D. Set flooring in place, press with a 150 pound resilient flooring roller to attain full adhesion.
- E. Lay flooring from center marks established parallel to building walls.
1. Allow minimum 1/2 full size tile width at room or area perimeter.
 2. Adjust tile layout as required to avoid use of units less than 1/2 tile.
- F. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar. Where flooring continues through door opening, continue established pattern with no interruption.
- G. Install edge strips at unprotected or exposed edges where flooring terminates.

- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- I. Extend flooring into toe spaces, door reveals, closets, and similar openings.
- J. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specifications sections for expansion joint covers.
- K. Adhere resilient flooring to flooring substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed flooring installation.
 - 1. Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and working times.
- L. The specified resilient tiles are factory finished; no finishing is required after installation. Refer to manufacturer's instructions referenced above for detailed recommendations for initial and restorative maintenance.

3.4 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.

3.5 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 Project Manager.

3.6 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.

3.7 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.

3.8 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.

3.9 INITIAL MAINTENANCE PROCEDURES FOR LINOLEUM.

- A. Drying Room Film: Expose installed linoleum to either natural or artificial light to allow "drying room film" (the yellow film is a natural occurrence of the oxidation of the linseed oil in linoleum products) on installed linoleum flooring to disappear prior to initiating temporary protection procedures.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
Last revised: 7/13/2016

SECTION 096519

RESILIENT QUARTZ FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient quartz tile flooring.
 - 2. 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.
 - 3. Section 123504 - Postal Casework.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
 - 2. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - 3. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - 4. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 5. ASTM F970 Standard Test Method for Static Load Limit.
 - 6. ASTM F1482 Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring.
 - 7. ASTM F1066 Standard Specification for Vinyl Composition Floor Tile.
 - 8. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
- B. Resilient Floor Covering Institute (RFCI)
 - 1. RFCI
- C. American Concrete Institute
 - 1. ACI 302.1R
 - 2. ACI 302.2R

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data describing physical and performance characteristics; including sizes, patterns and colors including manufacturer's product sheet.
 - a. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors, patterns and textures.

- b. Samples: Submit selection and verification samples for finishes, colors, and textures.
- c. Quality Assurance Submittals: Submit the following:
 - 1) Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 2) Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.
 - 3) Manufacturer's Instructions: Manufacturer's installation instructions.
 - 4) Manufacturer's Field Reports: Manufacturer's Field Reports Specified herein.
- d. Closeout Submittals: Submit the following:
 - 1) 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.
 - 2) 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. Training: Installer who has attended the manufacturer's installation training clinic.
 - 2. Certificate: When requested, submit certificate indicating qualification.
- B. Regulatory Requirements:
 - 1. Critical Radiant Flux in Accordance with ASTM E 648: More than 0.45 Watts per square centimeter.
 - 2. Specific Optical Smoke Density in Accordance with ASTM E 662: Less than 450.
- C. Pre-installation Meeting: If required by USPS Project Manager, conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

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.

1.6 PROJECT CONDITIONS

- A. Jobsite Requirements:
 - 1. Environmental Requirements/Conditions: In accordance with manufacturer's recommendations, areas where flooring is to be stored and areas to receive flooring shall be clean, fully enclosed, weather tight with the permanent HVAC set at a uniform temperature of at least 68 degrees F. The flooring material should be conditioned in the same manner. Maximum temperature should not exceed 80 degrees.
 - 2. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.

1. Temperature Conditions: Between 68 degrees F (20 degrees C) and 80 degrees (26 degrees C) for 72 hours prior to, during and after installation.
3. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.7 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.

1.8 WARRANTY

- A. Manufacturer's Warranty: Submit, for USPS Project Manager'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 USPS may have under Contract Documents.
 1. Warranty Period: Minimum fifteen (15) year limited warranty commencing on Date of Substantial Completion.

1.9 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Maintenance stock:
 1. Provide 1 box of extra floor tiles for each tile type, panel, and color.
 2. Deliver to USPS maintenance stock from same production run as products installed. Package products with protective covering and identify with descriptive labels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tile: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 1. For general use, as indicated in the Room Finish Schedule:
 - a. Altro USA, Inc., Wilmington, MA, 800.583.4244.
 - b. Rikett America, City of Industry, CA, 855.745.3887.
 - c. UPO Floor Americas, Inc., Altamonte Springs, FL., 800.800.5247.
- B. Wall Base: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 1. Burke Mercer Flooring Products, San Jose, CA., 800.669.7010.
 2. Johnsonite; A Tarkett Company, Solon, OH., 800.899.8916.
 3. Roppe Corporation, USA, Fostoria, OH., 800.537.9527.

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

2.2 MATERIALS

A. Floor Tile

1. Altro Quartz Tile
 - a. Size: 24 inch x 24 inch (61 cm x 61 cm)
 - b. Thickness: 0.08 inch (2 mm)
 - c. Factory applied PUR coating
 - d. Color:
 - 1) RFT-1: #9306 - Charcoal CD
 - 2) RFT-2: #9302 - Rock Salt CD
2. Rickett Quartz Tile
 - a. Size: 24 inch x 24 inch (61 cm x 61 cm)
 - b. Thickness: 0.08 inch (2 mm)
 - c. Factory applied PUR coating
 - d. Color:
 - 1) RFT-1: #8806 - Fly Ash
 - 2) RFT-2: #8804 - Tribeca
3. UPO Floor Quartz Mosaic Collection
 - a. Size: 24 inch x 24 inch (61 cm x 61 cm)
 - b. Thickness: 0.08 inch (2 mm)
 - c. Factory applied PUR coating
 - d. Color:
 - 1) RFT-1: #618315 – Lava Grey
 - 2) RFT-2: #618302 – Conglomerate Grey

B. Wall Base:

1. Material: Thermoplastic Vinyl
2. Height: 4 inches
3. Thickness: 1/8 inch.
4. Coved.
5. Length: Roll.
6. Color: Black

2.3 ACCESSORIES

- A. Underlayment and Patching Compound: Refer to Section 033000 Cast-In-Place Concrete for Portland cement based underlayments and patching compounds; white gypsum materials are not acceptable.
- B. Proprietary Accessory Products: Provide flooring manufacturer's accessories for use with Quartz Tile: Acrylic Adhesive: one part, water based, 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 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions and product label instructions for installation.

3.2 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.

3.3 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.
- B. Surface Preparation:
 - 1. General: Prepare floor substrate in accordance with manufacturer's instructions.
 - 2. Floor Substrate: Prepare floor substrate to be smooth, rigid, flat, level, permanently dry, clean and free of foreign materials such as dust, paint, grease, oils, solvent, curing and hardening compounds, sealers, asphalt and old adhesive residue.
 - 3. Concrete slabs must conform to ACI 302.1R and ACI 302.2R.
 - 4. A vapor retarder of a minimum of 0.050 Perms or less must be placed directly under any on or below grade concrete slabs, consult ACI 302.2R and ASTM E-1745. This barrier must be fully intact and retain its integrity. The water to cement ratio of the concrete should not exceed 0.45.
 - 5. Concrete Floor Substrate: Concrete floor substrate shall have a minimum compressive strength of 3500 psi. Refer to Division 3 Concrete sections for patching and repairing crack materials, and leveling compounds with Portland cement based compounds. Do not use or install flooring over gypsum based leveling or patching materials
 - 6. Reference Standard: Comply with ASTM F 710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
- C. Concrete Moisture Test:
 - 1. Perform moisture tests on concrete floors regardless of the age or grade level. Verify concrete substrate is dry in accordance with ASTM F 2170, in strict accordance with instructions.
 - 2. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub floor Using Anhydrous Calcium Chloride: The moisture emission from the concrete shall not exceed 5.0 lbs. per 1000 sq. ft. in 24 hrs (verify using the calcium chloride test as per ASTM F

- 1869). A diagram of the area showing the location and results of each test shall be submitted to the Contracting Officer. If the test results exceed the limitations, the installation shall not proceed until the problem has been corrected.
3. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes. The relative humidity measured from the center of the concrete slab should not exceed 75%. If the test results exceed the limitations, the installation must not proceed until the problem has been corrected.
 4. The test area shall be conditioned 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 testing.
- D. Concrete pH Test: Perform pH tests on concrete floors regardless of the age or grade level. If the pH is greater than 9.9, it must be neutralized prior to beginning the installation.
- E. Do not proceed with work until results of moisture condition and/or pH tests are acceptable.
- F. Meet and prepare concrete per ASTM F710 Standard for Concrete or other monolithic floors / ASTM F1482 Standard for Wood Subfloors.
1. Floor surfaces shall be clear, dry, and smooth, free of dust, solvent, paint, wax, oil, grease, or other materials that might prevent a strong bond.
 2. Use a probe test method to test for moisture and pH (alkalinity) per ASTM 2170. Do not proceed with installation until moisture and pH levels are within acceptable ranges stated in the flooring manufacturers literature.
 3. Floor surface flatness shall not vary more than +/- 3/16 inches across 10 linear feet.
- G. Apply subfloor filler to low spots and cracks to achieve flatness to a tolerance of 3/16" over 10 feet (and/or per architect's specifications for slope and pitch), allow to cure. Never install flooring over gypsum-based toppings, underlayments, leveling or patching compounds, use only moisture tolerant patches in potential wet areas.
- H. Wood subfloors shall not exceed 10% moisture content when measured with a Delmhorst Wood Moisture Tester.
- I. Prohibit traffic until filler is cured.
- J. Vacuum clean substrate.

3.4 INSTALLATION - TILE FLOORING

- A. Install resilient tile flooring in accordance with manufacturer's current published installation guide.
- B. Prior to installation, confirm material installation pattern and direction per design specifications or work order. Inspect all tiles before installing or during installation to verify that there are no visible defects, damages, or excessive shading variations.
- C. Do not blend materials from different cartons and avoid mixing cartons and pallets whenever possible. Some flooring products, colors and textures have latent and acceptable color and shade variations. If there are concerns regarding shade or color variations, do not install material and consult a sales representative and manufacturer's technical staff.
- D. A tile cutter shall be used for all standard cuts. For intricate or specialty cuts, use a tungsten-carbide blade and heat the back of the tile using a heat gun or equivalent to ease cutting. Pre-cut borders and other specialty pieces to fit snugly against or around walls, thresholds, transition strips, fixtures and other protrusions or accessories.

- E. Lay flooring from center marks established parallel to building walls.
 1. Allow minimum 1/2 full size tile width at room or area perimeter.
 2. Adjust tile layout as required to avoid use of units less than 1/2 tile.
- F. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar. Where flooring continues through door opening, continue established pattern with no interruption.
- G. Install edge strips at unprotected or exposed edges where flooring terminates.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- I. Extend flooring into toe spaces, door reveals, closets, and similar openings.
- J. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specifications sections for expansion joint covers.
- K. Adhere resilient flooring to flooring substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed flooring installation.
 1. Ensure adhesive is approved for use with flooring materials and that proper trowel type and size is used.
 2. Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and working times.
 3. Pay close attention to working time to avoid adhesion issues. This may require installing material in smaller sections. Replace trowels at recommended intervals to maintain proper trowel ridge and spread rate.
- L. Roll material with a 3 section, 100 lb. roller within 30 minutes of installation, crossing in a perpendicular direction after initial roll. Use a hand roller in areas that cannot be reached with larger roller.

3.5 INSTALLATION - 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.

3.6 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality:

1. Temporary ventilation: As specified in Section 013543 - Environmental Procedures.
 1. Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues for a minimum of 72 hours. Do not ventilate within limits of Work unless otherwise approved by USPS Contracting Officer.

3.7 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Field inspection.

1. Manufacturer's Field Services: Upon USPS Project Manager'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.

3.8 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 USPS Project Manager'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.

3.9 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.

1. Protect the newly installed flooring from foot traffic for 24 hours and heavy rolling traffic for 72 hours.
2. Protect installed product and finish surfaces from damage during construction.

B. Cover and protect finished installation from damage that may be caused by other trades using a plywood or non-staining temporary floor protection system, such as textured plastic sheeting.

Special Note: Do not use tapes on the surface of flooring as the adhesives in some tapes may cause permanent staining.

END OF SECTION

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SECTION 096723
RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Slip-resistant epoxy coating for use on floors with integral cove base.

1.2 RELATED SECTIONS

- A. Section 016000 - Product Requirements: Product options and substitutions.
- B. Section 099656 – Epoxy Coatings: Wall coating.

1.3 REFERENCES

- A. ASTM C579 Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
- B. ASTM C580 Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
- C. ASTM D2240 Standard Test Method for Rubber Property—Durometer Hardness
- D. ASTM D2369 Standard Test Method for Volatile Content of Coatings
- E. ASTM D4060 Test Method for Abrasion Resistance of Organic Coatings
- F. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

1.4 SUBMITTALS

- A. Product Data: Indicate product components, compliance with physical characteristics, application method, required substrate moisture content, required storage conditions, and permitted disposal method for unused product.
- B. Product Safety Data Sheets.
- C. Applicator Qualifications: Evidence of certification by manufacturer and years of experience.
- D. Samples: Product applied to each type of substrate, 12 by 12-inch square with two 6-inch high vertical surfaces to illustrate 4-inch cove base and corner condition.

1.5 QUALITY ASSURANCE

- A. Applicator: Certified by manufacturer with minimum 5 years of experience installing manufacturer's product.
- B. Wall Coating Compatibility: In rooms scheduled for Epoxy Coatings, the epoxy wall coating and resinous floor and cove products to be compatible products by the same manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

- A. In accordance with manufacturer instructions for components.

1.7 SITE CONDITIONS

- A. Substrate: Conditions of substrate materials and surfaces, including moisture content, to meet manufacturer's requirements.
- B. Environment: Ambient temperature and humidity to be maintained in accordance with manufacturer's requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Stonclad GS with Stonkote GS4 topcoat, Stonhard Inc., Maple Shade, NJ (800) 257-7953.
 - 1. Color: Pewter
 - 2. Cove Base: Integral, seamless, 4 inches high.
 - 3. Aggregate: Silica sand or glass bead texture, 90 mesh aggregate size.
- B. Characteristics:
 - 1. ASTM C579: .10,000 psi after 7 days.
 - 2. ASTM C580: 4,000 psi
 - 3. ASTM D2240: Shore D, 85 to 90
 - 4. ASTM D2369: 4 g/l.
 - 5. ASTM D4060: 0.1 gm.
 - 6. ASTM E648: Flammability Class 1.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrate in accordance with manufacturer's requirements.
- B. Verify substrate moisture content meets manufacturer's requirements and take corrective action as necessary.

3.2 APPLICATION

- A. Apply coating system in accordance with manufacturer instructions for material and substrate involved.
- B. Provide ventilation during application as required by manufacturer.
- C. Apply each component in compliance with manufacturer's directions to produce a uniform monolithic coating, uninterrupted except at divider strips or at joints indicated or required.
- D. Primer: Mix and apply material according to manufacturer's procedures.
- E. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, of cove base. Round internal and external corners.

- F. Epoxy Base Coat: Mix and apply material according to manufacturer's procedures. Apply base coat to primed wall surface.
- G. Top Coat: Mix and apply material according to manufacturer's procedures.
- H. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations. Apply joint sealant to comply with manufacturer's written recommendations.

3.3 FIELD QUALITY CONTROL

- A. Prevent material from pooling or puddling at the cove base.

3.4 PROTECTION AND CLEANING

- A. Cure materials in compliance with manufacturer's directions.
- B. Close area of application for a minimum of 24 hours.
- C. Prevent contamination during stages of application and prior to completion of curing process.
- D. Protect from damage and wear during construction.
- E. After curing, clean surfaces just prior to final inspection using cleaning materials and procedures recommended by manufacturer.
- F. Dispose of unused materials in accordance with manufacturer's directions and local regulations.

END OF SECTION

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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.
- 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.
 - 3. Section 083323 - Overhead Coiling Doors: 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 USPS Project Manager.
 - 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. PPG Paints, Pittsburgh, PA (800) 441-9695.

3. 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: V110 Acrylic Metal Primer, 3.5-4.6 mils wet, 1.4-1.9 mils dry..
 - b. Each Finish Coat: V331 Acrylic DTM Enamel Semi-Gloss; 4.6-5.3 mils wet, 1.9-2.3 mils dry.
 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: V110 Acrylic Metal Primer; 3.5-4.6 mils wet, 1.4-1.9 mils dry.
 - b. Each Finish Coat: V331 Acrylic DTM Enamel Semi-Gloss; 4.6-5.3 mils wet, 1.9-2.3 mils dry.
- B. PPG Paints:
1. Ferrous Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: 4020 PF Pitt-Tech Plus DTM Interior/Exterior Primer; MDF 3.0 mils.
 - b. Each Finish Coat: 90-1110 Series Acrylic Enamel Satin; MDF 3.0 mils.
 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: 4020 PF DTM Interior/Exterior Primer; MDF 3.0 mils.
 - b. Each Finish Coat: 90-1110 Acrylic Enamel Satin; MDF 3.0 mils.
 3. Concrete/Masonry Semi-Gloss Acrylic Latex MDF 1.5 mil.
 - a. Primer: 4-22 Perma Crete High Build 100% Acrylic Primer 7.0 mil.
 - b. Each Finish Coat: 4-22 Perma Crete High Build Acrylic Top Coat 1.5 mil.
- C. Sherwin-Williams:
1. Ferrous Metal: Semi-Gloss, Low VOC, Alkyd Primer/Acrylic Latex.
 - a. Primer: Pro-Cryl Universal Water-Based Primer, B66-1310 Series, 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, B66-1310 Series, MDF 3.0 mils.
 - b. Each Finish Coat: DTM Acrylic B66 Series; MDF 3.0 mils.
 3. Concrete/Masonry Semi-Gloss Acrylic Latex MDF 1.5 mil.
 - a. Primer: Loxon Concrete & Masonry Primer MDF 3.0 mils.
 - b. Each Finish Coat: A-100 Exterior Acrylic, A8 Series MDF 3.0 mils.

2.4 INTERIOR PAINT SYSTEMS

- A. Benjamin Moore:
1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: N534 Interior Latex Primer; 4.3 mils wet, 1.4 mils dry.
 - b. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
 2. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: 571 Ultra Spec Hi-Build Masonry Block Filler; 16-21 mils wet, 8.5-11.4 mils dry
 - b. Each Finish Coat: 485 Ultra Spec Scuff-X Interior Eggshell; 4.0-4.5 mils wet, 1.6-1.8 mils dry.
 3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: WH25 Ultra Spec HP DTM Acrylic Low Lustre Enamel; 5.2 mils wet, 2.3 mils dry.
 4. Wood: Satin, Water Base, Acrylic Latex.
 - a. Primer: AQ-0400 Aqua Lock Plus 100% Acrylic Primer Sealer; 4.0-5.3 mils wet, 1.6-2.2 mils dry.
 - b. Each Finish Coat: 485 Ultra Spec Scuff-X Interior Eggshell; 4.0-4.5 mils wet, 1.6-1.8 mils dry.
 5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: 571 Ultra Spec Hi-Build Masonry Block Filler, 16-21 mils wet, 8.5-11.4 mils dry.

- b. Each Finish Coat: 487 Ultra Spec Scuff-X Interior Semi-Gloss Finish, 4.3 mils wet, 1.6 mils dry.
 - 6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: V110 Acrylic Metal Primer; 3.5-4.6 mils wet, 1.4-1.9 mils dry.
 - b. Each Finish Coat: 487 Ultra Spec Scuff-X Interior Semi-Gloss Finish, 4.3 mils wet, 1.6 mils dry.
 - 7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Enamel Undercoater: AQ-0400 Aqua Lock Plus 100% Acrylic Primer Sealer; 4.0-5.3 mils wet, 1.6-2.2 mils dry.
Each Finish Coat: CC-66 Cabinet Coat Trim & Cabinet Enamel Semi-Gloss; 3.6-4.6 mils wet, 1.3-1.6 mils dry.
- B. PPG Paints:
 - 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: 6-7 Speedhide Block Filler; MDF 10.2 mils.
 - b. Each Finish Coat: 6-411 Speedhide Eggshell Latex; MDF 1.5 mils.
 - 3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Primer: 4020 PF DTM Waterborne Acrylic Prime MDF 2.2mils.
 - b. Each Finish Coat: 1110 HP Series DTM Acrylic Satin; MDF 1.5 mils.
 - 4. Wood: Satin, Water Base, Acrylic Latex.
 - a. Primer: 17-921XI 100 Percent Acrylic Universal Primer; MDF 1.5 mils.
 - b. Each Finish Coat: 90-1110 DTM Acrylic Satin; MDF 1.5 mils.
 - 5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: 6-7 Speedhide Block Filler; MDF 10.2 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: 17-921XI 100 Percent Acrylic Universal Primer; MDF 1.5 mils.
 - b. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
- C. Sherwin Williams:
 - 1. Gypsum Board: Zero VOC, Eg-shell, Water Base, Acrylic Latex.
 - a. Primer: ProMar 200 Zero VOC Primer, B28W2600, MDF 1.0 mils.
 - b. Each Finish Coat: Scuff Tuff Eg-Shel, S24-50 Series MDF 1.6 mils.
 - 2. Masonry: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: PrepRite Interior/Exterior Block Filler, B25W25; MDF 3.0 mils.
 - b. Two Finish Coats: ProMar 200 HP Zero VOC Interior Latex Semi-Gloss, B31W1950 Series: MDF 1.5 mils.
 - 3. Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Pro Industrial DTM Acrylic S-G, B66-1151 Series; MDF 3.0 mils.
 - 4. Wood: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Wall & Wood Primer, B28W08111, MDF 1.6 mils.
 - b. Each Finish Coat: Pro Industrial Waterborne Alkyd Urethane S-G, B53-1150 Series MDF 1.4 mils.
 - 5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Loxon Concrete & Masonry Primer; MDF 10.0 mils.
 - b. Each Finish Coat: Pro Industrial Waterborne Alkyd Urethane S-G B53-1150 Series, MDF 1.4 mils.
 - 6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Pro-Cryl Universal Water Based Primer, B66-1310 Series, MDF 3.0 mils.
 - b. Each Finish Coat: Pro Industrial DTM Acrylic S-G, B66-01151 Series; MDF 3.0 mils.
 - 7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: Wall & Wood Primer, B2808111, MDF 1.6 mils.

- b. Each Finish Coat: Pro Industrial Waterborne Alkyd Urethane S-G B53-1150 Series, MDF 1.4 mils.

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 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 USPS Project Manager. 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. Pre-paint 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. Similarly, paint colors proposed for P-4 and P-5 must include the manufacturer's certification that the color matches the specified PMS number.
- B. P-1 White (Munsell notation: #5Y 9.25/0.5NN)
 - 1. Benjamin Moore: #968.
 - 2. PPG Paints: #512-1, Winter Mood.
 - 3. Sherwin-Williams (S-W): #SW 7636, Origami White.
- C. P-2 Light Gray (Munsell notation: #N8.0)
 - 1. Benjamin Moore: #1612, Pelican Gray.
 - 2. Sherwin-Williams: #SW7662, Evening Shadow

- D. P-3 (Not Used)
- E. P-4 Red (Match PMS 485C "Postal Red") Custom Match
- F. P-5 Blue (Match PMS 301C "Postal Blue") Custom Match
- G. P-6 Medium Gray (Munsell notation: #10B7/1)
 - 1. Sherwin Williams: SW#1232, Dublin Gray (custom mix)
- 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 Gypsum Wallboard Painted P-4 and P-5:
 - a. 1 coat Latex Wall Primer
 - b. 5 coats Latex Eggshell Enamel
3. Interior Masonry:
 - a. 1 coat Latex Block Filler
 - b. 1 coat Latex Eggshell Enamel
4. Interior Metal:
 - a. 2 coats Latex Satin
5. Interior Wood (painted):
 - a. 1 coat Enamel Undercoat
 - b. 2 coats Alkyd Semi-Satin Enamel
6. Cast-In-Place Concrete:
 - a. One coat of Latex Masonry Block Filler.
 - b. Two tinted coats of Acrylic Latex Semi-Gloss Enamel.
7. Wood Doors - Painted.
 - a. One coat Enamel Undercoat.
 - b. Two tinted coats of Latex Semi-Gloss Enamel.
8. Ferrous Metals
 - a. Touch up Prime Coat.
 - b. Two tinted coats of Alkyd Enamel Semi-Gloss.
9. Wood Cabinets, Shelves, etc. - exposed surfaces.
 - a. One coat Primer-Sealer.
 - b. One coat Enamel Undercoat.
 - c. One coat Alkyd Enamel Semi-Gloss Enamel.

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: 10/1/2021
Last revised: 08/09/2021

SECTION 099656
EPOXY COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: High solids, pigmented epoxy wall system.

1.2 RELATED SECTIONS

- A. Section 016000 - Product Requirements: Product options and substitutions.
- B. Section 096723 – Resinous Floorings: Epoxy floor and cove.

1.3 REFERENCES

- A. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
- B. ASTM D2369 Standard Test Method for Volatile Content of Coatings

1.4 SUBMITTALS

- A. Product Data: Indicate product components, compliance with physical characteristics, application method, required storage conditions, and permitted disposal method for unused product.
- B. Product Safety Data Sheets.
- C. Applicator Qualifications: Evidence of certification by manufacturer and years of experience.
- D. Samples: Product applied to 12 by 12-inch squares of each type of substrate.

1.5 QUALITY ASSURANCE

- A. Applicator: Certified by manufacturer with minimum 5 years of experience installing manufacturer's product.
- B. Floor Coating Compatibility: In rooms scheduled for Resinous Flooring, the epoxy wall coating and resinous floor and cove products to be compatible products by the same manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

- A. In accordance with manufacturer instructions for components.

1.7 SITE CONDITIONS

- A. Substrate: Conditions of substrate materials and surfaces to meet manufacturer's requirements.
- B. Environment: Ambient temperature and humidity to be maintained in accordance with manufacturer's requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Stonglaze VSR, Stonhard Inc., Maple Shade, NJ (800) 257-7953.
 - 1. Color: Ash Gray
- B. Characteristics:
 - 1. ASTM E84:
 - a. Class: A
 - b. Flame spread: 10.
 - c. Smoke developed: 20.
 - 2. ASTM D2369: 39 g/l.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrate in accordance with manufacturer's requirements.

3.2 APPLICATION

- A. Apply coating system in accordance with manufacturer instructions for material and substrate involved.
- B. Provide ventilation during application as required by manufacturer.
- C. Apply each component in compliance with manufacturer's directions to produce a uniform monolithic coating with a total minimum dry film thickness of 10 mil, uninterrupted except at divider strips or at joints indicated or required.
- D. Primer: Mix and apply material according to manufacturer's procedures.
- E. Epoxy Base Coat: Mix and apply material according to manufacturer's procedures. Apply base coat to primed wall surface.
- F. Top Coat: Mix and apply material according to manufacturer's procedures.

3.3 FIELD QUALITY CONTROL

- A. Prevent material from pooling or puddling at the floor.

3.4 PROTECTION AND CLEANING

- A. Cure materials in compliance with manufacturer's directions.
- B. Close area of application for a minimum of 24 hours.
- C. Prevent contamination during stages of application and prior to completion of curing process.
- D. Protect from damage and wear during construction.
- E. After curing, clean surfaces just prior to final inspection using cleaning materials and procedures recommended by manufacturer.
- F. Dispose of unused materials in accordance with manufacturer's directions and local regulations.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
Last revised: 08/13/2011

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 Order 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 Order 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 Order 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 Order 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, USPS@gablecompany.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, USPS@gablecompany.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: 10/1/2021
Last revised: 8/27/2018

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, USPS@gablecompany.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.
 2. For use above Impact/Traffic doors, which are not an approved means of emergency egress and must be so identified, signs reading "NOT AN EMERGENCY EXIT",

- 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
5.	TOILETS, MEN
6.	TOILETS, WOMEN
7.	LUNCH ROOM
8.	GROUNDS EQUIPMENT
9.	EXIT (Tactile Sign)
10.	ELECTRICAL ROOM
11.	LOCKERS AREA

END OF SECTION

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Last revised: 8/20/2016

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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 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

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Last revised: 09/22/2015

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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 1023 and 1023B Classic Series including the following:
 - 1. Sizes:
 - a. 1023: 36 inches high by 48 inches wide radius edge cabinet.
 - b. 1023B: 36 inches high by 72 inches wide radius edge cabinet.
 - 2. Pair of Hinged Doors: with 3/16 inch thick tempered glass and integral cylinder lock device. Door frames to be heavy gauge extruded aluminum with continuous piano hinges with clear anodized aluminum finish.
 - 3. Back Panel: fabric with 7/32 inch natural cork underlay with 1/4 inch hard back panel.
 - 4. Back Panel Color: #1690 Gray Mix.

2.3 FABRIC WRAPPED BULLETIN BOARDS

- A. Manufacturer: Claridge
- B. 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

USPS CSF Specifications issued: 10/1/2021
Last revised: 5/24/2021

SECTION 102600

WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic Lumber Wall Bumpers.
2. Fiberglass Reinforced Plastic (FRP) Wall Protection.
3. Metal Sheet Wall Protection.
4. Plastic Laminate Wall Protection.
5. Corner Guards.

B. Related Requirements:

1. Section 013300 - Submittal Procedures: Procedures for submittals.
2. Section 016000 - Product Requirement: Product options and substitutions.
3. Section 123216 - Manufactured Plastic Laminate Clad Casework: Plastic laminate wall protection product.

1.2 SUBMITTALS

A. Product Data: Data indicating characteristics, available colors, and component dimensions.

B. Samples:

1. Panels: 12 by 12-inch square, each type and color.
2. Plastic lumber and corner guards: 12-inch length, each type and color.
3. Fasteners: One of each type.

1.3 DELIVERY, STORAGE, AND HANDLING

A. In accordance with manufacturer instructions for components.

PART 2 - PRODUCTS

2.1 PLASTIC LUMBER BUMPERS

A. Product Description:

1. Solid reclaimed polyethylene or solid homogenous blend of approximately 50 percent reclaimed polyethylene and 50 percent waste wood (non-virgin).
2. Size: 2 inches x 10 inches.
3. Edge to be manufacturer's standard bullnose or chamfer.
4. Spacer Blocks: Same as bumper material, 4 x 4 inch where indicated on the Drawings.
5. Color: Beige as selected by Project Manager.

B. Manufacturers:

1. American Plastic Lumber, Inc., Shingle Springs, CA (877) 677-7701.
2. Engineered Plastic Systems, Elgin, IL (800) 480-2327.
3. Markstaar, Scarborough, ME (888) 846-2693.
4. PlasTEAK, Copley, Ohio (800) 320-1841.
5. Plastic Lumber Yard, Plymouth Meeting, PA (610) 277-3900.

- C. Bumper Fasteners:
 - 1. Concrete wall: Hooked bolts with heavy flat washer, lock washer and hex head nut; sizes as indicated on Drawings.
 - 2. Masonry wall: Hooked bolts with heavy flat washer, lock washer and hex head nut; sizes as indicated on Drawings.
 - 3. Metal stud wall: Toggle bolts plus a continuous 14 gauge metal plate backing welded to the metal studs; sizes as indicated on Drawings.
 - 4. Wood stud wall: Lag bolts plus 3 x 4 inch wood blocking between studs for frame wall anchorage; sizes as indicated on Drawings.

2.2 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

- A. Product Description:
 - 1. 0.09-inch thick, white, embossed finish, Class A Fire Rated panels.
 - 2. Provide Manufacturer's trim, joining and cap accessories.
 - 3. Install panels in accordance with Manufacturer's recommendations.
- B. Manufacturer/Model:
 - 1. Crane Composites, Channahon, IL (800) 435-0080.
 - a. Glasbord FX.
 - 2. Glasteel, Moscow, TN (800) 238-5546.
 - a. Glasliner FRP.

2.3 METAL SHEET WALL PROTECTION

- A. Type MS-1: Aluminum Flat Sheet
 - 1. 1/16-inch (0.063 inch) thick, 6061-T6 aluminum sheet, mill finish.
- B. Type MS-2: Aluminum Diamond Plate Sheet
 - 1. 1/8-inch (0.125 inch) thick, 6061-T6 aluminum diamond plate, mill finish.

2.4 CORNER GUARDS

- A. Type CG-1: Snap-On Surface Mount With Continuous Aluminum Retainer.
 - 1. Product Description: 4 feet long, anchored to wall at 20 inches on center maximum, with molded end caps color matched to covers.
 - a. Color: Most closely matched to adjacent finish wall color.
 - 2. Manufacturer/Model:
 - a. Construction Specialties, Inc., Lebanon, NJ (800) 972-7214.
 - 1) Acrovyn SM-20AN.
 - b. Pawling Corporation, Wassaic, NY (800) 431-3456.
 - 1) Pro-Tek Corner Guards CG-10P with TC-10 caps.
 - c. InPro Corporation, Muskego, WI (800) 222-5556.
 - 1) 150 High Impact Corner Guard.
- B. Type CG-2: Aluminum Angle:
 - 1. Product Description: .063-inch thick minimum aluminum corner guards, 3-inch minimum legs, 4 feet long, anchored to wall at 20 inches on center maximum, bend to match angle of wall.
 - 2. Manufacturer/Model:
 - a. Construction Specialties, Inc., Lebanon, NJ (800) 972-7214.
 - 1) Acrovyn ASCO-8.
 - b. Pawling Corporation, Wassaic, NY (800) 431-3456.
 - 1) Pro-Tek Corner Guards CG-405.

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

- A. Plastic Lumber Wall Bumpers:
 - 1. Use anchors as specified for each wall type.
 - 2. Provide for 1/8 inch gap at ends between plastic lumber pieces and between plastic lumber other materials.
 - 3. CMU Walls: Fill concrete masonry block cavities with concrete to 24-inch minimum for single bumper and to 48-inch minimum for double bumpers.
- B. Fiberglass Reinforced Plastic (FRP) Wall Protection:
 - 1. Install FRP panels and corner guards in accordance with manufacturers recommendations.
- C. Metal Sheet Wall Protection:
 - 1. Install metal sheets with the long dimension horizontal over gypsum wallboard and screw to steel studs at 16 inches on center horizontally and vertically.
- D. Plastic Laminate Wall Protection:
 - 1. Install MDF panels over gypsum wallboard and fasten to steel studs at 16 inches on center horizontally and vertically.
 - 2. Adhere plastic laminate to MDF with adhesive.
- E. Corner Guards:
 - 1. Install corner guards in accordance with manufacturers recommendations.
 - 2. Install single-height 4-foot corner guards with tops at 5 feet above finished floor.
 - 3. Install double-height 4-foot corner guards with top length at 9 feet above finished floor.

3.3 FIELD QUALITY CONTROL

- A. Inspect Products for proper material, color, placement, and alignment.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
Last revised: 8/20/21

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.
- 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: 0345.
 - b. Bobrick: B-2112.
 - c. Bradley: 6542.
 - 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-2 - Recessed Combination Sanitary Napkin/Tampon Vendor:
 - 1. Model Numbers:
 - a. American Specialties: 04684.
 - b. Bobrick: B-4606 25, surface mounted.
 - c. Bradley: 401.
 - 2. Description: Cabinet of stainless steel, minimum 22 gage, all-welded construction. Door of seamless steel, minimum 18 gage, with returned edges equipped with tumbler lockset. Coin operated; 50 cent denomination. Identification reading "Napkins" and "Tampons" at coin slot. Coin box with separate tumbler lock. No brand name advertising permitted. Capacity minimum 30 sanitary napkins and 27 tampons.
- C. AC-3 - Mirror with Stainless Steel Channel Frame:
 - 1. Model Numbers:
 - a. American Specialties: 0620.
 - b. Bobrick: B-165 series.
 - c. Bradley: 781.

2. Description: 20 inches wide x 60 inches high. Minimum 18 gage 1/2 inch x 1/2 inch x 1/2 inch stainless steel frame with 90 degree mitered hairline corners mechanically interlocked. Type 430 bright polished finish. Galvanized steel back with integral horizontal hanging brackets for mounting on concealed wall hanger, secured with concealed wall vandalproof screws in lower frame. Edges and back protected by shock-absorbing water-resistant padding. Ten year warranty against silver spoilage.
- D. AC-4A - Mirror with Stainless Steel Channel Frame:
1. Model Numbers:
 - a. American Specialties: 0600.
 - b. Bobrick: 165 series.
 - c. Bradley: 780.
 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.
- E. AC-5 - Mop and Broom Holder:
1. Model Numbers:
 - a. American Specialties: 8215.-4
 - b. Bobrick: B-224.
 - c. Bradley: 9954.
 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.
- F. AC-6 - Surface-Mounted Multi-Roll Tissue Dispenser:
1. Model Numbers:
 - a. American Specialties: 0030.
 - b. Bobrick: B-2888.
 - c. Bradley: 5402.
 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.
- G. AC-7 - Recessed Combination Paper Towel Dispenser and Waste Receptacle:
1. Model Numbers:
 - a. American Specialties: 0469.
 - b. Bobrick: B-3944.
 - c. Bradley: 234.
 2. Description: 4 inch wall depth. Minimum 22 gage Type 304 stainless steel. Drawn and beveled one-piece seamless flange. Full length stainless steel piano hinge and concealed tumbler lock at towel dispenser door. No. 4 satin finish. Capacity minimum 600 C-fold or 800 multi-fold paper towels. Waste receptacle with all edges with hemmed construction. Removable waste receptacle secured to cabinet with tumbler lock. Minimum 12 gallon capacity.
- H. AC-8 - Grab Bar - 36 Inch:
1. Model Numbers:
 - a. American Specialties: 3100 series.
 - b. Bobrick: B-5806x36.
 - c. Bradley: 832 series.
 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.
- I. AC-9 - Grab Bar - 42 Inch:

1. Model Numbers:
 - a. American Specialties: 3100 series.
 - b. Bobrick: B5806x42.
 - c. Bradley: 832 series.
 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.
- J. AC-10 - Recessed Sanitary Napkin Disposal:
1. Model Numbers:
 - a. American Specialties: 0473.
 - b. Bobrick: B-353.
 - c. Bradley: 4731-15.
 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.
- K. AC-11 - Partition Mounted Dual-Access Sanitary Napkin Disposal:
1. Model Numbers:
 - a. American Specialties: 0472.
 - b. Bobrick: B-354.
 - c. Bradley: 4721-15.
 2. Description: Mounted in toilet compartment panel serving both sides of panel. 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 stainless steel receptacle with tumbler lock. International graphic symbol on door. Minimum 1.2 gallon capacity.
- L. AC-12 - Surface Mounted Shelf:
1. Model Numbers:
 - a. American Specialties: 0692.
 - b. Bobrick: B-295x24.
 - c. Bradley: 756-24.
 2. Description: 24 inches long, 6 inch depth. Minimum 18 gage Type 304 stainless steel. 3/4 inch return edge with hemmed construction. No. 4 satin finish.
- M. AC-13 - Swing-Up Grab Bar:
1. Model Numbers:
 - a. American Specialties: not used
 - b. Bobrick: B-4998.
 - c. Bradley: 8370-107.
 2. Description: Minimum 18 gage Type 304 stainless steel; 1-1/4 inch minimum to 2 inch maximum diameter, (1-1/2 inch diameter where required by Local Code) textured grip surface. No. 4 satin finish. Wall plate fabricated from 3/16 inch stainless steel with concealed spring mechanism attached to wall plate holding bar up against wall.
 3. Function: Grab bar is manually lowered to horizontal support position and raised for departure. Bar has counterweight to prevent unintentional lowering to position.
- N. AC-14 – Vertical Grab Bar:
1. Model Numbers:
 - a. American Specialties: 3100 Series
 - b. Bobrick: 5806 x 18
 - c. Bradley: 832 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.
- O. AC-15 - Toilet Seat Cover Dispenser
1. Model Numbers:
 - a. American Specialties: 20477 – SM
 - b. Bobrick: B-221 Classic Series
 - c. Bradley: 5831
 2. Description: Satin finish 18-8 type 304, 22 gauge stainless steel, all welded construction, dispenses 250 single or half-fold toilet seat covers. Surface mounted with concealed opening in bottom for filling.

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.
- C. Cabinet:
 - 1. Models:
 - a. J.L. Industries: Clear VU Series No. 1515F25.
 - b. Larsen's: Vista Series No. V-2709.
 - c. Potter-Roemer: Buena Series No. 7121-A-16-VR.
 - 2. Description:
 - a. Metal: Formed sheet steel.
 - b. Mounting: Recessed.
 - c. Trim: Trimless.
 - d. Door: Clear acrylic bubble.
 - e. Finish: Primer.
 - f. Lettering: Vertical red 1-inch letters; "Fire Extinguisher."

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

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SECTION 105113

METAL WARDROBE 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 Lockers which may be incorporated in the Work include the following:
 1. ASI Storage Solutions, Eastanollee, GA., (706) 827-2710.
 2. DeBourgh Manufacturing Company, La Junta, CO, (800) 328-8829.
 3. List Industries, Inc., (800) 776-1342.
 4. Lyon Metal Products, LLC, Aurora, IL (800) 323-0082.
 5. Penco Products, Incorporated, Oaks, PA (800) 562-1000.
 6. 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. ASI Storage Solutions, Eastanollee, GA., (706) 827-2710.
 2. DeBourgh Manufacturing Company, La Junta, CO, (800) 328-8829
 3. List Industries, Inc., (800) 776-1342.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 LOCKERS

- 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 36 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. Bases: 4" high solid zee base, 14 gauge. Provide front and closed end where visible.
- K. Fasteners and Anchors: As recommended by locker manufacturer.
- L. 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.

M. Padlocks: Combination lock with master-key operation at back of lock.

2.3 LOCKER ROOM BENCHES

A. Bench Tops: Provide manufacturer's standard one-piece units, of the following material minimum 9-1/2 inches wide by 3/4 inch thick, with rounded corners and edges:

1. Black phenolic core with finish color selected by USPS Project Manager.

B. Handicap Bench Tops: Provide manufacturer's standard one-piece units, of the following material, 20 to 24 inches deep by 48 inches long by 3/4 inch thick, with rounded corners and edges:

1. Black phenolic core with finish color selected by USPS Project Manager.

C. Pedestals: Provide manufacturer's standard heavy duty pedestal supports, with predrilled fastener holes, complete with fasteners and anchors, and as follows:

1. Type: Tubular steel, minimum 1-3/4 inch diameter, threaded on both ends, with standard pipe flange at top and bell shaped cast base; baked-enamel finish; floor anchored with concealed fasteners.

2. Color: Match locker units.

3. Pedestal spacing shall be not more than 40 inches and not more than 8 inches from bench end.

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 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 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 LOCKERS 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.

3.4 BENCHES INSTALLATION

- A. Install benches at locations indicated on drawings in accordance with manufacturer's published instructions.
- B. Install benches plumb, level and straight.
- C. Bench quantity: as indicated on drawings.

3.5 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.

3.6 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 107316

CANOPIES

1.1 SUMMARY

- A. Section Includes:
 - 1. Engineered automobile shelter at Carrier Walk.
- 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 A 446 - Specification for Steel Sheet, Zinc Coated by the Hot-Dip Process, Structural Quality.
 - 2. ASTM A-500 - Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 3. ASTM A-525 - Specification for General Requirements for Steel Sheet, Zinc-Coated by the Hot-Dip Process.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. The engineered system may be substituted for the conventionally structured system detailed in the construction documents, provided that it meets or exceeds the level design and design criteria indicated. The design calculations, product data and shop drawings for the engineered system shall be submitted to the Contracting Officer and Architect for approval.
 - 2. Indicated on the drawings is the location and coverage of the shelter. It is up to the manufacturer to design his optimum shelter based on columns spaced at 20'-0" on center for parking bay width and manufacturer optimal spacing in the opposite direction.
 - 3. The roof configuration is generally flat with the roof sloped toward the middle of the shelter area and drainage within the column supports.
 - 4. Locate columns away from curb and wheel stop to prevent damage from vehicles.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Product data including manufacturer's product specifications, standard details, certified product test results, installation instructions, and general recommendations, as applicable to materials and finishes for each component and for the system.
 - 2. Shop Drawings: Submit shop drawings showing all erection procedures and accessories required.
 - 3. Samples: Submit two 2" x 3" color samples for selection of roof deck and trim.
 - 4. 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. Submit record drawings bearing the seal and signature of a Professional Engineer registered in the jurisdiction in which the building is being constructed.

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. Store materials on site in a manner so they will not be damaged. Materials shall be placed so water will drain and not accumulate.

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. Alcan Building Products, Cleveland, OH (440) 423-6600.
 2. Childers Carports and Structures, Incorporated, Houston, TX (713) 460-2181.
 3. Texas Aluminum Industries, Incorporated, Houston, TX (800) 231-4009.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Roof deck and trim shall be prepainted, hot-dip galvanized steel meeting ASTM A446, Grade D, 50,000 psi yield. Galvanizing shall meet ASTM A-525, G-90 Class. Paint shall be factory applied baked polyester with a full coat on color side and a white wash coat on reverse.
- B. Roof beams shall meet ASTM A-446, Grade D, 50,000 psi yield. Galvanizing shall meet ASTM A-525, G-90 Class. A white wash coat factory applied shall be the color required on roof beams.
- C. Columns shall be square tubes meeting ASTM A-500, Grade B. Columns shall be hot-dip galvanized after fabrication with a minimum zinc coating of 2 ounces per square foot. The columns shall be painted to match the full color coat on the top side of the roof deck.
- D. Projections of structural framing creating bird nesting areas shall be framed out with sheet metal closures, with all fluted deck flutes sealed off with and securely attached rubber or metal closure inserts.

2.3 EXTRUDED ALUMINUM

- A. General: Aluminum extruded canopy shall be an all extruded structural system of pre-painted rigid bents and anodized long span deck equal to that manufactured by Alcan Building Products, Division of Alcan Aluminum Corporation, Cleveland, Ohio. All structural sections shall be extruded Aluminum Alloy 6063, heat treated to a T6 Temper. Shop drawings shall be furnished for Contracting Officer's approval. Verify all dimensions, elevations and conditions before fabrication.
- B. Load Requirements: Design the system to meet Live Load requirements and Wind Up-Lift Loads as noted on S1.1 of the drawings plus the Extruded Aluminum Roof Deck shall be able to withstand concentrated loads at any point such as walking on top.
- C. Engineering Properties: All beam, deck, and column extrusions shall be of the dimensions shown and shall have Engineering Properties as shown in current Alcan Catalog for the Sections.
- D. Bent Construction: Beams and columns shall be shop fabricated to be shipped as individual pieces for assembly at the jobsite. All field assembled joints shall be mechanical joints using proper length 3/8 inch diameter aluminum bolts of 6061-T6 alloy or 3/8-inch diameter stainless steel bolts. Extruded beam end caps shall be field installed to the ends of all beams for Type "B", "C", and "D" bents, as shown on the approved shop drawings. Extruded structural beam ties shall be field installed as shown on the drawings to serve as closures between draining deck sections.
- E. Roof Deck Construction: Extruded sections shall be field interlocked into a structurally rigid connection that is self-flashing. Interlocking joints shall be rigidly field fastened 8 inches on center for their entire length. Fastening may be self-riveted by upsetting the metal or by screws or rivets. These fastenings shall have a minimum shear strength of 350 lbs. each, and all such fastenings must be made from the topside of the assembled deck. No exposed interlocking deck joints on the underside of the deck are permissible. Extruded rain caps shall be field installed at all draining breaks in the roof deck as shown on the approved shop drawings.
- F. Drainage: Water shall drain internally from the roof deck as indicated.
- G. Finish: All extrusions shall have factory applied baked enamel finish, color to be selected. The underside of all anodized decks shall be given a clear coat of acrylic lacquer to seal the anodized finish.
- H. Fabrication: Material shall be fabricated from shop drawings, approved by the Contracting Officer. Field verify all dimensions, elevations and conditions before releasing for fabrication.
- I. Erection: Erection shall be performed by manufacturer approved erectors and shall be scheduled after all concrete, masonry and roofing work in the vicinity is complete and cleaned. Column sleeves and/or anchor bolts shall be furnished by the manufacturer and installed to the approved shop drawings. Extreme care shall be taken to prevent damage to the structure and its finish. All extruded canopy systems shall be installed plumb and level as shown on the approved shop drawings. Design and installation of footings to be furnished by others.
- J. Flashing: Any and all flashing to existing construction shall be furnished and installed by others.

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 canopy in accordance with manufacturer's drawings and specifications.

3.3 TOLERANCES

- A. Maximum variation from plan or location indicated on drawings: 1/2".
- B. Maximum offset from true alignment between adjacent members butting or in line: none.

3.4 ADJUST AND CLEANING

- A. Clean up site and remove excess material.

END OF SECTION

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SECTION 122000
WINDOW TREATMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Criminal Investigative Office Curtain.
2. Vertical blinds at Lunchroom
3. Mounting system.
4. Operating 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.

1.2 SUBMITTALS

A. Section 013300 - Submittal Procedures: Procedures for submittals.

1. Product Data: Data indicating physical and dimensional characteristics and operating features.

B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.

1. Operation and Maintenance Data: Manufacturer's recommendations for maintenance and cleaning.

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 to site in manufacturer's original packaging.

- C. Store blinds to prevent damage to materials, finishes and operating mechanisms.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Existing Conditions: Take field measurements of openings to determine exact sizes required for each opening.

1.6 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. Blinds
 - a. Springs Window Fashions, LP, Montgomery, PA (800) 544-4749
 - b. Hunter Douglas Inc., Upper Saddle River, NJ (800) 727-8953
 - c. Levolor, Rockway, NJ (800) 826-8021
 - 2. Curtain
 - a. Imperial Fastener Co., Pompano Beach, FL (800) 826-8021
- B. Section 016000 - Product Requirements: Product Options and Substitutions. Substitutions: Permitted.

2.2 HORIZONTAL BLINDS

- A. Horizontal Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; manual control of raising and lowering by cord with full range locking open and closed point locking; blade angle adjustable by control wand.
 - 1. Springs Window Fashions, Bali: Classic 1 inch Mini Blinds, No. 042 "Matte White" color.
 - 2. Hunter Douglas: Contract Flexalum Decor 1 inch Aluminum Blinds Model CD80, No. 127 "Linen Flirt" color.
 - 3. Levolor: Monaco 1 inch Contract Blind, No. 115 "Dover" color.
 - a. Headrail Attachment: Wall brackets.
 - b. Accessory Hardware: Type recommended by blind manufacturer.

2.3 VERTICAL BLINDS

- A. Vertical, 3 ½" PVC Louver Vanes hung from full width headrail, manual wand control for traversing and rotating louvers.
 - 1. Springs Window Fashions: Graber G.85 Dura-Vue, #3353 "Alabaster".
 - 2. Levolor: Horizon #8091 "Dover".
 - 3. Hunter Douglas: Vertical Solutions, Color to match horizontal blinds.
 - a. Headrail Attachment: Wall Brackets.

2.4 CURTAIN

- A. Model/Color:
 - 1. Imperial: Cubicle Track IFC-98 with Supercote black fabric.

2.5 FABRICATION

- A. Fabricate blinds to cover window frames completely.

- B. At openings requiring multiple blind units, provide separate blind assemblies with space of 1 inch between assemblies, occurring at window mullion 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 structural blocking and supports are correctly placed.
- 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 blinds in accordance with manufacturer's published instructions where indicated on Drawings.
- B. Secure in place with concealed fasteners.
- C. Install curtain on a hospital-type curtain track mounted to the ceiling or to structure above. The curtain must drape from minimum 7 feet above finished floor to the finished floor. The curtain is to be attached with a hook and loop fastener or other mechanical device.

3.3 CONSTRUCTION

- A. Interface with Other Work: Coordinate Work with window installation and placement of concealed blocking to support blinds.
- B. Site Tolerances:
 - 1. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.
 - 2. Maximum Offset From Level: 1/8 inch.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect installation, attachment, and operation of blinds.

3.5 ADJUSTING AND CLEANING

- A. Section 017300 - Execution: Requirements for adjusting and cleaning.
- B. Adjust blinds for smooth operation.

C. Clean blind surfaces prior to Final Acceptance inspection.

END OF SECTION

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Last revised: 7/30/2021

SECTION 123216

MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fabricated custom cabinets and fixtures.
 - 2. Countertops.
 - 3. Cabinet and fixture hardware.
 - 4. Preparation for installing utilities.
- 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 011000 - Summary of Work: Requirements for Postal Service furnished Products.
 - 2. Section 102600 – Wall and Door Protection.
 - 3. Section 123504 - Postal Casework: USPS provided casework and equipment.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI A135.4 - Basic Hardboard.
 - 2. ANSI A208.1 - Mat Formed Wood Particleboard.
- B. Architectural Woodwork Institute (AWI):
 - 1. AWI AWQS - Architectural Woodwork Quality Standards, 6th Edition Version 1.0.
- C. National Electric Manufacturer's Association (NEMA):
 - 1. NEMA LD3 - High Pressure Decorative Laminates.
- D. United States Department of Commerce Product Standard (PS):
 - 1. PS 1 - Construction and Industrial Plywood.
 - 2. PS 20 - American Softwood Lumber Standard.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data for hardware and accessories indicating material, type, function, attachment and finish.
 - 2. Shop Drawings:
 - a. Indicate each material used, wood species, component profiles, sections, and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, and schedule of finishes in conformance with requirements of AWI AWQS.
 - b. Indicate composition of each material and compliance with referenced standards.
 - c. Keying Schedule: Indicate keying system for cabinet and fixture locks.
 - d. Present drawings in related and dimensional positions; section details drawn at minimum 1-1/2 inch scale.

3. Samples: Two 2 inch x 3 inch samples of each plastic laminate finish and color.
4. Assurance/Control Submittals:
 - a. Certificate: Manufacturer certificate indicating that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Custom cabinetwork and fixture manufacturer and installer documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with AWI AWQS Custom quality.
 1. Affix the AWI Quality Grade Stamp to each unit of custom cabinet and fixture work. The AWI Quality Grade Stamp shall display Custom Grade as specified for each section of Work.
- B. Qualifications:
 1. Manufacturer: Company specializing in manufacturing store fixtures specified in this section with minimum five years documented experience. Member in good standing of the Architectural Woodwork Institute.
 2. Installer: Company specializing in performing work of this Section with minimum 5 years documented experience.
- C. Pre-installation Meeting:
 1. Convene a pre-installation meeting at Project Site, one week prior to commencing work of this Section.
 2. Require attendance of parties directly affecting work of this Section.
 3. Review preparation and installation procedures and coordinating and scheduling required with related work.
 4. Agenda:
 - a. Tour, inspect, and discuss condition of areas where custom cabinets and fixtures will be installed and other preparatory work performed by other trades.
 - b. Review custom cabinet and fixture requirements (drawings, specifications and other contract documents). Identify requirements for Contractor furnished Products.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review and finalize construction schedule related to custom cabinet and fixture work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - e. Review requirements for inspections, installation certification, and material usage accounting procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Package fixtures in watertight container for transportation to project site to prevent damage and for storage outside building, if required.
- C. Protect fixtures from damage and excessive or inadequate relative humidity.
- D. Maintain relative humidity between 25 percent and 55 percent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers who have previously furnished and installed Products specified in this Section include the following:
- B. [_____]
- C. [_____]
- D. Alternate Manufacturers:
 - 1. Local millwork manufacturers may be approved by Contracting Officer.
 - 2. Submit documentation indicating local millwork manufacturer has produced millwork of a quality acceptable to United States Postal Service for Projects of similar type to Work of this Contract.
 - 3. Obtain approval from Contracting Officer.

2.2 WOOD MATERIALS

- A. Softwood Lumber: PS 20; graded in accordance with AWI Custom; average moisture content of 6 percent.
- B. Hardwood Lumber: NHLA; graded in accordance with AWI Custom; average moisture content of 6 percent.

2.3 PANEL MATERIALS

- A. Softwood Plywood: PS 1; graded in accordance with AWI, core materials of particleboard.
- B. Hardwood Plywood: PS 51; graded in accordance with AWI, core materials of particleboard, type of glue recommended for application.
- C. Wood Particleboard: PS1; AWI standard, composed of wood chips, medium density, made with water resistant adhesive; of grade to suit application; sanded faces.
- D. Hardboard: ANSI A135.4; Pressed wood fiber with resin binder, tempered grade, smooth two sides

2.4 PLASTIC LAMINATE AND OTHER FINISH MATERIALS

- A. Manufacturers: Subject to compliance with project requirements provide plastic laminates and other finish materials of one of the following:
 - 1. Formica Corporation.
 - 2. Micarta Corporation.
 - 3. Nevamar Corporation.
 - 4. Wilsonart International.
 - 5. Pionite.
 - 6. Samsung.
 - 7. Forbo
- B. High-Pressure Decorative Laminate: NEMA LD3, GP-50 General Purpose .050 inch.
- C. Low Pressure Laminate: Melamine thermo set decorative overlay.

2.5 COLOR SCHEDULE

- A. PL-1 White
 - 1. Nevamar, #S-7-27T, Smokey White, textured.
 - 2. Formica, #933, Mission White
 - 3. Micarta, #90M92, Dover White
 - 4. Pionite, #SW806, Carnation White
 - 5. Wilsonart, #1573-60, Frosty White
- B. PL-2 Red
 - 1. Formica #839-58, Stop Red
- C. PL-3 Blue
 - 1. Formica #914-58, Marine Blue
- D. PL-4 Gray
 - 1. Wilsonart #4142-60, Grey Glace
- E. PL-5 Countertop
 - 1. Forbo, Walton, UNI #186, Lead
- F. S-1 Solid Surfacing
 - 1. Samsung Staron, Solid Bright White

2.6 ACCESSORIES

- A. Adhesive: Type recommended by AWI to suit application.
- B. Plastic Edge Trim: Extruded flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
- C. Fasteners: Size and type to suit application.
- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application.
- E. Concealed Joint Fasteners: Threaded steel.
- F. Grommets: Metal material for cut-outs.

2.7 HARDWARE

- A. [_____]
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Lock Keying: [_____]

2.8 FABRICATION

- A. Fabricate cabinets and fixtures to AWI AWQS, Section 400 - Architectural Cabinets, Custom Grade Standards.

- B. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- C. Fit shelves, doors, and exposed edges with matching plastic edging. Use one piece for full length only.
- D. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Door and Drawer Fronts: [_____]
- F. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- G. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.
- H. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.
- I. Provide cutouts for inserts, appliances, outlet boxes, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

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 custom cabinet and fixture dimensions by field dimensions.
- 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 custom fabricated cabinets and fixtures in conformance with AWI AWQS, Section 1700 - Installation of Woodwork.
- B. Set and secure fixtures in place; rigid, plumb, and level at locations indicated on Drawings.
 - 1. Attach to floor or walls with fasteners as indicated on Drawings.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Carefully scribe fixtures abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure fixtures to floor using appropriate angles and anchorages.

- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.3 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate installation sequence of fixtures with trades providing data and communication connections to fixtures.
- B. Site Tolerances:
 - 1. Maximum Variation from True Position: 1/16 inch.
 - 2. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Inspection procedures.
- B. Contracting Officer will inspect custom cabinet and fixture installation, alignment, attachment to structure, and connection to data and communication lines.

3.5 ADJUSTING

- A. Adjust moving or operating parts to function smoothly and correctly.

3.6 CLEANING AND PROTECTION

- A. Section 017300 - Execution Cleaning and protection of installed Work.
- B. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

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SECTION 123504

POSTAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fabricated custom cabinets and fixtures.
 - 2. Countertops- including field installed custom solid surface tops on selected fixtures
 - 3. Cabinet and fixture hardware.
 - 4. Preparation for installing utilities.

- B. The USPS Direct Vendor for supplying postal casework listed in this specification through the contractor is 3C Store Fixtures, Inc. (formerly known as Carolina Cabinet Company). No substitutions allowed, for exceptions see Part 2 – Products.
 - 1. In the Offer, include the casework cost from the selected Direct Vendor, including shipping.
 - 2. Unloading and installation are also to be included as part of the Work.
 - 3. The contractor is to order the casework from the USPS Direct Vendor based on the Casework Drawings, in time to meet the schedule.
 - 4. Payment may be required by the USPS Direct Vendor from the contractor prior to shipment of the casework.

- 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 011000 - Summary of Work: Requirements for Postal Service furnished Products.
 - 2. Section 096500 – Resilient Flooring.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI A135.4 - Basic Hardboard.
 - 2. ANSI A208.1 - Mat Formed Wood Particleboard.

- B. Architectural Woodwork Institute (AWI):
 - 1. AWI AWQS - Architectural Woodwork Quality Standards, 6th Edition Version 1.0.

- C. National Electric Manufacturer's Association (NEMA):
 - 1. NEMA LD3 - High Pressure Decorative Laminates.

- D. United States Department of Commerce Product Standard (PS):
 - 1. PS 1 - Construction and Industrial Plywood.
 - 2. PS 20 - American Softwood Lumber Standard.

- E. Direct Vendor Detailed Installation Instructions.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Qualification Documentation: Custom cabinetwork and fixture installer documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with AWI AWQS Custom quality.
- B. Qualifications:
 - 1. Installer: Company specializing in performing work of this Section with a minimum of 5 years documented experience
- C. Pre-installation Meeting:
 - 1. Convene a pre-installation meeting at Project Site, one week prior to commencing work of this Section and after casework has been delivered.
 - 2. Require attendance of parties directly affecting work of this Section.
 - 3. Review preparation and installation procedures and coordinating and scheduling required with related work.
 - 4. Agenda:
 - a. Tour, inspect, and discuss condition of areas where custom cabinets and fixtures will be installed and other preparatory work performed by other trades.
 - b. Review custom cabinet and fixture requirements (drawings, specifications and other contract documents). Identify requirements for Postal Service furnished Products and Contractor furnished Products.
 - c. Review and finalize construction schedule related to custom cabinet and fixture work and verify availability of materials, installer's personnel, equipment and facilities needed to complete the Work and avoid delays.
 - d. Review requirements for inspections, installation certification, and material usage accounting procedures.

1.5 STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Receive, handle, store, and protect products.
- B. Protect fixtures from damage and excessive or inadequate relative humidity.
- C. Maintain relative humidity between 25 percent and 55 percent.
- D. Contractor to carefully coordinate delivery scheduling with Direct Vendor to avoid premature delivery and potential damage to casework on project site. Contractor will be responsible for inspection of casework upon receipt and shall report any damage to Direct Vendor, in writing, immediately.
- E. Contractor will be responsible to take an inventory of casework hardware and accessories provided by Direct Vendor and shall report any missing item to Direct Vendor, in writing, immediately.
- F. Contractor shall be responsible to properly store the keys in a safe place and hand them over to Contracting Officer immediately upon completion of installation works and obtain a receipt. KEYS SHALL NOT BE DUPLICATED.
- G. Certain casework items have been manufactured with additional weight installed (for safety reasons) and may require special equipment and handling during unloading. Contractor shall contact Direct

Vendor prior to receipt of shipment to insure adequate jobsite facilities for receiving and unloading casework.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The USPS Direct Vendor for supplying postal casework :
 - 1. 3C Store Fixtures, Inc., Wilson, NC, Representative Contact: Chris Dill (252) 291-5181, cdill@3c-inc.net.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not permitted except for the following items, when they are not located in retail areas or otherwise visible to the public: USPS reserves the right to procure items C501; C502H; C503; C504; C505; C506; C507; C508; C510; C511; C512 from other vendors, in accordance with specification 123216 MANUFACTURED LAMINATE-CLAD CASEWORK when approved by the Contracting Officer.
- C. USPS reserves the right to update these products through the Approved Vendor agreements.

2.2 CASEWORK DESCRIPTIONS

- A. For casework descriptions and requirements refer to contract drawing. A list of all USPS casework is included in Appendix A of this section.

2.3 CASEWORK HARDWARE AND ACCESSORIES

- A. Direct Vendor will supply all anchoring materials, glass, light fixtures, lamps, furring strips, trims, locks, keys (keyed independently) and any other materials and hardware shown on the details in contract 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 casework and fixture dimensions by field dimensions.
- 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. Install cabinets and fixtures, in conformance with AWI AWQS, Section 1700 - Installation of Woodwork, and Direct Vendor Detailed Installation Instructions, which will be provided with the casework.
- B. Set and secure fixtures in place; rigid, plumb, and level at locations indicated on Drawings.
 - 1. All blocking, screws, bolts, glue and fasteners are to be provided by the Direct Vendor.
 - 2. Attach to floor or walls with fasteners as indicated on Drawings.
 - 3. Firmly secure all freestanding floor units to floor with 2x4 wood blocking and expansion anchor bolts as per the anchoring details in contract drawings.
 - 4. Secure adjoining freestanding casework with four (4) connector bolts as shown on contract drawings
 - 5. Countersink all screws used to adhere slatwall to walls and cabinets.
 - 6. All attachment systems shall be concealed; no screw heads other than the screws covered by cove base shall be visible.
- C. Use fixture attachments in concealed locations for wall and floor mounted components.
- D. Secure fixtures to floor using appropriate angles and anchorages.
- E. Carefully scribe fixtures abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim for this purpose.
- F. Hand the keys over to the Contracting Officer and obtain a receipt.
- G. Cove base will be supplied and installed under Section 096519 – Resilient Quartz Flooring.

3.3 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate installation sequence of fixtures with trades providing electrical, data and communication connections to fixtures.
 - 2. Coordinate the installation of cove base with resilient flooring installer.
- B. Site Tolerances:
 - 1. Maximum Variation from True Position: 1/16 inch (1.58 mm).
 - 2. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Inspection procedures.
- B. USPS Project Manager will inspect custom cabinet and fixture installation, alignment, attachment to structure, and connection to data and communication lines.

3.5 ADJUSTING

- A. Adjust moving or operating parts to function smoothly and correctly.

3.6 CLEANING AND PROTECTION

- A. Section 017300 - Execution Requirements Cleaning and protection of installed Work.

B. Clean casework, counters, shelves, hardware, fittings, and fixtures.

APPENDIX A

ITEM #	DESCRIPTION	QUANTITY
C150	Mail Drop Counter – 72"	
C151	Mail Drop Counter – 96"	
C152	Mail Drop Counter – 138"	
C201	Slatwall Drawer Unit – 42"	
C203	Slatwall Corner Filler Unit – 45 Degree	
C204	Slatwall Corner Unit – 90 Degree, 21"	
C205	Slatwall End Filler – 21"	
C206	Slatwall Panel – 42"	
C207-L	Slatwall End Filler – Left Hand	
C207-R	Slatwall End Filler – Right Hand	
C216	Slatwall Panel – 48"	
C250	Merchandising Gondola	
C310	Writing Desk / Storage / Recycle	
C311	45 Degree Corner Filler	
C312	Forms Storage Unit	
C313	Recycle Unit	
C314	Non-Recyclable Waste Unit	
C321	Base Cabinet w / Recycle & Write	
C327	Base Cabinet / Recycle & Write, Unfinished Back	
C340	Accessible Writing Desk / Forms	
C342	Accessible Writing Desk / Forms	
C345	Accessible Combo Desk & Forms Counter	
C346	Forms Counter Cabinet / Recycle	
C349	Pack & Ship Station	
C410	Tub Storage Unit	
C411	Left Notice Cabinet	
C412	Storage Cabinet – 24" D	
C413-L	BMC Cabinet – Left Hand Access	
C413-R	BMC Cabinet – Right Hand Access	
C414-L	Side Load Hamper Unit – Left Hand Access	
C414-R	Side Load Hamper Unit – Right Hand Access	
C415	Pouch Hamper Cabinet	
C417	Meter Setting Cabinet w/ Upper	
C420	Wall Cabinet – 36"	
C431	Storage Cabinet – 15" D	
C432	Pouch Hamper Unit	
C440	Filler Trim Strip Kit	

C501	Break Room Base Cabinet – 36"	
C502	Break Room Base Sink Cabinet – 36"	
C503	Break Room Wall Cabinet – 36"	
C504	Break Room Base Cabinet – 24"	
C505	Break Room Wall Cabinet – 24"	
C506	Break Room Base Cabinet Top – 72"	
C507	Break Room Base Cabinet Top – 96"	
C508	Break Room Base Cabinet Top – 120"	
C510	Break Room Cabinet Configuration – 72"	
C511	Break Room Cabinet Configuration – 96"	
C512	Break Room Cabinet Configuration – 120"	
C601	4-Compartment / Safe Security Insert	
C602	8-Compartment / Safe Security Insert	
C603	12-Compartment / Safe Security Insert	
C604	4 Modules Compartment Addition	
C720	Accessible Add-On Counter	
C721-L	Full Service Counter Base Unit	
C721-R	Full Service Counter Base Unit	
C723	Pencil Tray – 16.75" Replacement Part	
C724	Aisle Panel	
C726-L	5' Accessible Service Counter – Option D	
C726-R	5' Accessible Service Counter – Option D	
C727-L	5' Non-Accessible Service Counter – Option D	
C727-R	5' Non-Accessible Service Counter – Option D	
C728-L	6'-8" Accessible Service Counter – Option B	
C728-R	6'-8" Accessible Service Counter – Option B	
C729-L	5'-8" Accessible Service Counter – Option C	
C729-R	5'-8" Accessible Service Counter – Option C	
C736-L	5' Accessible Service Counter – Option D w/o side return	
C736-R	5' Accessible Service Counter – Option D w/o side return	
C739-L	5'-8" Accessible Service Counter – Option C w/o side return	
C739-R	5'-8" Accessible Service Counter – Option C w/o side return	
C758	4-Drawer Cabinet	
G730	Swing Gate Assembly	
G731	Latched Gate Assembly	
C802	5' Parcel Slide Section – Open Both Ends, 2 Legs	
C803	5' Parcel Slide Section – 1 Finished End, 2 Legs	
C804	5' Parcel Slide – Finished Both Ends, 2 Legs	
C807	Parcel Slide Angled Corner	
BMEU719	BMEU Scale Base Unit	
BMEU720	BMEU Accessible Add-On Counter	

BMEU721-L	BMEU Full Service Counter Base Unit	
BMEU721-L	BMEU Full Service Counter Base Unit w/ Bumper & Corner	
BMEU721-R	BMEU Full Service Counter Base Unit	
BMEU721-R	BMEU Full Service Counter Base Unit w/ Bumper & Corner	
BMEU725	BMEU Graphics Frame	
BMEU731	BMEU Screenline Base Cabinet	
BMEU732	BMEU Screenline Wall Cabinet	
BMEU742	BMEU Accessible Rework Desk	
BMEU743	BMEU Rework Desk Storage / Recycle Unit	
BMEU744	BMEU Rework Desk Storage Unit	
BMEU745-L	BMEU Rework Desk End Cap Storage Unit	
BMEU745-R	BMEU Rework Desk End Cap Storage Unit	
SSK001	SSK Base Open Cabinet	
SSK002	SSK Base End Cabinet	
SSK003	SSK Base Middle Cabinet	
SSK004	SSK Finished End Panel	
SSK005	SSK Boise Slide	

END OF SECTION

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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. Mechanical sleeve seals.
 - 4. Sleeves.
 - 5. Escutcheons.
 - 6. Grout.
 - 7. Plumbing demolition.
 - 8. Equipment installation requirements common to equipment sections.
 - 9. Plumbing identification.
 - 10. Concrete bases.
 - 11. Supports and anchorages.

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 SUBMITTALS

- A. Welding certificates.

1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. 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 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Sealing Elements: [EPDM] [NBR] [Insert other] interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: [Plastic] [Carbon steel] [Stainless steel]. Include two for each sealing element.
- D. Connecting Bolts and Nuts: [Carbon steel with corrosion-resistant coating] [Stainless steel] of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.6 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] [Rough brass] [Polished chrome-plated and rough brass].
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - 1. Finish: [Polished chrome-plated] [Rough brass] [Polished chrome-plated and rough brass].

2.7 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 2. Design Mix: 5000-psi, 28-day compressive strength.
 3. Packaging: Premixed and factory packaged.

2.8 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) [diameter] [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.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION

- A. Refer to 024119 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 Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- 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. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- Q. Verify final equipment locations for roughing-in.
- R. 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.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. 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.
- M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

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. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.

- E. Identify plumbing equipment with plastic nameplates. Locate equipment labels where accessible and visible.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.
- 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. 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)] <Insert dimension> along each run. Reduce intervals to [25 feet (7.6 m)] <Insert dimension> 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 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 7. Use **[3000-psi]** <Insert other>, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "**[Cast-in-Place Concrete]** **[Miscellaneous Cast-in-Place Concrete]**."

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.9 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.10 GROUTING

- A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION

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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 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 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.
5. For insulation outdoors, provide stainless steel jacket, bonded, overlapped, screwed with pop rivets or screws, and sealant placed on joints as per manufacturers recommendation for a water-tight joint.

B. Cellular Foam

1. Manufacturers:
 - a. Armstrong World Industries, Inc, Lancaster, PA (800) 448-1405.
 - b. Other acceptable manufacturers offering equivalent products.
 - 1) Halstead Industries, Inc.
 - 2) Rubatex Corporation, Armaflex II.
2. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.
 - a. 'K' ('ksi') Value: ASTM C177 or C518; 0.27 at 75 degrees F,
 - b. Minimum Service Temperature: -40 degrees F.
 - c. Maximum Service Temperature: 220 degrees F.
 - d. Maximum Moisture Absorption: ASTM D1056; 1.0 percent (pipe) by volume, 1.0 percent (sheet) by volume.
 - e. Moisture Vapor Transmission: ASTM E96; 0.20 perm inches.
 - f. Maximum Flame Spread: ASTM E84; 25.
 - g. Maximum Smoke Developed: ASTM E84; 50.
 - h. Connection: Waterproof vapor barrier adhesive.
3. Elastomeric Foam Adhesive
 - a. Manufacturers:
 - 1) Dow U.S.A.
 - 2) H. B. Fuller Co.
 - 3) Rubatex Corporation.

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. Inserts and Shields:
 - 1. Application: Piping 3 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert Location: Between support shield and piping and under the finish jacket.
 - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- F. Finish insulation at supports, protrusions, and interruptions.
- G. 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.
- H. For exterior applications, provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with banded aluminum jacket with seams located on bottom side of horizontal piping.
- I. For buried piping, use elastomeric foam insulation only.
- J. For heat traced piping, insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

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	THICKNESS
	Inch	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"
Other Systems:		
Piping Exposed to Freezing with Heat Tracing	All	2"

- B. Cellular Foam Insulation Schedule

PIPING SYSTEMS	PIPE SIZE	THICKNESS
	Inch	Inch
Plumbing Systems:		
Domestic hot water supply	All	1/2"
Domestic hot water recirc	All	1/2"
Tempered Domestic Water Supply	All	3/8"
Tempered Domestic Water Recirc	All	3/8"
Domestic Cold Water	All	3/8"
Moisture Condensate Drains - Above Grade	All	3/4"
Horizontal Waste Lines from AC Equipment	All	3/4"
HVAC Refrigerant Lines (suction only)	All	3/4"
Other Systems:		
Piping exposed to freezing with heat tracing	All	1"

END OF SECTION

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SECTION 221116

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
 - 2. Specialty valves.
 - 3. Flexible connectors.
 - 4. Water meters furnished by utility company for installation by Contractor.
 - 5. Escutcheons.
 - 6. Sleeves and sleeve seals.
- 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: ASTM B 88, Type L water tube, drawn temper.
 - 1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint ends.
- B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.
 - 1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

2.3 DUCTILE-IRON PIPE AND FITTINGS

- A. Push-on-Joint or Mechanical Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - 1. Standard-Pattern, Push-on-Joint Fittings: AWWA C110, ductile or gray iron.
 - a. Gaskets: AWWA C111, rubber.

2.4 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.5 SPECIALTY VALVES

- A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
- B. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.

2.6 TRANSITION FITTINGS

- A. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- B. Sleeve-Type Transition Coupling: AWWA C219.

2.7 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. Dielectric Unions:
 - 1. Description:
 - a. Pressure Rating: 150 psig at 180 deg F.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous.

- C. Dielectric Flanges:
 - 1. Description:
 - a. Factory-fabricated, bolted, companion-flange assembly.
 - b. Pressure Rating: 150 psig.
 - c. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

- D. Dielectric-Flange Kits:
 - 1. Description:
 - a. Nonconducting materials for field assembly of companion flanges.
 - b. Pressure Rating: 150 psig.
 - c. Gasket: Neoprene or phenolic.
 - d. Bolt Sleeves: Phenolic or polyethylene.
 - e. Washers: Phenolic with steel backing washers.

- E. Dielectric Nipples:
 - 1. Description:
 - a. Electroplated steel nipple complying with ASTM F 1545.
 - b. Pressure Rating: 300 psig at 225 deg F.
 - c. End Connections: Male threaded or grooved.
 - d. Lining: Inert and noncorrosive, propylene.

2.8 FLEXIBLE CONNECTORS

- A. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
 - 1. Working-Pressure Rating: Minimum 200 psig.
 - 2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
 - 3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.

- B. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
 - 1. Working-Pressure Rating: Minimum 200 psig.
 - 2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
 - 3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

2.9 ESCUTCHEONS

- A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
- B. One Piece, Cast Brass: Polished, chrome-plated finish with setscrews.
- C. Split Casting, Cast Brass: Polished, chrome-plated finish with concealed hinge and setscrew.
- D. G.One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- E. Split-Casting Floor Plates: Cast brass with concealed hinge.

2.10 SLEEVES

- A. Cast-Iron Wall Pipes: Fabricated of cast iron, and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.
- E. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with setscrews.

2.11 SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.
 - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Stainless steel.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.12 GROUT

- A. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 1 - EXECUTION

2.13 EARTHWORK

- A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

2.14 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.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
- E. Install shutoff valve immediately upstream of each dielectric fitting.

- F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
- G. Install domestic water piping level and plumb.
- H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- J. 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.
- K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- L. Install piping adjacent to equipment and specialties to allow service and maintenance.
- M. Install piping to permit valve servicing.
- N. 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.
- O. Install piping free of sags and bends.
- P. Install fittings for changes in direction and branch connections.
- Q. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- R. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump.
- S. Install thermostats in hot-water circulation piping.

2.15 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.

2.16 VALVE INSTALLATION

- A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.

- B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.
- C. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 and smaller and butterfly valves for piping NPS 2-1/2 and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.

2.17 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Underground Domestic Water Piping:
 1. NPS 1-1/2 and Smaller: Fitting-type coupling.
 2. NPS 2 and Larger: Sleeve-type coupling.
- C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller:

2.18 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.

2.19 FLEXIBLE CONNECTOR INSTALLATION

- A. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.
- B. Install bronze-hose flexible connectors in copper domestic water tubing.
- C. Install stainless-steel-hose flexible connectors in steel domestic water piping.

2.20 WATER METER INSTALLATION

- A. Install water meters according to AWWA M6, utility company's requirements, and the following:
- B. Install displacement-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.
- C. Install compound-type water meters with shutoff valves on water-meter inlet and outlet and on valved bypass around meter. Support meters, valves, and piping on brick or concrete piers.
- D. Install remote registration system according to standards of utility company and of authorities having jurisdiction.

2.21 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.

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. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- D. 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.
- E. Install supports for vertical copper tubing every 10 feet.
- F. 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.
- G. Install supports for vertical steel piping every 15 feet.

2.22 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 the following:
 1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
 2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
 4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

2.23 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.

- 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] [stamped steel with set screw] [stamped steel with set screw or spring clips] [stamped steel with spring clips].
 3. Bare Piping at Ceiling Penetrations in Finished Spaces: [One piece, cast brass with polished chrome-plated finish] [One piece or split casting, cast brass with polished chrome-plated finish] [Split casting, cast brass with polished chrome-plated finish] [One piece, stamped steel with set screw] [One piece or split plate, stamped steel with set screw] [Split plate, stamped steel with set screw].
 4. Bare Piping in Unfinished Service Spaces: One piece, [cast brass with polished chrome-plated finish] [cast brass with rough-brass finish] [stamped steel with set screw] [stamped steel with spring clips] [stamped steel with set screw or spring clips].
 5. Bare Piping in Equipment Rooms: One piece, [cast brass] [stamped steel with set screw] [stamped steel with spring clips] [stamped steel with set screw or spring clips].
 6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
- 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 Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish.
 6. Bare Piping in Equipment Rooms: Split casting, cast brass.
 7. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.

2.24 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
- B. Sleeves are not required for core-drilled holes.
- C. Permanent sleeves are not required for holes formed by removable PE sleeves.
- D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
- E. Install sleeves in new partitions, slabs, and walls as they are built.
- F. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
- G. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
- H. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals specified in this Section.
- I. Seal space outside of sleeves in concrete slabs and walls with grout.
- J. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.

- K. Install sleeve materials according to the following applications:
 - 1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.
 - 2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Stack sleeve fittings.
 - a. Extend sleeves 2 inches above finished floor level.
 - b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 3. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - a. Steel pipe sleeves for pipes smaller than NPS 6.
 - b. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.
 - c. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
 - 4. Sleeves for Piping Passing through Concrete Roof Slabs: Steel pipe.
 - 5. Sleeves for Piping Passing through Exterior Concrete Walls:
 - a. Steel pipe sleeves for pipes smaller than NPS 6.
 - b. Cast-iron wall pipe sleeves for pipes NPS 6 and larger.
 - c. Install sleeves that are large enough to provide 1/2-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.

- L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

2.25 SLEEVE SEAL INSTALLATION

- A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
- B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

2.26 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.

2.27 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.

2.28 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

2.29 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. Under-building-slab, domestic water, building service piping, NPS 3 and smaller, shall be the following:
1. Soft copper tube, ASTM B 88, Type K; wrought-copper solder-joint fittings; and brazed joints.

- D. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 6, shall be the following:
 - 1. Push-on-joint or mechanical joint, ductile-iron pipe; standard-pattern push-on-joint or mechanical fittings; and gasketed joints.
- E. Aboveground domestic water piping, NPS 2 and smaller, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper solder-joint fittings; and soldered joints.
- F. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper solder-joint fittings; and soldered joints.
- G. Aboveground domestic water piping, NPS 5 and NPS 6, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper solder-joint fittings; and soldered joints.

2.30 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
 - 2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
 - 3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
 - 4. Drain Duty: Hose-end drain valves.
- B. Use check valves to maintain correct direction of domestic water flow to and from equipment.
- C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION

SECTION 221119

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following domestic water piping specialties:
 - 1. Vacuum breakers.
 - 2. Backflow preventers.
 - 3. Water pressure-reducing valves.
 - 4. Balancing valves.
 - 5. Temperature-actuated water mixing valves.
 - 6. Strainers.
 - 7. Hose bibbs.
 - 8. Wall hydrants.
 - 9. Drain valves.
 - 10. Water hammer arresters.
 - 11. Trap-seal primer valves.
- B. See Division 22 Section "Domestic Water Piping" for water meters.
- C. See Division 22 Section "Drinking Fountains and Water Coolers" for water filters for water coolers.

1.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. NSF Compliance:
 - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
 - 2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Ames Co.
 - b. Cash Acme.
 - c. Conbraco Industries, Inc.
 - d. FEBCO; SPX Valves & Controls.
 - e. Rain Bird Corporation.
 - f. Toro Company (The); Irrigation Div.
 - g. Watts Industries, Inc.; Water Products Div.
 - h. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1001.
3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
4. Body: Bronze.
5. Inlet and Outlet Connections: Threaded.
6. Finish: Chrome plated.

2.2 BACKFLOW PREVENTERS

A. Intermediate Atmospheric-Vent Backflow Preventers:

1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cash Acme.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; SPX Valves & Controls.
 - d. Honeywell Water Controls.
 - e. Legend Valve.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1012.
3. Operation: Continuous-pressure applications.
4. Size: As indicated on drawings.
5. Body: Bronze.
6. End Connections: Union, solder joint.
7. Finish: Rough bronze.

B. Reduced-Pressure-Principle Backflow Preventers:

1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Ames Co.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; SPX Valves & Controls.
 - d. Flomatic Corporation.
 - e. Watts Industries, Inc.; Water Products Div.
 - f. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 7 psig maximum, through middle 1/3 of flow range.
5. Size: As indicated on drawings.
6. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
7. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.

8. Accessories:
 - a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; outside screw and yoke gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
 - b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.
- C. Double-Check Backflow-Prevention Assemblies:
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. Ames Co.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; SPX Valves & Controls.
 - d. Flomatic Corporation.
 - e. Watts Industries, Inc.; Water Products Div.
 - f. Zurn Plumbing Products Group; Wilkins Div.
 2. Standard: ASSE 1015.
 3. Operation: Continuous-pressure applications, unless otherwise indicated.
 4. Pressure Loss: 4 psig maximum, through middle 1/3 of flow range.
 5. Size: As indicated on drawings.
 6. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
 7. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
 8. Accessories:
 - a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; outside screw and yoke gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.

2.3 WATER PRESSURE-REDUCING VALVES

- A. Water Regulators <Insert drawing designation if any>:
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. Cash Acme.
 - b. Conbraco Industries, Inc.
 - c. Honeywell Water Controls.
 - d. Watts Industries, Inc.; Water Products Div.
 - e. Zurn Plumbing Products Group; Wilkins Div.
 - f. <Insert manufacturer's name.>
 2. Standard: ASSE 1003.
 3. Pressure Rating: Initial working pressure of 150 psig.
 4. Size: As indicated on drawings.
 5. Body: Bronze with chrome-plated finish for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
 6. Valves for Booster Heater Water Supply: Include integral bypass.
 7. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

2.4 BALANCING VALVES

- A. Memory-Stop Balancing Valves:
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. Conbraco Industries, Inc.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Crane Co.; Crane Valve Group; Jenkins Valves.
 - d. Crane Co.; Crane Valve Group; Stockham Div.
 - e. Hammond Valve.
 - f. Milwaukee Valve Company.
 - g. NIBCO INC.

- h. Red-White Valve Corp.
- 2. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
- 3. Pressure Rating: 400-psig minimum CWP.
- 4. Size: NPS 2 or smaller.
- 5. Body: Copper alloy.
- 6. Port: Standard or full port.
- 7. Ball: Chrome-plated brass.
- 8. Seats and Seals: Replaceable.
- 9. End Connections: Solder joint or threaded.
- 10. Handle: Vinyl-covered steel with memory-setting device.

B. Primary, Thermostatic, Water Mixing Valves:

- 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. Armstrong International, Inc.
 - b. Lawler Manufacturing Company, Inc.
 - c. Leonard Valve Company.
 - d. Powers; a Watts Industries Co.
 - e. Symmons Industries, Inc.
- 2. Standard: ASSE 1017.
- 3. Pressure Rating: 125 psig.
- 4. Type: Cabinet-type, thermostatically controlled water mixing valve.
- 5. Material: Bronze body with corrosion-resistant interior components.
- 6. Connections: Threaded[union] inlets and outlet.
- 7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
- 8. Valve Pressure Rating: 125 psig minimum, unless otherwise indicated.
- 9. Valve Finish: Chrome plated or rough bronze.
- 10. Piping Finish: Copper.
- 11. Cabinet: Factory-fabricated, stainless steel, for mounting and with hinged, stainless-steel door.

2.5 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

- 1. Pressure Rating: 125 psig minimum, unless otherwise indicated.
- 2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and for NPS 2-1/2 and larger.
- 3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
- 4. Screen: Stainless steel with round perforations, unless otherwise indicated.
- 5. Perforation Size:
 - a. Strainers NPS 2 and Smaller 0.033 inch.
 - b. Strainers NPS 2-1/2 to NPS 4: 0.062 inch.
 - c. Strainers NPS 5 and Larger: 0.125 inch.
- 6. Drain: Pipe plug or factory-installed, hose-end drain valve.

2.6 HOSE BIBBS

A. Hose Bibbs:

- 1. Standard: ASME A112.18.1 for sediment faucets.
- 2. Body Material: Bronze.
- 3. Seat: Bronze, replaceable.
- 4. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
- 5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
- 6. Pressure Rating: 125 psig.
- 7. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.

8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Chrome or nickel plated.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: Operating key.
13. Operation for Finished Rooms: Operating key.
14. Include operating key with each operating-key hose bibb.
15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.7 WALL HYDRANTS

- A. Nonfreeze Wall Hydrants where local climate conditions require:
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.
 - b. MIFAB, Inc.
 - c. Prier Products, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Woodford Manufacturing Company.
 - h. Zurn Plumbing Products Group; Light Commercial Operation.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.
 2. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
 3. Pressure Rating: 125 psig.
 4. Operation: Loose key.
 5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
 6. Inlet: NPS 3/4.
 7. Outlet: Concealed, with integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011; and garden-hose thread complying with ASME B1.20.7.Box: Deep, flush mounting with cover.
 8. Box and Cover Finish: Polished nickel bronze.
 9. Nozzle and Wall-Plate Finish: Polished nickel bronze.
 10. Operating Keys(s): Two with each wall hydrant.
- B. Moderate-Climate Wall Hydrants where local climate conditions allow:
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.
 - b. MIFAB, Inc.
 - c. Prier Products, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Woodford Manufacturing Company.
 - h. Zurn Plumbing Products Group; Light Commercial Operation.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.
 2. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
 3. Pressure Rating: 125 psig.
 4. Operation: Loose key.
 5. Inlet: NPS 3/4.
 6. Outlet: Concealed, with integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011; and garden-hose thread complying with ASME B1.20.7.
 7. Box: Deep, flush mounting with cover.
 8. Box and Cover Finish: Polished nickel bronze.
 9. Nozzle and Wall-Plate Finish: Polished nickel bronze.
 10. Operating Keys(s): Two with each wall hydrant.

2.8 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.9 WATER HAMMER ARRESTERS

A. Water Hammer Arresters <Insert drawing designation if any>:

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. AMTROL, Inc.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. PPP Inc.
 - e. Sioux Chief Manufacturing Company, Inc.
 - f. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - g. Tyler Pipe; Wade Div.
 - h. Watts Drainage Products Inc.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.10 TRAP-SEAL PRIMER VALVES

A. Supply-Type, Trap-Seal Primer Valves:

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. MIFAB, Inc.
 - b. PPP Inc.
 - c. Sioux Chief Manufacturing Company, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Watts Industries, Inc.; Water Products Div.
 - f. <Insert manufacturer.>
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

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 backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
 - 1. Locate backflow preventers in same room as connected equipment or system.
 - 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
 - 3. Do not install bypass piping around backflow preventers.
- C. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.
- D. Install balancing valves in locations where they can easily be adjusted.
- E. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, solenoid valve, and pump.
- F. Install water hammer arresters in water piping according to PDI-WH 201.
- G. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- H. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.
- I. 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."

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and prepare test reports:
 - 1. Test each reduced-pressure-principle backflow preventer and double-check backflow-prevention assembly according to authorities having jurisdiction and the device's reference standard.
- B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.3 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
- B. Set field-adjustable flow of balancing valves.
- C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

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. Hub-and-Spigot, Cast-Iron Pipe and Fittings: ASTM A 74, Service class.
 - 1. Gaskets: ASTM C 564, rubber.
- B. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.
 - 1. Solvent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.
 - 2. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
 - a. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
 - b. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.

- C. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade A or B, Schedule 40, galvanized. Include ends matching joining method.
 - 1. Drainage Fittings: ASME B16.12, galvanized, threaded, cast-iron drainage pattern.
 - 2. Pressure Fittings:
 - a. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.
 - b. Malleable-Iron Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
 - c. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
 - d. Cast-Iron Flanges: ASME B16.1, Class 125.
 - e. Cast-Iron, Flanged Fittings: ASME B16.1, Class 125, galvanized.
- D. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
 - 1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought-copper, solder-joint fittings.
- E. Solid-Wall ABS Pipe: ASTM D 2661, Schedule 40, solid wall.
 - 1. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.
 - 2. Solvent Cement and Adhesive Primer:
 - a. Use ABS solvent cement that has a VOC content of 325 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. Solid-Wall PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
 - 1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
 - 2. Solvent Cement and Adhesive Primer:
 - a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- C. 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. Copper DWV tube, copper drainage fittings, and soldered joints.
 - 3. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints. Not to be used in plenum spaces.
 - 4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints. Not to be used in plenum spaces.
- D. Aboveground, soil, waste, and vent piping NPS 5 and larger 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. Copper DWV tube, copper drainage fittings, and soldered joints.
 3. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
 4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
- E. Underground in building (to 5 feet outside building), soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
1. Service class, hub-and-spigot, cast-iron soil pipe and fittings; gaskets; and compression joints.
 2. .
- F. Underground in building (to 5 feet outside building), soil and waste Piping NPS 5 and larger shall be any of the following:
1. Service class, cast-iron soil pipe and fittings; gaskets; and compression joints.

3.2 PIPING INSTALLATION

- A. Sanitary sewer piping outside the building is specified in Division 22 Section "Facility Sanitary Sewers."
- B. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- D. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."
- E. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 22 Section "Common Work Results for Plumbing."
- F. 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."
- G. 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.
- H. 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.
- I. 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 ventstack.
- J. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- K. Install ABS soil and waste drainage and vent piping according to ASTM D2661.
- L. Install PVC soil and waste drainage and vent piping according to ASTM D2665.
- M. 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 VALVE INSTALLATION

- A. General-duty valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
- B. Shutoff Valves: Install shutoff valve on each sewage pump discharge.
 - 1. Use gate or full-port ball valve for piping NPS 2 and smaller.
 - 2. Use gate valve for piping NPS 2-1/2 and larger.
- C. Check Valves: Install swing check valve, downstream from shutoff valve, on each sewage pump discharge.
- D. Backwater Valves: Install backwater valves in piping subject to sewage backflow.
 - 1. Horizontal Piping: Horizontal backwater valves.[Use normally closed type, unless otherwise indicated.]
 - 2. Floor Drains: Drain outlet backwater valves, unless drain has integral backwater valve.
 - 3. Install backwater valves in accessible locations.
 - 4. Backwater valves are specified in Division 22 Section "Sanitary Waste Piping Specialties."

3.5 HANGER AND SUPPORT INSTALLATION

- A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:

- a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- F. 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.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4: 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: 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.
- I. Install supports for vertical steel piping every 15 feet.
- J. 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.
- K. Install supports for vertical copper tubing every 10 feet.
- L. Install hangers for ABS and PVC piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 2. NPS 3: 48 inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 4. NPS 6: 48 inches with 3/4-inch rod.
- M. Install supports for vertical ABS and PVC piping every 48 inches.

- N. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 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.

3.7 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.

3.8 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.

3.9 PROTECTION

- A. Exposed ABS and 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.
 2. Floor drains.
 3. Roof flashing assemblies.
 4. Miscellaneous sanitary drainage piping specialties.
 5. Flashing materials.
 6. Grease interceptors.

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: **[Extra Heavy] [Heavy] [Light] [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.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains :

- 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. Commercial Enameling Co.
 - b. Josam Company; Josam Div.
 - c. MIFAB, Inc.
 - d. Prier Products, Inc.
 - e. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - f. Tyler Pipe; Wade Div.
 - g. Watts Drainage Products Inc.
 - h. Zurn Plumbing Products Group; Light Commercial Operation.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.
- 2. Standard: ASME A112.6.3 with backwater valve, if required.
- 3. Body Material: Gray iron.
- 4. Backwater Valve: Integral, ASME A112.14.1, swing-check type, if required.
- 5. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel, where required..
- 6. Sediment Bucket:
- 7. Top or Strainer Material: Nickel bronze.
- 8. Top of Body and Strainer Finish: [Nickel bronze] [Polished bronze] [Rough bronze] <Insert finish>.
- 9. Top Shape: Square.
- 10. Top Loading Classification: **[Extra Heavy-Duty] [Heavy Duty] [Light Duty] [Medium Duty]**.

2.3 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

- 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. Acorn Engineering Company; Elmdor/Stoneman Div.
 - b. Thaler Metal Industries Ltd.
- B. Description: Manufactured assembly made of 6.0-lb/sq. ft., 0.0938-inch-thick, lead flashing collar and skirt extending at least 10 inches from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.
- 1. Open-Top Vent Cap: Without cap.
 - 2. Low-Silhouette Vent Cap: With vandal-proof vent cap.
 - 3. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

- A. Open Drains:
- 1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
 - 2. Size: Same as connected waste piping.
- B. Deep-Seal Traps:
- 1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
 - 2. Size: Same as connected waste piping.
 - a. NPS 2: 4-inch- minimum water seal.
 - b. NPS 2-1/2 and Larger: 5-inch- minimum water seal.
- C. Floor-Drain, Trap-Seal Primer Fittings:
- 1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
 - 2. Size: Same as floor drain outlet with NPS 1/2 side inlet.
- D. Air-Gap Fittings:
- 1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
 - 2. Body: Bronze or cast iron.
 - 3. Inlet: Opening in top of body.
 - 4. Outlet: Larger than inlet.
 - 5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.
- E. Sleeve Flashing Device :
- 1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
 - 2. Size: As required for close fit to riser or stack piping.
- F. Stack Flashing Fittings :
- 1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
 - 2. Size: Same as connected stack vent or vent stack.
- G. Vent Caps :
- 1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
 - 2. Size: Same as connected stack vent or vent stack.

2.5 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 - 1. General Use: 6-lb/sq. ft., 0.0938-inch thickness.
- B. Fasteners: Metal compatible with material and substrate being fastened.
- C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- D. Solder: ASTM B 32, lead-free alloy.
- E. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

2.6 GREASE INTERCEPTORS

- A. Grease Interceptors :
 - 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. Applied Chemical Technology, Incorporated.
 - b. Josam Company; Josam Div.
 - c. MIFAB, Inc.
 - d. Rockford Sanitary Systems, Inc.
 - e. Schier Products Company.
 - f. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - g. Tyler Pipe; Wade Div.
 - h. Watts Drainage Products Inc.
 - i. Zurn Plumbing Products Group; Light Commercial Operation.
 - j. Zurn Plumbing Products Group; Specification Drainage Operation.
 - k. Ashland Trap Distribution Co.
 - l. Bio-Microbics, Inc.
 - m. Canplas LLC.
 - n. Schier Products Company.
 - o. Zurn Plumbing Products Group; Light Commercial Operation.
 - 2. Standard: ASME A112.14.3 and PDI-G101, for intercepting and retaining fats, oils, and greases from food-preparation or processing wastewater.
 - 3. Large facilities may require custom large (750 gallons and above) unit per local utility requirements.
 - 4. Plumbing and Drainage Institute Seal.
 - 5. Body Material: Cast iron for small systems. Large systems will be concrete or plastic tanks with integral baffles and manhole access.
 - 6. Interior Lining: Corrosion-resistant enamel.
 - 7. Exterior Coating: Corrosion-resistant enamel.
 - 8. Body Extension: As **required**.
 - 9. Operation: Manual manual cleaning

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 floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- H. Assemble open drain fittings and install with top of hub 2 inches above floor.
- I. Install deep-seal traps on floor drains and other waste outlets, if indicated.
- J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
 - 1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
 - 2. Size: Same as floor drain inlet.
- K. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- L. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- M. Install vent caps on each vent pipe passing through roof.
- N. Install grease interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.
 - 1. Above-Floor Installation: Set unit with bottom resting on floor, unless otherwise indicated.
 - 2. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor.
 - 3. Recessed Floor Installation: Set unit in receiver housing having bottom or cradle supports, with receiver housing cover flush with finished floor.
 - 4. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

- O. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- P. 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.
- C. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: 6.0-lb/sq. ft., 0.0938-inch thickness or thinner.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having caulking recess.

3.4 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."

3.5 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 workstops.

END OF SECTION

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SECTION 221413

FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following storm drainage 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. Storm Drainage 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-drain" for plastic drain piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Hub-and-Spigot, Cast-Iron Pipe and Fittings: ASTM A 74, Service class.
 - 1. Gaskets: ASTM C 564, rubber.
- B. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.
 - 1. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
 - a. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
 - b. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.
- C. Solid-Wall ABS Pipe: ASTM D 2661, Schedule 40, solid wall.
 - 1. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.
 - 2. Solvent Cement and Adhesive Primer:

- a. Use ABS solvent cement that has a VOC content of 325 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Solid-Wall 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. Solvent Cement and Adhesive Primer:
 - a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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 storm drainage piping NPS 6 and smaller shall be the following:
 - 1. Hubless cast-iron soil pipe and fittings; standard shielded, stainless-steel couplings; and coupled joints.
 - 2. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
 - 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
- C. Aboveground storm drainage piping NPS 8 and larger shall be the following:
 - 1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and coupled joints.
 - 2. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
 - 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
- D. Underground storm drainage piping NPS 6 and smaller shall be the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
- E. Underground storm drainage piping NPS 8 and larger shall be the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.

3.2 PIPING INSTALLATION

- A. Storm sewer and drainage piping outside the building are specified in Division 33 Section "Storm Utility Drainage Piping."
- B. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- C. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers. Cleanouts are specified in Division 22 Section "Storm Drainage Piping Specialties."
- D. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."

- E. Install wall-penetration-fitting system at each service pipe penetration through foundation wall. Make installation watertight.
- F. 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."
- G. Make changes in direction for storm piping using appropriate branches, bends, and long-sweep bends. 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.
- H. Lay buried building drain 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.
- I. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Storm Drain: 1 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 Storm-Drainage Piping: 2 percent downward in direction of flow.
- J. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- K. Install ABS storm drainage piping according to ASTM D 2661.
- L. Install PVC storm drainage piping according to ASTM D 2665.
- M. Install underground ABS and PVC storm drainage piping according to ASTM D 2321.
- N. 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. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- C. Hubless Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
- D. 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.
- E. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.4 VALVE INSTALLATION

- A. Backwater Valves: Install backwater valves in piping subject to backflow.
 - 1. Horizontal Piping: Horizontal backwater valves.[Use normally closed type, unless otherwise indicated.]
 - 2. Install backwater valves in accessible locations.
 - 3. Backwater valve are specified in Division 22 Section "Storm Drainage Piping Specialties."

3.5 HANGER AND SUPPORT INSTALLATION

- A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- F. 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. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.
 - 6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 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: 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.
 - 8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.
- I. Install supports for vertical steel piping every 15 feet.
- J. 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.
 - 6. NPS 8: 10 feet with 3/4-inch rod.
- K. Install supports for vertical copper tubing every 10 feet.

- L. Install hangers for ABS and PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 - 2. NPS 3: 48 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 - 4. NPS 6: 48 inches with 3/4-inch rod.
 - 5. NPS 8 to NPS 12: 48 inches with 7/8-inch rod.
- M. Install supports for vertical ABS and PVC piping every 48 inches.
- N. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.
- B. Connect storm drainage piping to roof drains and storm drainage specialties.

3.7 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.
 - 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 storm drainage piping according to procedures of authorities having jurisdiction.

3.8 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.

END OF SECTION

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SECTION 224000
PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Water closets.
 - 2. Urinals.
 - 3. Lavatories.
 - 4. Sinks.
 - 5. Service sinks.
 - 6. Electric water coolers.
 - 7. Wall hydrants
 - 8. Roof drains
 - 9. Floor drains
 - 10. Shock absorbers.
 - 11. Protective shielding 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 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. 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. Backflow Preventers
 - 1. Install in accordance with manufacturer's recommendations.
 - 2. Pipe relief through fixed air gap and discharge to sewer.
 - 3. Install adjacent to wall and/or floor utilizing stand-off brackets, angle frame, and/or concrete piers.
 - 4. Test unit for leaks and pressure drop. Clean and/or replace soiled strainer media.
- D. 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 01700
- 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-1)
 - 1. Bowl:
 - a. Floor mounted, vitreous china closet bowl, with elongated rim.
 - b. Manufacturer:
 - 1) Refer to approved manufacturers in Part 2.
 - 2. Flush Valve:
 - a. ASME A112.18.1; exposed chrome plated, diaphragm type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker ; maximum 1.28 gallon flush volume.
 - b. Manufacturer:
 - 1) Sloan: #111-1.5FYB.
 - 2) Zurn: #Z 6000 WS 1 YB.
 - 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.
 - 4. Fixture Support:
 - a. Manufacturer: Refer to approved manufacturers in Part 2.
- B. Water Closet -Handicap (P-2)
 - 1. Bowl:
 - a. Floor mounted, 18 inch high, vitreous china closet bowl, with elongated rim.
 - b. Manufacturer:
 - 1) Refer to approved manufacturers in Part 2.
 - 2. Flush Valve:
 - a. ASME A112.18.1; exposed chrome plated, diaphragm type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker ; maximum 1.28 gallon flush volume.
 - b. Manufacturer:
 - 1) Sloan: #111-1.5FYB.
 - 2) Zurn: #Z 6000 WS 1 YB.
 - 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.
 - 4. Fixture Support:

- a. Manufacturer: J.R. Smith 100 or 200 series adjustable support. J.R. Smith compact 400 series for furred spaces not sufficient for the adjustable 200 series.
- C. Water Closet -Handicap, Pressure-Assist Tank (P-3)
- 1. Bowl:
 - a. Floor mounted, 18 inch high, vitreous china closet bowl, with elongated rim, flush tank, right or left hand trip lever as required, maximum 1.1 gallon flush.
 - b. Manufacturer:
 - 1) Refer to approved manufacturers in Part 2.
 - 2. 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.
 - 3. Supplies:
 - a. Manufacturer:
 - 1) Brass Craft: #FR3911EC.
 - 2) Kohler: #K-7606P.
 - 3) McGuire: #2166 chrome supply.
- D. Lavatory - Single Lever (P-4)
- 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.
 - 4. Mounting height of 32 inches from basin rim to finished floor.
- E. Lavatory - Single Lever Handicap (P-5)
- 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.
- F. Sink - One Compartment Handicap (P-6)
1. Sink:
 - a. Stainless steel sink with nominal I.D. of 12 inch by 16 inch by 6 1/2 inches deep.
 - b. Manufacturer:
 - 1) Elkay: #[_____].
 - 2) Just: #SL-17519-B-GR.
 2. Fittings:
 - a. Manufacturer:
 - 1) McGuire: #151 drain with 1-1/2 inch tailpiece. Provide insulation on drain and hot water supply.
 - 2) McGuire: #8912, 1-1/2 inch by 1-1/2 inch semi-cast brass P-trap.
 - 3) McGuire: #111, 1-1/2 inch continuous waste.
 - 4) McGuire: #2165 supplies to wall, chrome nipple with stop.
 - 5) American Standard: #4205.074 kitchen faucet with hose spray.
- G. Service Sink - Floor Basin (P-7)
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.
- H. Electric Water Cooler – Bi-Level Handicap Wall Hung (P-8)
1. Electric Water Cooler :
 - a. 7.5 gph at 90 degree room temperature.
 - b. Manufacturer:
 - 1) Elkay: #EZTL8C, with LKAPREZL apron for upper unit.
 - 2) Halsey Taylor: #HAC8FSBL-VR-Q, with cane touch apron for upper unit.
 - 3) Oasis: #P8AMSL, with apron for upper unit.
 - 4) Sunroc: #NWCA-8F-BLN, with ADA apron extension kit for upper unit.
 2. Fittings:
 - a. Manufacturer:
 - 1) McGuire: #8872, 1-1/4 inch semi-cast brass p-trap.
 - 2) McGuire: #2165 supply to wall, chrome nipple with stop.
 3. Satin finished stainless steel apron and cabinet.
- I. Electric Water Cooler – Bi-Level Handicap Wall Hung with Bottle Filling Station (P-8)
1. Electric Water Cooler :
 - a. 8.0 gph at 90 degree room temperature.
 - b. Manufacturer:
 - 1) Elkay: # LZSTLG8WSSK.
 2. Fittings:

- a. Manufacturer:
 - 1) McGuire: #8872, 1-1/4 inch semi-cast brass p-trap.
 - 2) McGuire: #2165 supply to wall, chrome nipple with stop.
 - 3. Satin finished stainless steel apron and cabinet.
- J. Urinal - Wall Hung (P-9)
 - 1. Urinal:
 - a. Vitreous china washout urinal with 3/4 inch top spud and wall hanger.
 - b. Water Consumption: 0.125 gal/flush (nominal 0.13 gal/flush) maximum.
 - c. Manufacturer:
 - 1) American Standard: 6590.125, Washbrook.
 - 2) Kohler: #K-4904-ET, Bardon.
 - 3) Sloan: #WEUS-1000.1001-0.13, fixture and valve package.
 - 4) Zurn: #Z5798, EcoVantage.
 - 2. Fittings:
 - a. Manufacturer:
 - 1) Delta: #81T231.
 - 2) Sloan: Included with Sloan fixture package.
 - 3) Zurn: Z6003AV-ULF.
 - 3. Fixture Support:
 - a. Manufacturer: J.R. Smith adjustable support.
- K. Urinal - Wall Hung Handicap (P-10)
 - 1. Urinal:
 - a. Vitreous china washout urinal with 3/4 inch top spud and wall hanger.
 - b. Water Consumption: 0.125 gal/flush (nominal 0.13 gal/flush) maximum.
 - c. Manufacturer:
 - 1) American Standard: 6590.125, Washbrook.
 - 2) Kohler: #K-4904-ET, Bardon.
 - 3) Sloan: #WEUS-1000.1001-0.13, fixture and valve package.
 - 4) Zurn: #Z5798, EcoVantage.
 - 2. Fittings:
 - a. Manufacturer:
 - 1) Delta: #81T231.
 - 2) Sloan: Included with Sloan fixture package.
 - 3) Zurn: Z6003AV-ULF.
 - 3. Mount at handicapped height.
 - 4. Fixture Support:
 - a. Manufacturer: J.R. Smith adjustable support.
 - 5. Wall Hydrants:
 - a. Anti-siphon non-freeze recessed wall hydrant, cast polished brass face, with vacuum breaker.
 - b. Manufacturer:
 - 1) Woodford #B65-PB.
 - 2) J.R. Smith: #5509QT-PB.
- L. Roof Drain (P-12)
 - 1. Roof Drain:
 - a. Manufacturer: J.R. Smith: Model as follows:
 - 1) Without insulation above roof slab: #1010-C-R-A
 - 2) With insulation above roof slab: Figure Number 1015-C-R-A
 - b. Provide deck clamp, sump receiver, and aluminum dome.
 - c. Size of drain as shown on drawings.

3.8

- A. Overflow Roof Drain (P-13)
 - 1. Overflow Roof Drain:
 - a. Provide deck clamp, sump receiver, and aluminum dome, 2 inch water dam collar.
 - b. See drawings for detail of sump receiver and drain installation.
 - c. Manufacturer: J.R. Smith: #1080-C-R-A.

- B. Floor Drain - Regular (P-14)
 - 1. Floor Drain:
 - a. Cast iron floor drain with polished nickel-bronze top, adjustable strainer with flashing clamp device.
 - b. Provide flashing clamp on drains installed above first floor, slab on grade.
 - c. Size of drain as shown on drawings.
 - d. Manufacturer:
 - 1) Josam: #3000-S.
 - 2) J.R. Smith: #2005-A (and suffix "P", if required, see drawings).
 - 3) Zurn: #Z-415-S.

- C. Shock Absorbers (P-15)
 - 1. Shock Absorbers:
 - a. Manufacturer:
 - 1) Josam.
 - 2) J. R. Smith: #5005 through 5050, sized as recommended by manufacturer.
 - 3) Zurn: #Z-1700, Shocktrol (for small equipment with maximum 1 inch line size).

- D. Floor Clean-out (P-16)
 - 1. Floor Clean-out:
 - a. Cast iron body and frame, clean-out plug and adjustable round top.
 - b. Manufacturer:
 - 1) Wade: 6000-Z.

- E. Trap Primer
 - 1. Water Saving trap primer
 - a. Utilize when possible on all traps where sinks or lavs are in close proximity.
 - 1) Zurn: Z1021.
 - 2. Trap primer
 - a. Bronze body with integral vacuum breaker and low pressure differential operation.
 - b. Manufacturer:
 - 1) Zurn: Z1022.

END OF SECTION

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SECTION 230500

PART 1 - COMMON WORK RESULTS FOR HVACGENERAL

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. In those conditions where ductwork is exposed in finished areas, careful craftsmanship and only the highest standards of installation will be acceptable. All routing of exposed ducts, pipes, conduits, shall be approved in advance by the Contracting Officer prior to installation.
- G. 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. This 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).
- H. 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
7-1/2	1800	91.7
10	1800	91.7
15	1800	92.4
20	1800	93.0

- 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. 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.
 - 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.

2.4 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 [\[copper plated hangers and supports for copper piping\]](#) [\[sheet lead packing between hanger or support and piping\]](#).
- 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. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.
- E. 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.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.
- H. Identify air terminal units and radiator valves with numbered tags.
- I. Tag automatic controls, instruments, and relays. Key to control schematic.
- J. 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.
- K. 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.
- L. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

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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 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

SECTION 230713

DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ductwork 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 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 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. 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.

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 ductwork has been tested before applying insulation materials.
 2. 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.

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	2"	Aluminized Film
Return Ducts	1-1/2"	Aluminized Film
Outdoor Air Intake Ducts	2"	Aluminized Film

END OF SECTION

SECTION 230905

INSTRUMENTATION AND CONTROL FOR HVAC (SMALL)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. HVAC system 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.

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. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system. Submittals shall be furnished as a complete package prior to installation.
- 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.

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. Carrier Corp., Miami, FL (305) 590-1000.

2. Lennox, Dallas, TX (214) 497-5000.
3. Trane Co., Lacrosse, WI (608) 787-2000.
4. York, York, PA (717) 771-6225.
5. Honeywell, Minneapolis, MN (800) 328-5111.

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

2.2 ROOM THERMOSTATS/HUMIDISTATS

A. Thermostats/Humidistats for controlled HVAC equipment shall be low voltage digital electronic type. See drawings for HVAC equipment type and number of stages.

B. Performance Requirements:

1. LCD Touch-Screen Display
2. Energy Star approved
3. Seven-day programmable schedule: Minimum of four separate scheduling periods per day (with separate heating and cooling setpoints for each period). Each time period and temperature setpoint shall be individually programmable.
4. Automatic changeover between heating, humidity control and cooling modes
5. Built in time delay between compressor starts
6. Fan operation: Fan operation shall be programmable by time period to either operate continuously or automatically on a call for heating or cooling.
7. Adaptive Recovery Control: Thermostat shall have an adaptive recovery feature that adjusts the start time, based on learned system performance, to reach setpoint at the desired occupancy time.
8. Battery Back-up to retain program and time through minimum 24 hour power outage.
9. Keypad Lock: Keypad shall be partially lockable (via programming) to allow only temporary adjustment of temperature setpoints. Keypad shall also be fully lockable (via programming).

C. Model Selection: Provide the manufacturer's recommended model for the HVAC equipment to be controlled (type and number of stages), increasing humidity control.

D. Provide heavy duty, locking, ventilated, hinged all - metal enclosure with locking guards for all thermostats located in workroom and customer accessible areas. Provide two keys.

2.3 ELECTRONIC TIME CLOCKS:

A. Timeclock for head-bolt heater control shall be a single channel SPDT 7 day electronic programmable controller with up to minimum 2 on and 2 off times for each day of the week. Timeclock shall have COPY DAY function to speed programming, manual override of programming through single override button. Timeclock shall have at least 48 hour battery backup of memory retention in the event of power interruption. Timeclock abbreviated operating instructions shall be printed on inside of timeclock cover.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Provide new 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 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 wire-mold painted to match the

mounting surface. All concealed control wiring 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 new thermostats at 78 inches above the floor in workroom spaces subject to damage from operations. Mount new thermostats at 54 inches above the floor in office and public areas.

3.2 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.

3.3 TEMPERATURE CONTROL SYSTEM OPERATION

- A. The temperature control system for split system air conditioning systems and package rooftop air conditioning systems shall control the operation of the heating and ventilating and air conditioning system as follows:
 - 1. Refer to Mechanical Drawings for Control Sequences.

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. Control dampers.
 - 4. Flange connectors.
 - 5. Turning vanes.
 - 6. Duct-mounted access doors.
 - 7. Flexible connectors.
 - 8. Flexible ducts.
 - 9. 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. 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. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. 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] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, 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.
 - 13. <Insert manufacturer's name>.
- B. Description: Gravity balanced.
- 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] [Synthetic pivot bushings] [Steel ball or synthetic pivot bushings].
- 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.
 - i. <Insert manufacturer's name>.
- 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.
 - j. <Insert manufacturer's name>.
- 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.

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.
 - 4. <Insert manufacturer's name>.
- B. Material: Galvanized steel.
- C. Gage and Shape: Match connecting ductwork.

2.5 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. METALAIRE, Inc.
 - 4. SEMCO Incorporated.
 - 5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
 - 6. <Insert manufacturer's name>.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows."

- D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

2.6 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.
 - 9. <Insert manufacturer's name>.
- 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.

2.7 DUCT ACCESS PANEL ASSEMBLIES

- 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. Flame Gard, Inc.
 - 3. 3M.
 - 4. <Insert manufacturer's name>.
- B. Labeled according to UL 1978 by an NRTL.
- C. Panel and Frame: Minimum thickness 0.0428-inch stainless steel.
- D. Fasteners: Stainless steel. Panel fasteners shall not penetrate duct wall.
- E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.
- F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.8 FLEXIBLE 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. Duro Dyne Inc.
 - 3. Ventfabrics, Inc.
 - 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
 - 5. <Insert manufacturer's name>.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - 1. Minimum Weight: 24 oz./sq. yd..
 - 2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
 - 3. Service Temperature: Minus 50 to plus 250 deg F.

2.9 FLEXIBLE DUCTS

- 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. Flexmaster U.S.A., Inc.
 - 2. McGill AirFlow LLC.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
 - 4. <Insert manufacturer's name>.
- B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.
 - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 - 2. Maximum Air Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 10 to plus 160 deg F.
- C. Flexible Duct Connectors:
 - 1. Clamps: [Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action] [Nylon strap] in sizes 3 through 18 inches, to suit duct size.
 - 2. Non-Clamp Connectors: [Adhesive] [Liquid adhesive plus tape] [Adhesive plus sheet metal screws].

2.10 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

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.
- 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. Install flexible connectors to connect ducts to equipment.
- L. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- M. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

N. 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. Inspect turning vanes for proper and secure installation.

END OF SECTION

SECTION 233416

CENTRIFUGAL HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Roof exhausters.
 - 2. Cabinet exhaust fans.
- 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: Roof curbs for roof exhauster installation.
 - 2. Section 230500 – Common Work results for HVAC: Basic mechanical methods.
 - 3. Section 233100 – HVAC Ducts and Casings: Connections to ductwork and backdraft dampers.
 - 4. Section 260500 – Common Work Results for Electrical: Electrical connections.

1.2 REFERENCES

- A. Air Movement and Control Association (AMCA):
 - 1. AMCA 99 - Standards Handbook.
 - 2. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
 - 3. AMCA 261 - Directory of Products Licensed to Bear the AMCA Certified Ratings Seal.
 - 4. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
 - 5. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA MG1 - Motors and Generators.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.
- D. Underwriters Laboratories, Inc. (UL):
 - 1. UL 705 - Power Ventilators.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, sound power levels at rated capacity, and electrical characteristics and connection requirements.
 - 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. Operation and Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

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.

PART 2 - PRODUCTS

2.1 ROOF EXHAUSTER

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

1. ACME Engineering & Manufacturing, Muskogee, OK (918)682-7791.
2. Greenheck Fan Corp., Schofield, WI (715)359-6171.
3. Penn Ventilator, Philadelphia, PA (215)464-8900.
4. Cook, Loren Co., Springfield, MO (417)869-6474.
5. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

B. Product Requirements:

1. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
2. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.
3. Fabrication: Conform to AMCA 99.
4. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

C. Performance: Refer to schedule on Drawings.

D. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 16 gage aluminum birdscreen; square base to suit roof curb with continuous curb gaskets.

E. Roof Curb: Specified in Section 077213. Curbs to be supplied and installed by General Contractor.

F. Electrical Characteristics and Components

1. Electrical Characteristics: Refer to schedule on Drawings.
2. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
3. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor

G. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with nylon bearings.

H. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self aligning pre-lubricated ball bearings.

2.2 CABINET AND CEILING EXHAUST FANS

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. ACME Engineering & Manufacturing, Muskogee, OK (918)682-7791.
 - 2. Cook, Loren Co., Springfield, MO (417)869-6474.
 - 3. Greenheck Fan Corp., Schofield, WI (715)359-6171.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Performance: Refer to schedule on Drawings.
- C. Centrifugal Fan Unit: V-belt driven with galvanized steel housing lined with 1/2 inch acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- D. Electrical Characteristics and Components.
 - 1. Electrical Characteristics: Refer to schedule on Drawings.
 - 2. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
 - 3. Disconnect Switch: Cord and plug in housing for thermal overload protected motor.
- E. Grille: Molded white plastic or aluminum with baked white enamel finish.
- F. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

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 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 instructions.
- B. Secure roof exhausters with stainless steel lag screws to roof curb.
- C. Extend ducts to roof exhausters into roof curb. Install flexible connections between fan inlet and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

- D. Provide sheaves required for final air balance.
- E. Install backdraft dampers on inlet to roof exhausters.
- F. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.
- G. Do not operate fans for any purpose until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

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 70 - National Electrical Code.
 - 2. 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. Test and rate louver performance in accordance with AMCA500.
- C. 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:
- B.
 1. Price Industries Inc.,
 2. Titus, Richardson, TX (214) 899-1030.
 3. Ruskin, Kansas City, MO (816) 761-7476.
 4. Tuttle & Bailey, Holland, MI (800) 270-5686.

2.2 ROUND CEILING DIFFUSERS

- A. Type: Round, stamped or spun, multi-core diffuser to discharge air in 360 degree pattern, with sectorizing baffles where indicated. Diffuser collar shall project not more than one inch above ceiling.
- B. Fabrication: Steel with baked enamel, "off-white" finish.
- C. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.
- D. Insulation: Back plate covered with glass fiber insulation with an aluminum foil vapor barrier to prevent harmful effects of condensation.

2.3 RECTANGULAR CEILING DIFFUSERS

- A. Type: Square, stamped, multi-core diffuser to discharge air in four way pattern.
- B. Frame: Surface mount, Snap-in, Inverted T-bar, or Spline type as scheduled on plans.
- 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.

2.4 PERFORATED FACE CEILING DIFFUSERS

- A. Type: Perforated face with fully adjustable pattern and removable face.
- B. Frame: Surface mount, Snap-in, Inverted T-bar, or Spline type as scheduled on plans.
- C. Fabrication: Steel with steel or aluminum frame and 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.

2.5 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical or horizontal face as scheduled on Drawings.
- B. Frame: 1-1/4 inch margin with concealed mounting.
- 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.
- E. Insulation: Back plate covered with glass fiber insulation with an aluminum foil vapor barrier to prevent harmful effects of condensation.

2.6 CEILING GRID CORE EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Fixed grilles of 1/2 x 1/2 x 1/2 inch louvers.
- B. Fabrication: Aluminum or steel grid with factory baked enamel, "off-white" finish.
- C. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.
- D. Insulation: Back plate covered with glass fiber insulation with an aluminum foil vapor barrier to prevent harmful effects of condensation.

2.7 WALL SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable blades, 3/4 inch minimum depth, 3/4 inch maximum spacing with spring or other device to set blades, vertical or horizontal face, single or double deflection as scheduled on plans.
- B. Frame: 1-1/4 inch margin with countersunk screw or concealed mounting and gasket.
- 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.
- E. Insulation: Back plate covered with glass fiber insulation with an aluminum foil vapor barrier to prevent harmful effects of condensation.

2.8 WALL EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, vertical or horizontal face as scheduled on plans.
- B. Frame: 1-1/4 inch margin with countersunk screw or concealed mounting.
- C. Fabrication: Steel with 20 gage minimum frames and 22 gage minimum blades, or Steel and aluminum with 20 gage minimum frame, with factory baked enamel, "off-white" finish.
- D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.
- E. .

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 diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 099100.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
Last revised: 4/24/2012

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
 - 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, outdoor unit consisting of cabinet and frame, evaporator fan, evaporator-coil, electric heater, condenser coil, condenser fan, compressor(s), full perimeter roof curb and controls and filters in draw-through air flow configuration.
- B. Electric heaters and VFD fan controllers shall be as indicted in the drawing equipment schedule.

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 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 (Design basis)
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, minimum 1-1/2 lb density aluminum foilfaced insulation lining cabinet interior. There shall be no exposed edges exposed to conditioned air path.
4. Drain Pan: Stainless steel, 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: V-Belt driven, with permanently lubricated bearings, double width, double inlet, forward curved centrifugal fan, statically and dynamically balanced, resiliently mounted.
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. RTU fan motor shall be provided with a variable frequency drive (VFD) controlled by a duct static pressure transducer.

C. Evaporator Coil -

1. Direct expansion cooling coil shall be 5/16 inch outside diameter, seamless, internally grooved copper tubes expanded into aluminum fins and leaked tested to 150 psig and pressure tested to 450 psig. 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 -

Electric-Resistance Heater: Helical nickel-chrome resistance wire coil heating elements with refractory ceramic support bushings, with automatic reset thermal cut-out, built-in magnetic contactors, manual reset thermal cut-out, airflow proving device, load fuses.

E. Air Filters - Easily removed two (2) inch thick throw-away type with 25-30 percent ASHRAE Dust Spot Efficiency filter. Maximum filter face velocity shall not exceed three hundred feet per minute.

F. Condenser Fans and Motors: Totally enclosed multi speed ECM motor, direct-driven propeller fan with permanently lubricated bearings, thermal overload protection, vertical discharge with fan guard, statically and dynamically balanced, resiliently mounted.

G. Condenser Coil - Shall be be 5/16 inch outside diameter, seamless, internally grooved copper tubes expanded into aluminum fins with sub-cooling circuits, leak tested to 150 psig and pressure tested to 650 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 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. RTU Compressor - Shall be hermetically sealed, 3600 rpm maximum, resiliently mounted with positive lubrication internal motor protection, refrigerant line filter drier, and crankcase heater.
 - I. Compressor(s) - Shall be fully hermetic tandem scroll compressors and shall be configured to provide three stages of cooling operation.
 - J. Refrigerant – Only 514A or R-410A refrigerant is permitted.
 1. Note: As of this update, EPA has not designated a schedule for phase out of R-134A or 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-134A and 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.
 - K. Hot-Gas Reheat: Units shall be equipped with Hot-Gas Reheat. See Equipment schedules.
 - L. Controls:
 1. Controls – certified BacNet output directly from RTU to thermostats, Humidistats, sensors and other controllers as required for the sequence of the system served by the respective RTU.
 2. Low Ambient Controller: Cycles condenser fan to permit operation down to low temperature observed in project location.
 3. 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.
 4. RTU's shall be provided with factory installed non-fused disconnect switch, NEC and ETL/UL approved.
 5. RTU's shall be provided with factory installed powered convenience outlet, 15 amp GFI with fuse protection.
 - M. Mixed-Air Casing:
 1. Dampers: Provide outside and return dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fail to closed position. Gaskets: Provide tight fitting dampers with edge gaskets maximum leakage 5 percent at 2 inches (500 Pa) pressure differential.
 2. Damper Operator: 24 volt with gear train sealed in oil with spring return to fail to closed position.
 - N. Pre-fab Roof Mounting Curb - shall be supplied by the RTU manufacturer 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

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 262200 - Low Voltage Transformers.
10. Section 262416 - Panelboards.
11. Section 262726 - Wiring Devices.
12. Section 262816 - Enclosed Switches and Circuit Breakers.
13. Section 262923 - Variable Speed Drives.
14. Section 264100 - Facility Lightning Protection.
15. Section 264128 - Surge Protective Devices (SPD's).
16. Section 265100 - Interior Lighting (LED-Solid State).
17. Section 265600 - Exterior Lighting.
18. Section 270500 - Common Work Results for Communications.
19. Section 271100 - Communications Equipment Room Fittings.
20. Section 271300 - Communications Backbone Cabling.
21. Section 271500 - Communications Horizontal Cabling.
22. Section 272133 - Data Communications – Wireless Access Points.
23. Section 275116 - IP Integrated, Public Address Zone Paging System.
24. Section 275123 - Call Bell Systems.
25. Section 281600 - Intrusion Detection System.
26. Section 282304 - Analog CCTV System.
27. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.
28. Section 283100 - Fire Detection and Alarm System (Horn/Strobes).
29. Section 337173 - Electrical Utility Services.

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. The National Electrical Code (NFPA 70).
 - b. National Electrical Manufacturer's Associates.
 - c. Standards of National Fire Protection Association (NFPA 72, 90A and 101).
 - d. Underwriter's Laboratories.

- e. Occupational Safety and Health Agency Standards.
- f. Illuminating Engineering Society Handbook.
- g. The International Existing Building Code.
- h. The International Electrical Code.
- i. ASHRAE Standard 90.1.
- j. 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 is 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. Active Electrode]:
 - 1. Description: Metallic-salt-filled copper-tube electrode.
 - 2. Shape: As required to pass tes.
 - 3. Length: As required to pass test.
 - 4. Connector: U-bolt pressure plate.
- D. Mechanical Connectors: Bronze.
- E. Electrode Conductor:
 - 1. Material: Bare stranded copper.
 - 2. Foundation Electrodes: 2/0
 - 3. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

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. Transformers.
 - h. Pull boxes.
 - i. Lighting contactor/control panel enclosure.
 - j. Relays.
 - k. 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.
- E. Receptacles and Switches: All coverplates for receptacles and switches shall be labeled with the branch circuit number. Label shall be machine generated and permanently affixed to the outside of the coverplate.

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.
 5. Thermostat and special wire other than building wire.
- 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. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.
- B. Provide grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade or surface.
- C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing, building steel above grade and metallic cold water pipe.
- D. Provide bonding and grounding in conformance with NFPA 70.
- E. Equipment Grounding Conductor: Provide separate, insulated conductor within all lighting and power raceways. Terminate each end on suitable lug, bus, or bushing.
- F. 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 clamp-on 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, by driving additional ground rods; lengthening the rods or installing ground enhancing materials; then retest to demonstrate compliance. Install rods at least 8 feet apart.

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 and switchboards.
- 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 282304, 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

USPS CSF Specifications issued: 10/1/2021
 Last revised: 8/27/2021

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: .
3. 3M;

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 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 or aluminum conductors, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

1. Splicing of copper feeder conductors #3 AWG and larger is prohibited.
 2. Splicing of aluminum feeder conductors #1 AWG and larger is prohibited.
 3. Splices within branch circuit or feeder conductors located underground or below grade shall not be provided. All splices shall be terminated above grade.
- 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

USPS CSF Specifications issued: 10/1/2021
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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 281600 – Intrusion Detection System.
2. Section 282305 – Integrated Security and Investigative Platform (ISIP) CCTV System.
3. Section 283100 – Fire Detection and Alarm System (Horn/Strobes).
4. Section 230500 – Common Work Results for HVAC.
5. Section 260500 – Common Work Results for Electrical.
6. Section 262726 – Wiring Devices.
7. Section 270500 – Common Work Results for Communication.

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.

4. Underground conduits shall be sized 1 inch, minimum.

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. Electriflex, 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. Electriflex, 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: Raco, 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. 0-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: Raco 1222, 1223, 1224.
2. Flexible Metal Conduit: Raco 3302, 3303, 3304, 3305, 3306, 3308.
3. Liquidtight Flexible Metal Conduit: Raco 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; Raco 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: Raco, 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. Raco.
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: Raco 2232, 2233, 2234, 2235, 2336, 2238.

- 2. Electrical Metallic Tubing: Raco 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.
 - 1. Above suspended ceilings: Galvanized or sherardised thick wall rigid steel (GRC) or electrical metallic tubing (EMT).
 - 2. Metal stud walls: Galvanized or sherardised thick wall rigid steel (GRC) or electrical metallic tubing (EMT).
 - 3. Exposed interior areas: Galvanized or sherardised thick wall rigid steel (GRC) or electrical metallic tubing (EMT).
 - 4. Exposed exterior areas: Galvanized or sherardised 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 antioxidant 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

USPS CSF Specifications issued: 10/1/2021
Last revised: 9/8/2021

SECTION 260623

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Lighting control system for Workroom and Enclosed Platforms.
 - 2. Lighting control system for Box Lobby.
 - 3. Control of Interior/Exterior Lighting.
 - 4. Control of Administrative Area Lighting.
 - 5. Occupancy and Photo 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 shall be as follows:
 - 1. Individual luminaires, groups of luminaires or every other luminaire must be controlled as zones to achieve the required illumination levels under different lighting conditions. Control solutions such as LED step-dimming systems are acceptable.
 - 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. Ceiling mounted sensors shall be located to overlap their coverages and provide a seamless transition from one sensor zone to the next.
 - 3. The step-dimming occupancy sensors shall be dual-technology type and must turn the ambient lighting groups "off" within 20 minutes of the last detected presence within the workroom.
- D. Limit the ambient lighting group in the workroom or platform area to an average maintained level of 25 footcandles and use bi-level control. Average maintained high output illumination level is limited to 25 footcandles, low output illumination level to 12.5 footcandles.
 - 1. "High output illumination level" condition. This condition must provide 25 fc for normal workroom activities and must be automatically controlled using step-dimming type occupancy sensors. The high output illumination level groups must only be energized upon detection of presence by the occupancy sensor(s).. This must be the primary lighting system provided for the workroom.
 - 2. "Low output illumination level" condition. This condition must provide 12.5 fc for the workroom area when less visual activity is needed and must be automatically controlled using step-dimming type occupancy sensors.
 - 3. The control of luminaires in the ambient light group shall be achieved by the use of step-dimming type occupancy sensors to control each zone separately. Each high output illumination level shall be achieved when activity is detected by the occupancy sensor. Upon (10) minutes of inactivity the occupancy sensor shall dim the luminaires to the low output illumination level of 12.5 footcandles. Upon another (10) minutes of vacancy the step-dimmer occupancy sensor shall turn off the luminaires.

- 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 photocells 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.

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. Acuity Brands Lighting, Conyers, GA (770) 922-900.
 2. Cooper Controls, Peachtree City, GA (800) 553-3879.
 3. Encelium Technologies, Inc., Philadelphia, PA (267) 286-0336.
 4. General Electric Company, Plainville, CT (800) 626-2000.
 5. Hubbell Building Automation, Inc, Austin, TX (888) 698-3242.
 6. Intermatic, Inc., Spring Grove, IL (815) 675-7000.
 7. Leviton, Little Neck, NY (800) 824-3005.
 8. Lighting Control & Design, Glendale, CA (800) 345-4448.
 9. Lutron Electronics, Co. Coopersburg, PA (800) 523-9466.
 10. Novitas, Culver City, CA (310) 568-9600.
 11. Sensor Switch, Wallingford, CT (800) 727-7583.
 12. Tork, Mount Vernon, NY (914) 664-3542.
 13. WattStopper, Santa Clara, CA (800) 879-8585.
- B. Section 016000 - Product Requirements: Product substitutions: Permitted by manufacturers listed in 2.1A.

2.2 [DIGITAL (INTERVAL) TIMER SWITCH

- A. Provide flush wall mounted line voltage, digital, countdown timer switch with the following features:
1. The timer switch shall be preset to turn loads "off" after a preset interval time of (4) hours maximum. Switch shall be equipped with manual on/off pushbutton.
 2. Timer switch shall mount in a standard single gang wall box and shall fit behind a decorator style face plate. The control switches shall not protrude more than 1/8 inch from the wall.
 3. Timer switch shall have no minimum load requirement and shall be capable of switching all solid-state LED or electronic fluorescent ballast loads: from 0 to 800 Watt @ 120 VAC - 60 Hz, and 0 to 1200 Watt @ 277 VAC - 60 Hz.
 4. Optional flash and beep warnings shall notify occupants when the interval countdown reaches one minute.
 5. The switch shall not require a neutral, simplifying installation and shall feature terminal style wiring, which makes installation easier.
 6. Timer 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. Control switch shall be UL and CUL listed and shall have a five (5) year warranty.
 7. Basis of Design:
 - a. Sensor Switch #PTS-720 (4 hour max.)
 - b. Intermatic #EI215 (1800W @ 120 VAC).]

2.2 [LOW VOLTAGE-DIGITAL (INTERVAL) 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 #WSX PDT-SA 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 very 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:
 - a. Sensor Switch #WSX-PDT-2P-2SA-WH.
 - b. 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 and passive infrared heat changes.
[Sensor shall utilize Dual Sensing Verification Principle for coordination between ultrasonic and PIR technologies. Detection verification of both technologies must occur in order to activate lighting systems. Upon verification, detection by either shall hold lighting on.
 2. Sensor shall have a retrigger feature in which detection by either technology shall retrigger the lighting system on within 5 seconds of being switched off.
 3. The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material to offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.
 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. 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.
 7. 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.
 8. Basis of Design:
 - a. Sensor Switch #CMPDT-XX, #CM-XX.
 - b. WattStopper[#DT-30,] #CI-305.

9. 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:
 - a. Sensor Switch #PP20.
 - b. WattStopper #BZ-150.

2.8 CEILING MOUNTED, STEP-DIMMING TYPE OCCUPANCY SENSOR

- A. Provide low voltage, ceiling mounted, 360 degree, dual technology step-dimming type occupancy sensor with the following features.
 1. The sensor shall be equipped for 0 to 10 Volts step-level dimming. The high output illumination level shall be achieved when activity is detected by the occupancy sensor. Upon (10) minutes of inactivity the occupancy sensor shall dim the luminaires to the low output illumination level of 12.5 footcandles. Upon another (10) minutes of vacancy the step-dimmer occupancy sensor shall turn off the luminaires.
 2. The sensor shall be capable of detecting presence in the control area by detecting doppler shifts in transmitted ultrasound and passive infrared heat changes.
 3. Sensor shall utilize Dual Sensing Verification Principle for coordination between ultrasonic and PIR technologies. Detection verification of both technologies must occur in order to activate lighting systems. Upon verification, detection by either shall hold lighting on.
 4. Sensor shall have a retrigger feature in which detection by either technology shall retrigger the lighting system on within 5 seconds of being switched off.
 5. The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material to offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.
 6. 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.
 7. 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.
 8. 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.
 9. 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.
 10. Basis of Design: Acuity #nCMPDT-X-RJB, #nCM-X-RJB.
 11. 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: Sensor Switch #nPP16D-EFP.

2.9 LUMINAIRE INTEGRATED OCCUPANCY SENSOR

- A. Provide line voltage, low profile, luminaire integrated sensor with the following features:
 1. Sensor shall be factory or field installed within each luminaire and shall utilize passive infra-red technology to detect presence.
 2. Sensor shall be line voltage rated 0-800 Watts @ 120VAC and 0-1200 Watts @ 277VAC for all solid-state LED and electronic fluorescent lighting loads.
 3. Sensor shall be rated for indoor/outdoor installation, shall be UL listed and shall have a standard five (5) year warranty.

4. Sensor shall be available with different lens choices to provide flexibility for varying luminaire mounting heights of 8 ft. to 40 ft. AFF.
5. Sensor shall have adjustable time delay from 30 seconds to 30 minutes; set to 20 minutes.
6. Basis of Design:
 - a. WattStopper #FS-365
 - b. Leviton #OSFHP Series.

2.10 RELAY PANEL(S) AND DIGITAL SWITCHES

- A. Provide relay panel(s) and capacities as indicated on the drawings. Panel(s) shall be of modular construction and consist of the following components:
 1. The relay panel shall contain mechanically held latching control relays. Control relays shall be individually UL listed and shall bear labels indicating compliance. Control relays shall be specifically designed for control of 120, or 277VAC loads including but not limited to incandescent, low-voltage, neon, cold cathode, LED, fluorescent and HID lighting sources at a full 20 AMPS and motor loads of 1/2 Hp @ 120 VAC or 1.5 Hp @ 277 VAC. Control relays shall be designed with a mechanical latching mechanism that shall hold the relay in its last activated state indefinitely, with no change of state during an interruption of power. Each control relay shall include a mechanical means of turning the relay ON or OFF without the need for electrical power of any kind.
 2. Cover shall be configured for [surface] [flush] wall mounting of the panel. The panel cover shall have a hinged and lockable door with restricted access to line voltage section of the panel.
 3. Interior assembly shall be supplied as a factory assembled component specifically designed and listed for field installation. The interior construction shall provide total isolation of high voltage (class 1) wiring from low voltage (class 2) wiring within the assembled panel. The interior assembly shall include intelligence boards, power supply, DIN rails for mounting optional Class 2 control devices, and individually replaceable, mechanically held, latching type relays. The panel interiors shall include the following features:
 - a. Provision for one or two optional control and automation cards.
 - b. Removable, plug-in terminal blocks with screw-less connections for all low voltage terminations.
 - c. Individual terminal block, override push button, and LED status light for each relay
 - d. Switch inputs associated with each relay and group channel shall support two or three wire, momentary or maintained contact switches.
 - e. Isolated contacts within each relay shall provide true relay state to the electronics. True relay state shall be indicated by the on-board LED and shall be available to external control devices and systems.
 - f. Group, channel, and pattern control of relays shall be provided through a simple button-press interface within the panel. Any group of relays can be associated with a channel for direct on/off control or pattern (scene) control via a simple programming sequence using the relay and channel override push buttons and LED displays.
 - g. Each relay and channel terminal block shall provide a 24V pilot light signal. It shall be possible to configure the system for support for any Class 2 pilot light voltage with the use of an auxiliary power supply.
 - h. Single pole mechanically held relays with modular plug-in design. Relays shall provide the following ratings and features:
 - 1) Electrical:
 - i. 30 amp ballast at 277V
 - ii. 20 amp tungsten at 120V
 - iii. 1.5 HP motor at 120V
 - iv. 14,000 amp short circuit current at 277V.
 - 2) Mechanical:
 - i. Individually replaceable, 1/2" KO mounting with removable Class 2 wire harness

- ii. Actuator on relay housing provides manual override and visual status indication, accessible from Class 2 section of panel
 - iii. Dual line and load terminals each support two #14 – #12 solid or stranded conductors
 - iv. Tested to 250,000 mechanical on/off cycles
 - v. Isolated low voltage contacts provide for true relay status feedback and pilot light indication.
 - i. Power supply shall be a multi-voltage transformer assembly with rated power to supply all electronics, occupancy sensors, switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.
 - 4. The relay panel shall include in the control module an astronomical timeclock with programmable geographic location.
 - 5. Communication over the control network shall allow any switch input from any device to be linked to any relay output or group of relay outputs in the lighting control system for complete, unrestricted control.
 - 6. Power Failure and Power-Up Options: Each relay panel shall be provided with circuitry that shall automatically shut down the controller whenever the incoming power fails. Upon restoration of incoming control power, the relay panel electronics shall be restarted and resume normal operations, and all circuits will be maintained in the condition they were last in.
 - 7. The control system shall be provided with spare relays as indicated on the relay panel schedules and any required programming expandability for the spare relays.
 - 8. Basis of Design:
 - a. Lighting Control and Design - “Blue Box LT Series”.
 - b. Substitutions permitted as listed in paragraph 2.1A.
- B. Intelligent digital switching shall be provided operating on the dual twisted pair communication wire. Switches shall be available in single, dual, quad, or octal (1-button, 2-button, 4-button, or 8-button) designs. The single, dual, and quad devices shall mount in a standard single-gang box, the octal version in a two-gang box.
- 1. Each button shall be individually programmable. Programming of buttons shall not require the use of a computer or other programming device. It shall be possible to assign relays or channels to buttons using a simple button press interface. Each button can control any one of the following options:
 - a. Any individual relay in any single panel.
 - b. Any group of relays in any single panel.
 - c. Any group of relays in the system (via network clock, Automation Appliance, or WinControl software package).
 - 2. Switches shall be constructed of non-breakable Lexan on all exposed parts and shall include a matching screw-less Lexan wall plate.
 - 3. Switch LED pilot lights shall flash green to indicate impending off sweep during the five-minute grace period following blink warning of the lights. Once the button is pressed, the LED will change to Red to acknowledge the occupant's override command to keep lights ON.
 - 4. Multiple data line switches programmed to control the same relay or relay group shall indicate the same status automatically.
 - 5. Each switch shall also include a locator light illuminating the switch for easy location in the dark.
 - 6. The dual, quad, and octal switches shall all include a single master button that will override all relays controlled by the individual buttons OFF, or Restore them to their original state. Each switch's master button configuration can be altered to perform a Master ON/OFF, OFF Only, or Disabled function if desired.
 - 7. Each switch shall be available in a Key lock version to avoid unauthorized control.
 - 8. Basis of Design:
 - a. Lighting Control and Design - “Chelsea” Series.
 - b. Substitutions permitted as listed in paragraph 2.1A.

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 controls.
- E. System Programming
 - 1. Manufacturer shall provide system programming including:
 - a. Wiring documentation.
 - b. Switch operation.
 - c. Operating schedules.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
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SECTION 260800

COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. The Postal Service has retained an independent Commissioning Authority to provide Commissioning Services and a Commissioning Plan to confirm that the functionality of new equipment and systems meets the original design intent, operates efficiently, and demonstrates that all the required features of the new system are functioning as specified in the design documents.
- B. This Section and other Sections in the Project Manual detail the Contractor's responsibilities relative to the Commissioning process.

1.2 RELATED REQUIREMENTS

- A. Commissioning Plan: Available for reference.
- B. Section 013200 - Construction Progress Documentation.
- C. Section 013300 - Submittal Procedures.
- D. Section 017704 - Closeout Procedures and Training.
- E. Section 019113 - General Commissioning Requirements.
- F. Section 220800 - Commissioning of Plumbing.
- G. Section 230800 - Commissioning of HVAC.

1.3 REFERENCE STANDARDS

- A. ASHRAE/EIS Standard 202-2018, "Commissioning Process for Buildings and Systems".
- B. ASHRAE Guideline, "Preparation of Operating and Maintenance Documentation for Building Systems".
- C. AABC Commissioning Group (ACG).
- D. NEBB – Procedural Standards for Building Systems Commissioning.
- E. National Electric Code (NEC).
- F. American Society for Testing and Materials (ASTM).
- G. Electronics Industry Association/Telecommunications Industry Association (EIA/TIA).
- H. Illuminating Engineering Society (IES).
- I. Institute of Electrical and Electronics Engineers (IEEE).
- J. International Electrical Testing Association (NETA).
- K. National Electrical Manufacturers Associates (NEMA).
- L. National Fire Protection Association (NFPA).
- M. Underwriters Laboratory, Inc. (UL).

1.4 COMMISSIONING SCHEDULING

- A. Refer to Section 019113 - General Commissioning Requirements.

1.5 SUBMITTALS

- A. Start-Up Procedures: Provide quality assurance procedures, checklists, and manufacturer's installation and start-up procedures for all electrical equipment and systems to be commissioned.

- B. Field Testing Agency Reports: Prior to the Acceptance Phase, provide all documentation from independent testing agencies required by the contract.
- C. Test Kits: Provide prior to the Acceptance Phase.
- D. Equipment Warranties. Provide prior to the start of the Acceptance Phase.

1.6 QUALITY ASSURANCE

- A. Electrical Testing Equipment and Instrumentation: Provide all instrumentation necessary to accomplish the testing indicated in the Commissioning Plan. Quality and accuracy to be sufficient to test and measure system performance with the tolerances specified. Calibrate all equipment according to the manufacturer's recommended intervals. Calibration tags to be affixed or certificates readily available.
- B. Test Kits: Provide new, previously used test kits are unacceptable.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 COMMISSIONING CONSTRUCTION PHASE

- A. Provide assistance from list contractors as needed during the start-up process to confirm that the functionality of the new equipment meets the original design intent, operates efficiently, and demonstrates that all of the required features of the new system are functioning as specified in the design documents.
- B. Start-up requirements for electrical systems and equipment:
 - 1. List specific requirements as needed

3.2 COMMISSIONING ACCEPTANCE PHASE

- A. Provide assistance in functional performance testing from [list other contractors as needed] to:
 - 1. Manipulate electrical systems to facilitate functional performance testing.
 - 2. List requirements as needed
- B. Functional performance testing requirements for electrical systems and equipment:
 - 1. List requirements as needed

3.3 COMMISSIONING WARRANTY PHASE

- A. Provide assistance in functional performance testing from [list other contractors as needed] to:
 - 1. Participate as required in seasonal testing.
 - 2. List other requirements as needed

END OF SECTION

USPS CSF Specification issued: 10/1/2021
Last revised: 8/5/2021

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 4th 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. Panelboards shall be UL Listed and labeled and shall be designed in accordance with the applicable standards of ANSI and NEMA.
- C. 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
 4. No Substitutions permitted.

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 circuit breakers equipped with padlockable handle attachments, padlocks and keys for padlocking the breaker in the "on" position when used to serve Fire Alarm, Security and CCTV Systems. Handle padlock attachment shall be similar to Square D types #QOHPL or #QO1PA with padlock and keys or Garvin Industries #UBL2-UPC. Key operated, circuit breaker attachments utilizing a screwdriver or allen wrench shall not be acceptable.
 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 ¼ 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. Perform inspections and tests listed in NETA ATS, Section 7.6.
- D. 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.
- E. 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: 10/1/2021
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SECTION 262726

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wall switches.
 - 2. Receptacles.
 - 3. Device plates and box covers.
 - 4. Multi-Outlet surface raceway.
 - 5. TelePower Poles.
 - 6. Digital Interval Countdown Timer Switch
- 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. National Electrical Contractors Association (NECA):
 - 1. NECA "Standard of Installation."
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Device -- Dimensional Requirements.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.
- A. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Provide Products listed and classified by Underwriters Laboratories, Incorporated.

1.4 SUBMITTALS

- A. Product data required.

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.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. 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.
- D. Single Pole Switch:
1. Leviton Cat. No.1221-2.
 2. P&S Cat. No. PS20AC1.
 3. Hubbell Cat. No. HBL1221.
- E. Double Pole Switch:
1. Leviton Cat. No. 1222-2.
 2. P&S Cat. No. PS20AC2.
 3. Hubbell, Cat. No. HBL1222.
- F. Three-way Switch:
1. Leviton, Cat. No. 1223-2.
 2. P&S Cat. No. PS20AC-3.
 3. Hubbell Cat. No. HBL1223.
- G. Indicator Switch:
1. Leviton Cat. No. 1221-PLR (Red).
 2. P&S Cat. No. PS20AC1-RPL (Red).
 3. Hubbell Cat. No. HBL1221PL (Red).
- H. Locator Switch:
1. Leviton Cat. No. 1221-LHC (Clear).
 2. P&S Cat. No. PS20AC1-CSL (Clear).
 3. Hubbell Cat. No. HBL1221IL (Clear).
- I. Locking Switch:
1. Leviton Cat. No. 1221-2L.
 2. P&S Cat. No. PS20AC1-L.
 3. Hubbell Cat. No. HBL1221L.
- J. 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. Tamper and Weather Resistant GFCI Receptacle (Side Wired Feed-Thru):
1. Hubbell Cat. No. GFR5362SG.
- 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. Coverplate: Coverplates to be installed within the Retail Areas on “blue” or “red” painted walls shall be black smooth thermoplastic. All other coverplates shall be white smooth thermoplastic unless otherwise noted.
1. Sierra TP8-W.
- C. Weatherproof Coverplate: Gasketed cast metal with hinged gasketed device.
1. Sierra 4510 cast aluminum.
- D. Integral locking and pad-lockable coverplates:
1. Duplex receptacles shall be equipped with Decora style, stainless steel, single gang, locking coverplates: Pass & Seymour/Legrand #WR26L.
 2. Quadraplex receptacles shall be equipped die-cast metal, low profile, two gang, flip type, pad-lockable coverplates: Hubbell/TayMac #MX2050S.
 - a. Provide two (2) keyed, padlocks for each quadraplex coverplate: Master Lock #4120KA.
 - b. All quadraplex receptacles to be keyed alike.

2.4 MULTI-OUTLET SURFACE RACEWAY

- A. Manufacturer: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
1. Legrand/Wiremold, West Hartford, CT (800) 621-0049.
 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Raceway Material: Anodized aluminum with manufacturer’s standard hardware and fittings. Length as indicated on drawings.

- C. Wire: Factory pre-wired with No. 12 AWG minimum. Provide equipment grounding conductor.
- D. Wiring Devices: NEMA5-20R duplex receptacles and/or telecommunication outlets. Quantity as indicated on drawings.
- E. Provide single channel raceway for applications requiring power receptacles only. Provide dual channel raceway for applications requiring power receptacles and telecommunications outlets.
- F. Single channel, single cover raceway.
 - 1. Wiremold #AL3000 Series.
- G. Dual channel, single cover raceway
 - 1. Wiremold #AL4000 Series.

2.5 TELE/POWER POLE

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Legrand/Wiremold, West Hartford, CT (800) 621-0049.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Raceway Material: Anodized aluminum with manufacturer's standard hardware and fittings. Length as indicated on drawings.
- C. Wire: Factory pre-wired with No. 12 AWG minimum. Provide equipment grounding conductor.
- D. Wiring Devices: NEMA5-20R duplex receptacles and/or telecommunication outlets. Quantity as indicated on drawings.
- E. Basis of Design: Wiremold NP620 Series.

2.6 DIGITAL INTERVAL COUNTDOWN TIMER SWITCH

- A. Provide flush wall mounted line voltage, digital, countdown timer switch with the following features:
 - 1. The timer switch shall be preset to turn loads "off" after a preset interval time of 60 minutes maximum. Switch shall be equipped with manual on/off pushbutton.
 - 2. Timer switch shall mount in a standard single gang wall box and shall fit behind a decorator style face plate. The control switches shall not protrude more than 1/8 inch from the wall.
 - 3. Timer switch shall have no minimum load requirement from 0 to 800 Watt @ 120 VAC - 60 Hz.
 - 4. Optional flash and beep warnings shall notify occupants when the interval countdown reaches one minute.
 - 5. The switch shall not require a neutral, simplifying installation and shall feature terminal style wiring, which makes installation easier.
 - 6. Basis of Design:
 - a. Sensor Switch #PTS-60 (60 minute max.)
 - b. Intermatic #EI215 (1800W @ 120 VAC).

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 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 wiring devices as indicated, in accordance with manufacturer's written instruction, applicable requirements of the NEC and NECA "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements
- 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 galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- H. Provide coverplates on switch, receptacle, and blank outlets.
- I. Receptacles mounted within 8 feet of a fire extinguisher shall be equipped with integral locking or pad-lockable coverplates as specified in paragraph 2.3 D.

3.4 LABELING

- A. All coverplates for receptacles and switches shall be labeled with the branch circuit number. Label shall be machine generated and permanently affixed to the outside of the coverplate.

3.5 CONSTRUCTION

- A. Interface with other work:
 - 1. Coordinate locations of outlet boxes provided under Section 260533 to obtain mounting heights indicated on Drawings.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 – Quality Requirements: Field inspection.
- B. Prior to energizing circuitry, test wiring for electrical continuity, and for short circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements.
- C. Inspect each wiring device for defects.
- D. Operate each wall switch with circuit energized and verify proper operation.
- E. Verify that each receptacle device is energized.
- F. Test each receptacle device for proper polarity.
- G. Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING

- A. Adjust devices and wall plates to be flush, level and plumb with wall.

3.8 CLEANING

- A. Section 017300 Execution: Cleaning installed work.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

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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. National Electrical Testing Association (NETA):
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

- B. National Electrical Contractors Association (NECA):
 - 1. NECA SI - Standard of Installation.

- C. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA KS 1 - Enclosed Switches.

- 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. 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. Perform Work in accordance with NECA SI.
- B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years documented experience.
- C. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for purpose specified and indicated.

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 not 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. Section 014000 - Quality Requirements: Field testing and inspection.

- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.

END OF SECTION

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SECTION 264100

FACILITY LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. The work covered by this section of the specifications consists of furnishing all labor, materials and items of service required for the completion of a functional and unobtrusive, UL 96A master labeled, lightning protection and grounding system as approved by the Engineer and in strict accordance with this section of the specifications
1. If any departure from these specifications or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted as soon as practicable to the Engineer for approval. No such departures shall be made without the prior written approval of the Engineer.
- B. Section Includes:
1. Air terminals and bases.
 2. Grounding electrodes.
 3. Lightning Protection Conductors.
 4. Grounding and bonding for lightning protection.
- C. Substitutions:
1. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- 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.
- E. Related Sections:
1. Section 260500 - Common Work Results for Electrical.
 2. Section 264128 – Surge Protective Devices (SPDs).

1.2 REFERENCES

- A. Lightning Protection Institute (LPI):
1. LPI-175 - Lightning Protection Installation Standard.
 2. LPI-176 - Lightning Protection System Material and Components Standard.
 3. LPI-177 - Inspection Guide for LPI Certified Systems.
- B. National Fire Protection Association (NFPA):
1. NFPA 780 - Lightning Protection Code.
- C. Underwriters Laboratories, Inc. (UL):
1. UL 96 - Lightning Protection Components.
 2. UL 96A - Installation Requirements for Lightning Protection Systems.

1.3 SUBMITTALS

- A. Submit shop drawings showing layout of air terminals, grounding electrodes, and bonding connections to structure and other metal objects. Include terminal, electrode, and conductor sizes, and connection and termination details. Drawings shall include full layout of cabling and points, and connections.
- B. Submit product data showing dimensions and materials of each component, and include indication of listing in accordance with ANSI/UL 96.
- C. Submit manufacturer's installation instructions.
- D. Submittal shall include ground test wells.

1.4 PROJECT AS-BUILT DOCUMENTS

- A. Submit project as-built documents.
- B. Accurately record actual locations of air terminals, grounding electrodes, bonding connections and routing of system conductors.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience and member of Lightning Protection Institute.
- B. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience, certified by manufacturer as an "Approved Installer," and certified by Lightning Protection Institute.

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. Harger Lightning Protection, Inc., Grays Lake, IL (800) 842-7437.
 - 2. Heary Brothers Lightning Protection Company, Springville, NY (716) 941-6141.
 - 3. Independent Protection Co., Inc., Goshen, IN (800) 860-8388.
 - 4. Thompson Lightning Protection Company, St. Paul, MN (800) 777-1230.
 - 5. Robbins Lightning Inc., Maryville, MO (800) 426-3792.

2.2 STANDARDS

- A. All equipment used in this installation shall be UL approved and labeled in accordance with UL procedures, with each air terminal bearing an "A" label and all main conductors bearing a "B" label at 10 ft. – 0 in. intervals.
- B. All equipment shall be new, the product of a single manufacturer as outlined above, and of a design and construction to suit the application where it is used in accordance with accepted industry standards and L.P.I. and UL code requirements.

2.3 EQUIPMENT

- A. All materials shall be copper, aluminum or bronze as indicated on the drawings. All materials shall be UL approved and labeled and of the size, weight, and construction for use on building in accordance with L.P.I. and UL Code requirements for Class I structures and as per manufacturer's recommendations.
- B. Air terminal bases shall be of cast construction with bolted pressure cable connections and shall be securely mounted with stainless steel screws or bolts. Crimp type connectors are not acceptable. Bases shall have a minimum surface contact area of 8.5 square inches.
- C. Cable fasteners shall be of cast construction with pressure cable connectors, electrolytically compatible with the conductor and mounting surface and shall be spaced according to UL, L.P.I. and NFPA Code requirements.
- D. Bonding devices, cable splicers and miscellaneous connectors shall be of cast bronze with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable.
- E. Ground rods shall be 3/4 inch diameter, 10 feet long sectional copperweld steel. Obtain 5-OHMS maximum resistance as read with a clamp-on ground reading megger.
- F. All miscellaneous bolts, nuts and screws shall be brass, bronze or stainless steel. Crimp fittings are not acceptable. Stamped bronze materials are not acceptable.
- G. Equipment enclosures less than 3/16 inch thick shall be provided with individual air terminals bonded to the main coursing conductors.
- H. Equipment on ventilators, etc. shall be protected from corrosion in accordance with L.P.I. and UL requirements.
- I. All miscellaneous bolts, nuts and screws shall be stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with UL 96A, ANSI/NFPA 780 and LPI.
- C. Installation shall be made in an inconspicuous manner with conductors coursed to conceal equipment as much as possible. Down conductors shall be concealed within the structure and shall be run in 1 inch PVC conduit. Refer to NFPA 780 (78) 3-12.13.
- D. Where fasteners are to be mounted in masonry or structural work, they shall be furnished to the Masonry or Structural Contractor so they may be installed during construction of the project.
- E. Conductors concealed in steel reinforced concrete shall be installed, bonded, etc. per NFPA 780 (78) 3-18.3 and 3-12.13. Specific attention is brought to the requirements of 3-12.13 requiring down conductors to be connected to reinforced steel at its upper and lower extremities.
- F. Provide proper connections of lightning protection system to all grounded media in and around the protected structure per NFPA 780 (78) 3-23 "Potential Equalization".

- G. Provide proper grounding of all grounding media in, on and around structure to provide common ground potential per NFPA 780 (78) 3-17 including electric service, telephone and antenna system grounds as well as underground metallic piping systems, underground metal conduits, etc.
- H. All exposed conductors located 6 ft. or less above finished floor or finished grade are to be suitably protected/shielded as well as other exposed locations where conductor is subject to mechanical damage.
- I. Coordinate and receive approval of all penetrations of roofing system and mounting to roofing system with Designer and Roofing Contractor prior to submittal of shop drawings.
- J. Coordinate and receive approval of all connections to structural steel, rebar, etc. with Structural Engineer prior to submittal of shop drawings.
- K. Submittal of shop drawing by Contractor is evidence that the Contractor has received approval of penetrations, connections, etc., by all parties and that Contractor assumes responsibility for such penetrations, connections, etc.
- L. Locate air terminals as required. Take care to insure that all points are within 2 ft. - 0 in. of outside building edge, outside corners and ridge ends, and that maximum spacing does not exceed 20 ft. - 0 in, and that minimum projection above object protected is 10 inches.
- M. Maintain horizontal or downward coursing of main conductor and insure that all bends have at least an 8 inch radius and do not exceed 90 ft.
- N. Support all roof coursing conductors, down leads and bonding cables at 3 ft. - 0 in. on center maximum.
- O. Ground electrodes shall be installed within precast concrete handholes (11 inch x 17 inch x 12 inch D, minimum) Install handholes in unpaved, accessible areas, but in no instance less than 1 ft. - 0 in. below grade and 2 ft. - 0 in. from foundation wall. Handholes shall be amply sized to allow future resistance testing of the rod and conductor. Driven rods shall penetrate earth at least 10 ft. - 0 inch. All down conductors and below grade connections shall be bonded to the electrodes utilizing exothermic welds.
 - 1. Handholes that must be installed within paved areas shall be equipped with traffic rated, extra heavy duty, bolt down covers (rated 22,500 lbs.)
- P. Bond to all metal bodies of conductance on roof with main size conductors as shown and as required by UL codes. These bonds include, but are not limited to, exhaust fans, vents, handrails, metal screens and panels, HVAC units, hatches, skylights, cooling towers, flag poles, antennas, etc., or any large metal body subject to direct stroke or exceeds the height of adjacent air terminals.
- Q. Bond to metal bodies of conductance located within 6 ft. - 0 in. of main conductor or other bonded object with approved secondary bonding conductor as shown and as required by UL codes. Such objects include, but are not limited to, flashings, metal coping caps, gravel guards, fascias, roof drains, down-spouts, interior ducts, machinery or piping, etc., or, in general, any isolated body at or below the roof subject to inductance and within 6 ft. - 0 in. of system.

3.2 FIELD QUALITY CONTROL

- A. The resistance of the lightning protection 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, by driving additional ground rods, lengthening ground rods or installing ground enhancement materials; then retest to demonstrate compliance. Furnish written report of all tests.

- B. Obtain the service of Underwriters Laboratories, Inc. to provide inspection and certification of the lightning protection system under provisions of UL 96A. Submit certification and submit in O&M Manual.
- C. Obtain UL Master Label per UL 96A. Submit copy of paperwork to the USPS Project Manager and submit in O&M Manual.
- D. Submit test results on each ground location including final length of each ground rod and final distance between each installed ground rod at each ground rod location.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
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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 264100 – Facility Lightning Protection.
 - 3. Section 265600 – Exterior Lighting.
 - 4. Section 275116 – IP Integrated, Public Address Zone Paging Systems.
 - 5. Section 281600 – Intrusion Detection System.
 - 6. Section 282304 – Analog CCTV System.
 - 7. Section 282305 – Integrated Security and Investigative Platform (ISIP) CCTV System.
 - 8. Section 283100 – Fire Detection and Alarm System (Horn/Strobes).

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, 4th Edition, effective December 30, 2017 – 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, 4th 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. SPDs must be manufactured in the United States.
- B. Manufacturer Qualifications: Engage a firm with at least ten (10) years experience in manufacturing transient voltage surge suppressors.
- C. Manufacturer shall be ISO 9001 or 9002 certified.
- D. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- E. 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/Advanced Protection 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.
 - 5. Ditek Surge Protection, Largo, FL, (800) 753-2345.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 SERVICE ENTRANCE SURGE PROTECTIVE DEVICES (SPDs)

- A. Models:
 - 1. Basis of Design: Advanced Protection Technologies: "TEXAS" Series.
- B. Surge Protective Device Description: Replaceable module type complying with UL 1283 and UL 1449 4th Edition Listed. Provide unit with the following features and accessories:
 - 1. LED indicator lights for power and protection status.
 - 2. Audible alarm, with silencing switch, to indicate when protection has failed.
 - 3. One set of dry contacts rated at 5.0 amperes, 240 volts ac, for remote monitoring of 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) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.
- 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 300 kA.
- H. Connection Means: Permanently wired via internal or external disconnecting means.
- I. Protection modes and UL 1449 4th Edition Voltage Protection Rating for grounded WYE circuits with voltages of 480Y/277, 3-phase, 4-wire shall be as follows:

VOLTAGE	L-N	L-G	N-G
208Y/120V	700V	700V	700V

- J. Install devices at service entrance at load side, with ground lead bonded to service entrance ground.

K. Test unit in accordance with manufacturer’s written instructions.

2.3 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 4th 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 4th Edition Voltage Protection Rating for grounded WYE circuits with voltages of 480Y/277, 3-phase, 4-wire shall be as follows:

VOLTAGE	L-N	L-G	N-G
208Y/120V	700V	700V	700V

J. Install devices as close as possible to distribution or branch panelboards.

K. Test unit in accordance with manufacturer’s written instructions.

2.4 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 4th Edition verifiable by visiting UL.com.

2. SPD shall provide surge current L-N or L-G mode of protection.

3. Every mode of protection shall be protected by internal overcurrent and thermal overtemperature controls.

4. 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 4th 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

5. SPD shall have a warranty for a period of five years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

B. Signal line protection

1. SPD shall be solid state, silicon avalanche diode circuitry for protection from overvoltages on 2 or 4 wire signal lines such as balanced pair telephone, metallic pair telephone, buried and overhead field cable, remote radio equipment, and control systems. Unit shall have an external ground lug or wire. Connect ground lug or wire to protected equipment grounding system with a No. 12 green insulated stranded ground wire as short as possible.
 - a. Pins Protected: Pins 4, 5 on the RJ- 45 Interface; Pins 3, 4 on the RJ- 11 Interface
 - b. Clamping Voltage: 310 Volts in 500 nsec
 - c. Surge Capacity: 1500 Watts for 1 msec;
 - d. Protection Mode:
 - 1) Common Mode Pins 4, 5 to shielding braid
 - 2) Differential Mode Pins 4,5
 - e. Shall be listed to UL497A Telco Specification

C. Video 75 ohm coaxial cable

1. Solid state, silicon avalanche diode circuitry for non-interrupting overvoltage protection of RG-59/U coaxial cable. Unit shall be provided with one female input connector for "F" series male connector, one output RG-59/U coax cable terminated with an "F" series male cable end connector and A #16 stranded, 18 inch long grounding wire on output end of unit or similar arrangement. Securely mount adjacent to protection equipment and ground to equipment or local building ground if an equipment ground is not available.
 - a. Normal Operating Characteristics
 - 1) Voltage5.8V max
 - 2) Current.....500ma max
 - 3) Frequency.....DC to 10 Mhz
 - 4) Insertion Loss.....3.5db @ 4Mhz
 - b. Protection Requirements
 - 1) Transient suppression level.....7.5v Voltage Protection Level
 - 2) Transient response.....<5 nanoseconds
 - 3) Operating temp.....-20° C to +50° C
 - 4) Energy dissipation.....15,000 watts (10X1000 Test Wave)

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 40A 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 TESTING

- A. Check tightness of all accessible mechanical and electrical connections to assure they are torqued to the minimum acceptable manufacture's recommendations.
- B. Check all installed panels for proper grounding, fastening and alignment.

END OF SECTION

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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. Light Sources.
 6. Luminaire accessories.
- B. Substitutions:
1. Section 016000 - Product Requirements: Product substitutions permitted by manufacturers listed in 2.1A.
- 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 ANSILG 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 LED array 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. Evenlight, Trevose, PA (800) 872-0879.
 - 12. Gardco Lighting, San Leandro, CA (800) 227-0758.
 - 13. GE Lighting Systems, Charlotte, NC (803)462-2016.
 - 14. Gotham Lighting, Conyers, GA (800) 315-4982.
 - 15. Guth Lighting, St. Louis, MO (314) 533-3200.
 - 16. H.E.Williams, Carthage, MO (417) 358-4065.
 - 17. Holophane, Newark, OH (740) 345-9631.
 - 18. Hubbell Lighting, Inc., (Columbia, Spaulding, Sterner) Spartanburg, SC (864) 599-6000.
 - 19. Intense Lighting LLC, Anaheim, CA (800) 961-5321.
 - 20. Indy Lighting, Fishers, IN (817) 849-1233.
 - 21. Kenall Manufacturing, Gurnee, IL (847) 360-8200.
 - 22. Killark Electric, Fenton, MO (314) 531-0460.
 - 23. Kirlin Lighting, Detroit, MI (313) 259-6400.
 - 24. Kramer Lighting, Sturtevant, WI (800) 236-6800.
 - 25. Kurt Versen Company, Westwood, NJ (201) 664-8200.
 - 26. Kurtzon Lighting, Chicago, IL (773) 277-2121.
 - 27. LaMar Lighting, Farming Dale, NY (631) 777-7700.
 - 28. LightAlarms (Thomas & Betts) Montreal, ON (888) 552-6467.
 - 29. Lithonia Lighting, Conyers, GA (770) 922-9000.
 - 30. LSI Industries, Cincinnati, OH (513) 793-3200.
 - 31. Lumax Industries, Altoona, PA (814) 944-2537.
 - 32. Omega Lighting, Tupelo, MS (800) 234-1890.
 - 33. Orion Energy Systems, Inc., Manitowoc, WI (800) 660-9340.
 - 34. Phoenix Products, Milwaukee, WI (414) 438-1200.
 - 35. Prescolite Lighting, Spartanburg, SC (864) 599-6000.
 - 36. Prudential Lighting, Los Angeles, CA (213) 746-0360.
 - 37. Vista Lighting, Tupelo, MS (662) 690-4105.
 - 38. Zumtobel Staff, Highland, NY (800) 448-4131.

2.2 LUMINAIRE TYPES

A. **Type A1** Lithonia #2BLT4-XXX-ADP-EZ1-LP840.

1. Description: Recessed, 2 ft. W x 4 ft. L x 3 inch 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 – 24W at 3000 Lumen, 32W at 4000 Lumen, 38W at 5000 Lumen or 48W 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, 5000 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. Substitutions permitted: As listed in paragraph 2.1A.

B. **Type A2** Lithonia #2BLT2-XXX-ADP-EZ1-LP840.

1. Description: Recessed, 2 ft. W x 2 ft. L x 3 inch 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 – 16W at 2200 Lumen, 27W at 3300 Lumen or 32W at 4100 Lumen. Wattage based on lumen package selected.
5. Mounting:
 - a. Recessed in inverted T suspended ceiling.
 - b. Recessed in a gypsum board ceiling. Provide frame-in kit or plaster frame.
6. Lamps: 2200 Lumen, 3300 Lumen or 4100 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 #LCAT22-40-XXXX-G-ED-U.
 - b. Metalux #22RTC-XX-UNV-L840-CD-U.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

C. **Type A3** Lithonia #BLT4-XXX-ADP-EZ1-LP840.

1. Description: Recessed, 1 ft. W x 4 ft. L x 3 inch 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 – 12W at 1500 Lumen, 16W at 1900 Lumen, 24W at 3000 Lumen, 33W at 4100 Lumen, 40W at 5000 Lumen or 50W at 6100 Lumen. Wattage based on lumen package selected.
5. Mounting:
 - a. Recessed in inverted T suspended ceiling.
 - b. Recessed in a gypsum board. Provide frame-in kit or plaster frame.
6. Lamps: 1500 Lumen, 1900 Lumen, 3000 Lumen, 4100 Lumen, 5000 Lumen or 6100 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 #LCAT14-40-XXXX-G-ED-U.

- b. Metalux #14RTC-XX-UNV-L840-CD-U.
 - c. As listed in paragraph 2.1A.
- D. **Type A5** Lithonia #STL4-XXX-EZ1-LP840.
1. Description: 10 inch W x 4 ft. L x 4 inch D surface volumetric LED luminaire, non-air handling.
 2. Refractor: Impact modified, linear – faceted refractor with diffusing film.
 3. Housing:
 - a. 20 gauge steel body with die-cast end caps.
 - b. White baked enamel or powder coated finish.
 4. Ballast/Driver: LED high efficiency – 20W at 2000 Lumen, 27W at 3200 Lumen, 35W at 4000 Lumen or 45W at 5100 Lumen. Wattage based on lumen package selected.
 5. Mounting: Surface ceiling mounted.
 6. Lamps: 2000 Lumen, 3200 Lumen, 4000 Lumen or 5100 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. Columbia #LAW4-40-XX-ED-U.
 - b. Metalux #2WSNLED-LD4-XXXL-F-UNV-L840-CD1.
 - c. Substitutions permitted: As listed in paragraph 2.1A.
- E. **Type A6** Lithonia #WL4-XXX-EZ1-LP840.
1. Description: 5 inch W x 4 ft. L x 3 7/8 inch 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 2200 Lumen, 28W at 3200 Lumen or 40W at 4300 Lumen. Wattage based on lumen package selected.
 5. Mounting: Surface ceiling mounted.
 6. Lamps: 2200 Lumen, 3200 Lumen or 4300 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. Substitutions permitted: As listed in paragraph 2.1A.
- F. **Type B1** Kenall #ES848-XXX40K-2H-PP.
1. Description: 8 in. x 4 ft. long enclosed and gasketed LED luminaire. UL listed for damp location.
 2. Lens: UV-stabilized, pearlescent, polycarbonate; smooth exterior and linear prismatic interior, 0.125 inches thick.
 3. Housing:
 - a. 20 gauge steel housing.
 - b. White polyester powder coated.
 4. Ballast/Driver: LED high efficiency – 49W at 5100 Lumen, 73W at 7800 Lumen or 97W at 10,000 Lumen. Wattage based on lumen package selected.
 5. Mounting: Surface ceiling or pendant mounted.
 6. Lamps: 5100 Lumen, 7800 Lumen or 10,000 Lumen LED array; 4000K rated 80,000 hours at LLD = 0.7 (5100L & 7800L), 60,000 hours at LLD = 0.7 (10,000L).
 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
 8. Alternate Manufacturers:
 - a. Fail-Safe #HVSL8-4-LD4-X-XXX-40-UNV-0-EDD-X.
 - b. Kurtzon #FP-FPD-1-40-X/LEDR-840-UNV.
 - c. Substitutions permitted: As listed in paragraph 2.1A.
- G. **Type B2** #Kenall ES896-XXX40K-2H-PP.
1. Description: 8 in. x 8 ft. long enclosed and gasketed LED luminaire. UL listed for damp location.

2. Lens: UV-stabilized, pearlescent, polycarbonate, smooth exterior and linear prismatic interior, 0.125 inches thick.
3. Housing:
 - a. 20 Gauge steel housing.
 - b. White polyester powder coated.
4. Ballast/Driver: LED high efficiency – (2) 49W at 5100 Lumen each, (2) 73W at 7800 Lumen each or (2) 97W at 10,000 Lumen each. Wattage based on lumen packages selected.
5. Mounting: Surface ceiling or pendant mounted.
6. Lamps: (2) 5100 Lumen, (2) 7800 Lumen or (2) 10,000 Lumen LED arrays, 4000K rated 80,000 hours at LLD=0.7 (5100L & 7800L), 60,000 hours at LLD=0.7 (10,000L).
7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
8. Alternate Manufacturers:
 - a. Fail-Safe #HVSL8-8-LD4-X-XXX-40-UNV-0-EDD-X.
 - b. Substitutions permitted: As listed in paragraph 2.1A.

H. **Type B3** Lithonia #WL2-18L-EZ1-LP840-NES7/N80.

1. Description: 5 inch W x 2 ft. L x 3 7/8 inch D, surface mounted, LED luminaire. UL listed for damp location.
2. Refractor: Impact modified, linear-faceted refractor with diffusing film.
3. Housing:
 - a. 20 gauge steel housing with die cast end caps.
 - b. White polyester powder coated finish.
4. Ballast/Driver: 18 Watt, 1900 Lumen.
5. Mounting: Surface wall or ceiling.
6. Lamp: 1900 Lumen, 4000K, LED array; 60,000 Hours at LLD = 0.9.
7. Luminaire shall be equipped with integral occupancy sensor to control 50% high light output.
8. Alternate Manufacturers:
 - a. Metalux #2SWLED-20SL-LN-UNV-L840-CD1.
 - b. Columbia #CWM2-40-MW-SM-FR-FA-ED-U-OW.
 - c. Columbia #ESL2-40-MW-FA-W-ED-U-NXOS.
 - d. Orion (Apollo) #SWHU1-036L-UNV-FD30-AP-840.
 - e. Substitutions permitted: As listed in paragraph 2.1A.

I. **Type B4** Lithonia #FEML48-XXXX-IMAFL-MD-40K-80CRI-STSL-SPD.

1. Description: 7" x 4 ft. long enclosed and gasketed LED luminaire. UL listed for wet location.
2. Lens: 4 ½ inch Deep high impact, injection molded, acrylic lens; linear ribbed frosted, 0.08 inches thick.
3. Housing:
 - a. One piece, 5 VA fiberglass housing with stainless steel latches.
 - b. NEMA 4x, IP65 rated.
4. Ballast/Driver:
 - a. LED high efficiency – 18W at 2900 Lumen, 24W at 3800 Lumen, 38W at 5600 Lumen, 51W at 7400 Lumen or 62W at 9200 Lumen. Wattage based on lumen package selected.
 - b. Integral 10 KV/5 kA surge protection device.
5. Mounting: Surface ceiling or wall mounted.
6. Lamps: 2900 Lumen, 3800 Lumen, 5600 Lumen, 7400 Lumen or 9200 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. Metalux #4VT2-LD5-X-DR100-WL-SSL.
 - b. Columbia #LXEM4-40-XX-RFA-E-U.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

J. **Type B5** Lithonia #FEML96-XXXX-IMAFL-MD-40K-80CRI-STSL-SPD.

1. Description: 7" x 8 ft. long enclosed and gasketed LED luminaire. UL listed for wet location.
2. Lens: Deep high impact, injection molded, acrylic lens; linear ribbed frosted, 0.08 inches thick.
3. Housing:
 - a. One piece, 5 VA fiberglass housing with stainless steel latches.

- b. NEMA 4x, IP65 rated.
- 4. Ballast/Driver:
 - a. LED high efficiency – 54W at 8500 Lumen, 76W at 11,000 Lumen, 94W at 14,000 Lumen, 104W at 17,000 Lumen or 126W at 19,000 Lumen. Wattage based on lumen package selected.
 - b. Integral 10 KV/5 kA surge protection device.
- 5. Mounting: Surface ceiling or wall mounted.
- 6. Lamps: 8500 Lumen, 11,000 Lumen, 14,000 Lumen, 17,000 Lumen or 19,000 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. Metalux #8VT2-LD4-X-DR100-WL-SSL.
 - b. Columbia #LXEM8-40-XX-RFA-E-U.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

K. Type CL1 Lithonia #ZLIN-L48-XXXX-FST-40K.

- 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 3300 Lumen, 34W at 4600 Lumen or 52W at 6800 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: 3300 Lumen, 4600 Lumen or 6800 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. Columbia Lighting #MPS4-40XX-FW-EDU.
 - b. Metalux #4SNLED-LD5-XXX-LW-UNV-L840-CD1-U.
 - c. Orion (Harris) #SFHC1 Series with lens.
 - d. Substitutions permitted: As listed in paragraph 2.1A.

L. Type CL2 Lithonia #ZLIN-L24-XXXX-FST-40K.

- 1. Description; 2 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 – 15W at 1800 Lumen, 19W at 2400 Lumen or 31W at 3700 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: 1800 Lumen, 2400 Lumen or 3700 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. Columbia Lighting #MPS2-40XX-FW-EDU.

- b. Metalux #2SNLED-LD5-XXX-LW-UNV-L840-CD1-U.
 - c. Substitutions permitted: As listed in paragraph 2.1A.
- M. **Type CL3** Lithonia #TZLIN-L96-XXXX-FST-40K.
1. Description; 8 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 – 48W at 6800 Lumen, 68W at 9000 Lumen or 104W at 13,000 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: 6800 Lumen, 9000 Lumen or 13,000 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. Metalux #8TSNLED-LD5-XXX-LW-UNV-L840-CD1-U.
 - b. Columbia Lighting #MPS8-40XX-FW-EDU.
 - c. Orion (Harris) #SFHC1 Series with lens.
 - d. Substitutions permitted: As listed in paragraph 2.1A.
- N. **Type EM1** Lithonia #ELSQM-LEX-N.
1. Description: Ceiling mounted semi-recessed 10.5 inch square decorative halogen emergency light unit with nickel-cadmium battery. Provide with line latching, solid-state voltage limiting charger, solid-state switching, low voltage disconnect, brownout circuit, overload, short-circuit protection test switch and power indicator light.
 2. Lens: Lexan lens.
 3. Housing: Black thermoplastic body, UL924 listed, all components meet the UL 94-0.5VA flame retardant standard.
 4. Mounting: Provide with manufacturer rough-in kit for semi-recessed installation.
 5. Voltage: 120.
 6. Lamps: 2 at 8W Tungsten Halogen (included).
 7. Alternate Manufacturers:
 - a. Substitutions permitted: As listed in paragraph 2.1A.
- O. **Type EM2** Lithonia #ELM4L-UVOLT-LTP-SDRT.
1. Description: Compact contemporary design LED emergency light unit with adjustable heads and lithium iron phosphate battery. Provide with line latching, solid-state voltage limiting charger, solid-state switching, low voltage disconnect, brownout circuit, overload, short-circuit protection test switch and power indicator light.
 2. Battery: Sealed, maintenance free, lithium iron phosphate, 11 Watt at 9.6 volt.
 3. Housing: White thermoplastic body, UL924 listed, all components meet the UL 94-0.5VA flame retardant standard.
 4. Mounting: Wall mounted.
 5. Voltage: 120.
 6. Lamps: 640 Lumens total, 2 at 3.3 Watt/9.6 volt. (included)
 7. Alternate Manufacturers:
 - a. Beghelli #XLPLED1-HO.
 - b. Evenlite #TEBL6W-SD.
 - c. Dual-Lite #EVHC12-I-06L.
 - d. Substitutions permitted: As listed in paragraph 2.1A.
- P. **Type EM3** Exitronix #RS6NM-36-REN1-2-W-G2.

1. Description: Industrial design LED emergency light unit with adjustable heads and nickel metal hydride battery. Provide with line latching, solid-state voltage limiting charger, solid-state switching, low voltage disconnect, brownout circuit, overload, short-circuit protection test switch and self test/self diagnostics.
 2. Battery: Sealed, maintenance free, nickel metal hydride, 6 volt, with 36 Watt capacity.
 3. Housing: 20-gauge steel housing finished in white epoxy, powder coat finish, with hinged faceplate for ease of maintenance. UL924 listed, all components meet the UL 94-0.5VA flame retardant standard.
 4. Mounting: Wall mounted.
 5. Voltage: 120.
 6. Lamps: 2 at 3.6 Watt, PAR 18 LED (included).
 7. Alternate Manufacturers:
 - a. Beghelli #EST6V-42.
 - b. Dual-Lite #LM33-N-I-03L.
 - c. Lightalarms #2PN1/DR130-LD10.
 - d. Chloride #6N25-J9 Series.
 - e. Substitutions permitted: As listed in paragraph 2.1A.
- Q. Type EM4** (exterior egress doors) Lithonia #AFF-OEL-XXXXXX-UVOLT-LTP-SDRT-FCT.
1. Description: Wall mounted wet location LED emergency light unit.
 2. Ballast/Driver: LED high efficiency – 2.5W at 635 Lumen LED (forward throw).
 3. Housing: UL listed wet location (NEMA 4X) low profile, die-cast aluminum, sealed and gasketed. Finish by the USPS Project Manager.
 4. Battery: Lithium iron phosphate with self-diagnostics. 32 to 122 degrees F (standard), -22 to 122 degrees F (cold weather), wet locations.
 5. Mounting: Surface wall.
 6. Voltage: 120.
 7. Lamps: 2.5W at 635 Lumen LED array.
 8. Alternate Manufacturers:
 - a. Isolite #ELED-EM-XX Series.
 - b. Compass #CUWZ-PC Series.
 - c. Compass #CUSO Series.
 - d. Sure-Lites #SELW-W Series
 - e. Substitutions permitted: As listed in paragraph 2.1A.
- R. 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. Substitutions permitted: As listed in paragraph 2.1A.
- S. Type R1** Gotham #EVO4-40/XX-WR-MD-MVOLT.
1. Description: Recessed 4.5 inch dia. aperture LED downlight.
 2. Reflector: Low brightness, white painted, self-flanged reflector.
 3. Ballast/Driver: 8 Watt/750 Lumen, 9 Watt/1000 Lumen or 14 Watt/1500 Lumen LED light engine with remote phosphor technology; Wattage based on lumen package selected; 5-year factory warranty.
 4. Housing:
 - a. Frame to be 18 gauge galvanized steel ring.
 - b. Mounting ring shall be secured to grid ceiling bar hangers (supplied with luminaire).
 - c. Luminaire frame to be supported from the structure by at least two opposing corners.
 5. Junction Box:
 - a. Junction box to be code approved for through wiring.
 - b. Junction box to be secured to the mounting ring and accessible from two sides.
 - c. Junction box to be pre-wired and accessible per code through the ceiling trim opening.

6. Mounting:
 - a. 24 inch grid ceiling bar hangers shall be supplied by manufacturer and securely fastened to grid.
 - b. Provide 28 inch 'C' channel mounting bars and flange kit for drywall ceilings.
7. Voltage: 120.
8. Lamp: 750 Lumen, 1000 Lumen or 1500 Lumen, 4000K, remote phosphor enclosed LED array; 60,000 hours at LLD = 0.7.
9. Marking: Luminaires are to be labeled on the interior side with lumen packaged used.
10. Alternate Manufacturers:
 - a. Portfolio #LD4BXXD010-EU4B-1020-80-40-4LBM-1-MW.
 - b. Prescolite Lighting LTR-4RD-H-XX-XXL-DM1 LTR-4RD-T-XX-XXK-8-MD-WC.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

T. Type R2 Gotham #EVO4WW-40/XX-WR-MVOLT.

1. Description: Recessed 4.5 inch dia. aperture LED wall washer type downlight.
2. Reflector: Low brightness, white painted, self-flanged reflector.
3. Ballast/Driver: 8 Watt/750 Lumen, 9 Watt/1000 Lumen or 15 Watt/1500 Lumen LED light engine with remote phosphor technology; Wattage based on lumen packaged selected; 5-year factory warranty.
4. Housing:
 - a. Frame to be 18 gauge galvanized steel ring.
 - b. Mounting ring shall be secured to ceiling bar hangers (supplied with luminaire).
 - c. Luminaire frame to be supported from the structure by at least two opposing corners.
5. Junction Box:
 - a. Junction box to be code approved for through wiring.
 - b. Junction box to be secured to the mounting ring and accessible from two sides.
 - c. Junction box to be pre-wired and accessible per code through the ceiling trim opening.
6. Mounting:
 - a. 24 inch grid ceiling bar hangers shall be supplied by manufacturer and securely fastened to grid.
 - b. Provide 28 inch "C" channel mounting bars and flange kit for drywall ceiling.
7. Voltage: 120.
8. Lamp: 750 Lumen, 1000 Lumen or 1500 Lumen, 4000K, remote phosphor enclosed LED array; 60,000 hours at LLD = 0.7.
9. Marking: Luminaires are to be labeled on the interior side with lumen package used.
10. Alternate Manufacturers:
 - a. Portfolio #LD4BXXD010-EU4B-1020-80-40-4LBSW-XX-1-XX.
 - b. Prescolite Lighting LTR-4RD-H-XX-XXL-DM1 LTR-4RW-T-XX-40K-8-WW-WC.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

U. Type R5 Gotham #EVO6-40/XXX-WR-MD-MVOLT.

1. Description: Recessed 6 inch dia. aperture LED downlight.
2. Reflector: Low brightness, white painted, self-flanged reflector.
3. Ballast/Driver: 10 Watt/1000 Lumen, 15 Watt/1500 Lumen or 20 Watt/2000 Lumen LED light engine with remote phosphor technology; Wattage based on lumen package selected; 5-year factory warranty.
4. Housing:
 - a. Frame to be 18 gauge galvanized steel ring.
 - b. Mounting ring shall be secured to grid ceiling bar hangers (supplied with luminaire).
 - c. Luminaire frame to be supported from the structure by at least two opposing corners.
5. Junction Box:
 - a. Junction box to be code approved for through wiring.
 - b. Junction box to be secured to the mounting ring and accessible from two sides.
 - c. Junction box to be pre-wired and accessible per code through the ceiling trim opening.
6. Mounting:
 - a. 24 inch grid ceiling bar hangers shall be supplied by manufacturer and securely fastened to grid.
 - b. Provide 28 inch 'C' channel mounting bars and flange kit for drywall ceilings.
7. Voltage: 120.

8. Lamp: 1000 Lumen, 1500 Lumen or 2000 Lumen, 4000K, remote phosphor enclosed LED array; 60,000 hours at LLD = 0.7.
 9. Marking: Luminaires are to be labeled on the interior side with lumen package used.
 10. Alternate Manufacturers:
 - a. Portfolio #LD6B-XXXX-D010-EU6B-1020-80-40-6LB-M-1-MW.
 - b. Prescolite Lighting LTR-6RD-H-XX-XXL-DM1 LTR-6RD-T-XX-40K-8-MD-WC.
 - c. Substitutions permitted: As listed in paragraph 2.1A.
- V. **Type UC1** Lithonia #UCLD-24IN-30K-90-SWR-WH.
1. Description: 2 ft. long, under cabinet mounted, LED luminaire, with swivel head.
 2. Lens: Clear acrylic prismatic diffuser shall snap into place without tools.
 3. Housing:
 - a. Low profile extruded aluminum housing.
 - b. White polyester powder coat finish with 92% overall reflectance.
 4. Ballast/Driver:
 - a. LED high efficiency – 13W at 740 Lumen,
 - b. Electrical contractor shall inter-link to an adjacent UC 2/1 luminaire using factory connector (when applicable).
 5. Lamp: 740 Lumen LED array; 3000K, 50,000 hours at LLD=0.7.
 6. Alternate Manufacturers:
 - a. HALO #HU11-24-D9-S-P.
 - b. Columbia #CUC2-CS-ED120.
 - c. Substitutions permitted: As listed in paragraph 2.1A.
- W. **Type UC2** Lithonia #UCLD-18IN-30K-90-SWR-WH.
1. Description: 18 in. long, under cabinet mounted, LED luminaire, with swivel head.
 2. Lens: Clear acrylic prismatic diffuser shall snap into place without tools.
 3. Housing:
 - a. Low profile extruded aluminum housing.
 - b. White polyester powder coat finish with 92% overall reflectance.
 4. Ballast/Driver:
 - a. LED high efficiency – 10W at 585 Lumen.
 - b. Electrical contractor shall inter-link to an adjacent UC 2/1 luminaire using factory connector (when applicable).
 5. Lamp: 585 Lumen LED array; 3000K, 50,000 hours at LLD=0.7.
 6. Alternate Manufacturers:
 - a. HALO #HU11-18-D9-S-P.
 - b. Columbia #CUC1-CS-ED120.
 - c. Substitutions permitted: As listed in paragraph 2.1A.
- X. **Type W1** Lithonia #TZLID-L96-SMR-XXXX-FST-MVOLT-40K.
1. Description: Cable/chain or pendant hung, 8 ft. long, industrial LED, strip light luminaire providing 10% uplighting with locking lampholders and protective wireguards.
 2. Lens: Snap on frosted, diffused lens.
 3. 8 ft. long, symmetrical reflector with uplight #ZLR-L96-SYM-UPL-WH.
 4. Housing:
 - a. Channel and end plates of formed steel, 20 gauge material thickness.
 - b. Reflector and housing shall be white baked enamel with 90% minimum reflectance.
 5. Ballast/Driver: 60W at 8400 Lumen, 81W at 11,400 Lumen or 121W at 16,000 Lumen. Wattage based on lumen packages selected.
 6. Mounting: Wire rope/chain from ceiling structure.
 7. Lamps: 8400 Lumen, 11,400 Lumen or 16,000 Lumen LED array; 4000K, 50,000 hours at LLD=0.7.
 8. Marking: Luminaires are to be labeled on the interior side with lumen package used.
 9. Alternate Manufacturers:
 - a. Mercury #LW4-8-XXXX-40K-HTA-1-UNV-SRA.
 - b. Lumax #CHLEDR-XXXL-4K-96-9.

c. Substitutions permitted: As listed in paragraph 2.1A.

Y. **Type W2** Lithonia #ZLID-L48SMR-XXXX-FST-MVOLT-40K.

1. Description: Cable/chain or pendant hung, 4 ft. long, industrial LED, strip light luminaire providing 10 percent uplighting, with locking lampholders and protective wireguards.
2. Lens: Snap on frosted, diffused lens.
3. Reflector: 4 ft. long, symmetrical reflector with uplight #ZLR-L48-SYM-UPL-WH.
4. Housing:
 - a. Channel and end plates of formed steel, 20 gauge material thickness.
 - b. Reflector and housing shall be white baked enamel with 90% minimum reflectance.
5. Ballast/Driver: 30W at 4000 Lumen, 41W at 5500 Lumen or 59W at 7600 Lumen. Wattage based on lumen packages selected.
6. Mounting: Wire rope/chain from ceiling structure.
7. Lamps: 4000 Lumen, 5500 Lumen or 7600 Lumen LED array; 4000K, 50,000 hours at LLD=0.7.
8. Marking: Luminaires are to be labeled on the interior side with lumen package used.
9. Alternate Manufacturers:
 - a. Mercury #LW4-4-XXXX-40K-HTA-1-UNV-SRA.
 - b. Lumax #CHLEDR-XXXL-4K-48-9.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

Z. **Type W3** Lithonia #TMSL-XXXX-L/LV-MVOLT-GZ10-40K-80CRI-WH.

1. Description: Cable/chain or pendant hung, 8 ft. long, enclosed and gasketed, LED low bay luminaire. U.L. listed for damp locations.
2. Lens: 8 ft. long, enclosed and gasketed diffused acrylic.
3. Housing:
 - a. Full body housing and optical assembly of formed steel, 20 gauge material thickness.
 - b. Housing shall be high gloss, white baked enamel with 90% minimum reflectance.
 - c. Reflector: Internal, anodized, MIRO 5 high reflectance aluminum.
4. Ballast/Driver: 58W at 7300 Lumen, 149W at 17,500 Lumen or 181W at 19,600 Lumen. Wattage based on lumen packages selected.
5. Mounting: Wire rope/chain or pendant from ceiling structure.
6. Lamps: 7300 Lumen, 17,500 Lumen or 19,600 Lumen LED array; 4000K, 60,000 hours at LLD=0.94.
7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
8. Alternate Manufacturers:
 - a. Metalux #8ILED-LD5-XX-W-FL/UPL-UNV-L840-CD.
 - b. Substitutions permitted: As listed in paragraph 2.1A.

AA. **Type W4** Lithonia #MSL-XXXX-L/LV-MVOLT-GZ10-40K-80CRI-WH.

1. Description: Cable/chain or pendant hung, 4 ft. long, enclosed and gasketed, LED low bay luminaire. U.L. listed for damp locations.
2. Lens: 4 ft. long, enclosed and gasketed diffused acrylic.
3. Housing:
 - a. Full body housing and optical assembly of formed steel, 20 gauge material thickness.
 - b. Housing shall be high gloss, white baked enamel with 90% minimum reflectance.
 - c. Reflector: Internal, anodized, MIRO 5 high reflectance aluminum.
4. Ballast/Driver: 29W at 3700 Lumen, 75W at 8700 Lumen or 86W at 9800 Lumen. Wattage based on lumen packages selected.
5. Mounting: Wire rope/chain or pendant from ceiling structure.
6. Lamps: 3700 Lumen, 8700 Lumen or 9800 Lumen LED array; 4000K, 60,000 hours at LLD=0.94.
7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
8. Alternate Manufacturers:
 - a. Metalux #4ILED-LD5-XX-W-FL/UPL-UNV-L840-CD.
 - b. Substitutions permitted: As listed in paragraph 2.1A.

BB. **Type XF1** (hazardous location) Killark #EML-XX-30-XX-G.

1. Description: Vapor tight LED luminaire UL listed for Class I, Div. 2, Groups C,D, hazardous locations.
2. Lens: Heat and impact resistant fluted glass globe.

3. Housing: Body and guard of die-cast aluminum.
4. Ballast/Driver: LED high efficiency – 40W at 3400 Lumen or 50W at 5700 Lumen. Wattage based on lumen package selected.
5. Mounting: Pendant, wall or ceiling mounted.
6. Voltage: 120.
7. Lamps: 3400 Lumen or 5700 Lumen LED array; 4000K.
8. Alternate Manufacturer:
 - a. Solar Ray Lighting #HQH1-043-40-PC-U-GR (ceiling or wall mounted).
 - b. Solar Ray Lighting #HTJM-XX-50-XXX-GG-XX-LG.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

CC. Type X1 Lithonia #LQM-S-W-3R-120/277-ELN-SD.

1. Description: Ceiling, end 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 Series.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

DD. Type X2 Lithonia #LQM-S-W-3R-120/277-ELN-SD.

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 Series.
 - c. Substitutions permitted: 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 nickel cadmium or lithium iron phosphate battery is required to supply a minimum of 90 minutes of emergency power at 700 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 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: 10/1/2021

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SECTION 265600
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior luminaires and accessories.
2. Poles.
3. Ballast/Drivers.

B. Substitutions:

1. Section 016000 – Product Requirements: Product substitutions permitted by manufacturers listed in paragraph 2.1A.

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. 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. GE Lighting Systems, Charlotte, NC (803) 462-2016.
10. Gotham Lighting, Conyers, GA (800) 315-4982.
11. Hadco Lighting, Littlestown, PA (717) 359-7131.
12. H.E. Williams, Carthage, MO (417) 358-4065.
13. Holophane, Newark, OH (740) 345-9631.
14. Hubbell Lighting, Inc., (Kim, Spaulding, Sterner) Spartanburg, SC (864) 599-6000.
15. Hydrel Architectural and Landscape Products, Sylmar, CA 91342 (818) 362-9465.
16. Intense Lighting, Anaheim, CA (800) 961-5322.
17. Kenall Manufacturing, Gurnee, IL (847) 360-8200.
18. Kim Lighting, City of Industry, CA (626) 968-5666.
19. Kirlin Lighting, Detroit, MI (313) 259-6400.
20. Ligman Lighting USA, Hillsboro, OR (503) 645-0500.
21. Lithonia Lighting, Conyers, GA (770) 922-9000.
22. LSI Industries, Cincinnati, OH (513) 793-3200.
23. McPhilben Lighting, San Leandro, CA (510) 357-6900.
24. Pathway Lighting, Old Saybrook, CT (800) 342-0592.
25. Quality Lighting, Franklin Park, IL (847) 451-0090.
26. Visionaire Lighting, Rancho Dominguez, CA (310) 512-6480.
27. Wide-Lite, San Marcos, TX (512) 392-5821

2.2 LUMINAIRE TYPES

A. **Type MH3** (exterior) Lithonia #MRWLED-XX-40K-SRX.

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 at 2200 Lumen, 29W at 3000 Lumen, 40W at 4500 Lumen or 61W at 6000 Lumen. Wattage based on lumen packaged selected.
5. Mounting: Surface wall.
6. Voltage: 208 or 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 #104L-XXL-XXX-NW-G1-X.
 - b. Hubbell #QSP2-XXL-XX-4K7-UNV-DBT.
 - c. Lithonia #WSRLED-XX-40K-SRX.
 - d. McGraw Edison #ISS-AF-XXX-LED-E1-XXX.
 - e. Barron Trace-Lite #TLED111P-XX-VS.
 - f. Deco Lighting #D440-LED-XX-40-UNV-D-XX.
 - g. Substitutions permitted: As listed in paragraph 2.1A.

B. **Type PL1** (exterior) Lithonia #DSXSLED-XXC-XXXX-40K-T5M-MVOLT-SRM.

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. Finish by USPS Project Manager.
3. Ballast/Driver: 26W at 2700 Lumen thru 107W at 11,000 Lumen. Wattage based on lumen package selected.
4. Mounting: Surface mounted with recessed outlet box.
5. Lamp: 2700 Lumen thru 11,000 Lumen LED array; 4000K, 60,000 hours; LLD=0.85.
6. Voltage: 208 or 120
7. Label: U.L. listed for wet locations; IP66 rated with 5-year factory warranty.
8. Alternate manufacturers:
 - a. Philips/Gardco # SFCX-DD-5W-48L-XXX-NW-G2.
 - b. Deco Lighting #D533-PRO-XXX-XX-40-U-5-SU.
 - c. McGraw-Edison #CNC-XXX-LED-E1-XX.
 - d. McGraw Edison #LRC-B-XX-LED-E1-XXX (recessed only).
 - e. Substitutions permitted: As listed in paragraph 2.1A.

C. **Type PL2** (exterior) Lumark #XTORXB-W Series.

1. Description: Slim, low profile, wall mounted, full cut-off LED luminaire. U.L. listed for wet locations.
2. Housing/Lens: Die-cast aluminum housing with flat glass bottom lens.
3. Ballast/Driver: 12W at 1400 Lumen, 18W at 2100 Lumen, 26W at 2700 Lumen or 38W at 4200 Lumen. Wattage based on lumen package selected.
4. Mounting: Surface, wall mounted with recessed outlet box - 4 inch profile.
5. Lamp: 1400 Lumen, 2100 Lumen, 2700 Lumen or 4200 Lumen LED array; 4000K, 72,000 hours; LLD=0.90.
6. Voltage: 208 or 120
7. Label: U.L. listed for wet locations; 5-year factory warranty.
8. Alternate manufacturers:
 - a. Hubbell #SG1-XX-4K7-UNV Series.
 - b. Substitutions permitted: As listed in paragraph 2.1A.

D. **Type PL3** (exterior) Gotham #EVO6-40/XXX-WR-MD.

1. Description: Recessed 6 inch diameter aperture LED downlight.
2. Reflector: Low brightness white painted, self-flanged reflector.
3. Ballast/Driver: 10W at 1000 Lumen thru 176W at 17,500 Lumen. Wattage based on lumen package selected.
4. Mounting Frame: Frame to be 18 gauge galvanized steel ring. Mounting ring shall be secured to ceiling hangers (supplied with luminaire). NOTE: Luminaire frame to be supported from the structure by at least two opposing corners.
5. Junction Box: Junction box to be code approved for through wiring. Junction box to be secured to the mounting ring and accessible from two sides. Junction box to be pre-wired and accessible per code through the ceiling trim opening.
6. Mounting: 28 inch 'C' channel mounting bars and flange kit for drywall ceilings.
7. Voltage: 208 or 120
8. Lamp: 1000 Lumen thru 17,500 Lumen LED array; 4000K, 60,000 hours at LLD = 0.7.
9. Label: U.L. listed for damp locations; 5-year factory warranty.
10. Alternate Manufacturers:
 - a. Portfolio #LD6BXXD010-EU6B Series.
 - b. Prescolite #LTR-6RD-H-XX-XXL-DM1 LTR-6RD-T-XX-40K-8-MD-WC.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

E. **Type PL4** (exterior) #Kenall #MR13XL-PP-XX-XXL40K-DV.

1. Description: 13 inch dia., low profile, round, wall mounted, full cut-off LED luminaire.
2. Reflector: High efficiency, semi-specular aluminum.
3. Lens: Pearlescent, U.V. stabilized, high impact resistant, virgin injection molded polycarbonate.
4. Finish: Finish by the USPS Project Manager.
5. Recessed Housing: 18 gauge, cold rolled steel.
6. Ballast/Driver: 13W at 1100 Lumen or 24W at 2200 Lumen. Wattage based on lumen package selected.
7. Mounting: Semi-recessed, wall mounted; A.D.A. compliant.
8. Voltage: 208 or 120
9. Lamp: 1100 Lumen or 2200 Lumen LED array; 4000K, 60,000 hours at LLD = 0.7.
10. Label: U.L. listed for wet locations; 5-year factory warranty.
11. Alternate manufacturers:
 - a. Cooper/Fail-Safe #TRX-15-LD4-XXW-40 Series.
 - b. Kim #WF31X-X-XXL2KUV Series.
 - c. CGF Design #GB-4-LEDXX-CT4-UNV-0-10D Series.
 - d. Substitutions permitted: As listed in paragraph 2.1A.

F. **Type PL5** Lithonia #LDN6CYL-40/XX-L06-WR-MVOLT-EZ10.

1. Description: Pendant 6 inch dia., aperture LED downlight.
2. Reflector: Low brightness, matte-diffused, clear specular alzak finish.
3. Housing: Heavy gauge aluminum cylinder, finished white. Pendant hung on a 24 inch stem with a swivel canopy.
4. Ballast/Driver: 6W at 530 Lumen thru 58W at 5000 Lumen. Wattage based on lumen package selected.
5. Mounting: Pendant or surface mounted.
6. Voltage: [277] [120].
7. Lamp: 530 Lumen thru 5000 Lumen LED array; 4000K 60,000 hours at LLD = 0.7.
8. Label: U.L. listed for wet locations; 5-year factory warranty.
9. Alternate manufacturers:
 - a. Prescolite #LTC-6RD-X-XXL-40K-8-MD-DM1-SS-WH.
 - b. Pathway #C68LB79V-XX-4K.
 - c. Kirlin #LSR-12484-XXXL.
 - d. Portfolio #LER6B Series.
 - e. Substitutions permitted: As listed in paragraph 2.1A.

G. **Type SB1** Kim #VRB1-LED-20L-4K-UV-XX.

1. Description: 6 inch dia. x 42 inch high aluminum domed top round LED bollard with flared cone.
2. Reflector: Anodized aluminum upper reflector with spun anodized aluminum flared cone.

3. Housing: extruded, one piece aluminum, 0.156 inch wall thickness. Top cover is a weldment of 0.125 inch wall extrusion and 0.25 inch top plate. Finish by the USPS Project Manager.
4. Ballast/Driver: 13W at 1000 Lumen, LED light engine.
5. Mounting: Four ½ inch x 11 inch anchor bolts with double nuts and washers included.
6. Voltage: 208 or 120
7. Lamp: 1000 Lumen LED array; 4000K, 60,000 hours at LLD = 0.7.
8. Label: U.L. listed for wet locations; 5-year factory warranty.
9. Alternate Manufacturers:
 - a. Gardco/Philips #BRM832-42 Series.
 - b. Substitutions permitted: As listed in paragraph 2.1A.

H. Type SF1 LSI #XIGB-LED-19-350-NW-UE-SP10-SVG-XXX.

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 at 2159 Lumen, 350 mA, LED array.
7. Mounting: Direct burial mounting. Provide 6 inch deep gravel bed.
8. Voltage: [480] [277] [208] [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 #LTV81FF-SP-36L-4K-UV-SR.
 - b. Ligman Lighting #UKI60781-30WLED-N-W40-UNV-A61312.
 - c. Hydrel #M9720C-B-LED-XX-40K.
 - d. Substitutions permitted: As listed in paragraph 2.1A.

I. Type SP1 Lithonia #DSX0LED-PX-40K-TXX-MVOLT-SPA.

1. Description: 13 inch W x 26 inch L x 3 inch H, low profile, 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: 38W at 4700 Lumen thru 166W at 18,000+ Lumen. Wattage based on lumen package selected.
5. Mounting: 20 – 25 ft. high, square, tapered aluminum pole.
6. Voltage: [480] [277] [208] [120].
7. Lamp: 4700 Lumen thru 18,000+ 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. Hubbell #ASL1-XXXL-XXX-4K7-X-UNV-A-XXX.
 - b. McGraw-Edison #GLEON-SAXX-740 Series.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

J. Type SP2 Lithonia #DSX1LED-PX-40K-TXX-MVOLT-SPA.

1. Description: 13 inch W x 33 inch L x 3 ½ inch H, large, low profile, rectilinear architectural arm-mounted full 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.
4. Ballast/Driver: 54W at 7000 Lumen thru 241W at 27,000+ Lumen. Wattage based on lumen package selected.

5. Mounting: 20 – 25 ft. high, square, tapered aluminum pole.
6. Voltage: [480] [277] [208] [120].
7. Lamp: 7000 Lumen to 27,000+ 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. Hubbell #ASLX-XXXL-XXX-4K7-X-UNV-A-XXX.
 - b. McGraw-Edison #GLEON-SAXX-740 Series.
 - c. Substitutions permitted: As listed in paragraph 2.1A.

K. Type SP5 Lithonia #DSX0LED-PX-40K-TXX-MVOLT-SPA Series.

1. Description: 13 inch W x 26 inch L x 3 inch H, low profile, rectilinear architectural arm-mounted full 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.
4. Ballast/Driver: 38W at 4700 Lumen thru 166W at 18,000+ Lumen, 1000 mA.
5. Mounting: 12 – 15 ft. aluminum pole.
6. Voltage: [480] [277] [208] [120].
7. Lamp: 4700 Lumen thru 18,000+ 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. Hubbell #ASL1-XXXL-XXX-4K7-X-UNV-A-XXX.
 - b. McGraw-Edison #GLEON-SAXX-740 Series.
 - c. Substitutions permitted: 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: [480] [277] [208] [120].
6. Provide individual surge protectors within handhole of each pole mounted luminaire. Branch circuit breakers feeding pole mounted luminaires shall also be equipped with surge protection.

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.

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 substitutions permitted by manufacturers listed in paragraph 2.1A.
- B. Material and Finish: Aluminum. Finish by the USPS Project Manager.
- C. Section Shape and Dimensions: Round or Square.
- D. Height: as shown on drawings.

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: 16 pounds.
2. Luminaire and Bracket Effective Projected Area: 1.0 square feet.
3. Steady Wind: 125 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: 10/1/2021
Last revised:9/2/2021

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 Structured Cabling System Best Practices, 01 October 2020.
 3. USPS Requirements for Entrance Facilities and DEMARC – October 1, 2020.
 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 - Firestopping: Firestopping 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 272133 - Data Communications - Wireless Access Points
 8. Section 275116 - IP Integrated, Public Address Zone Paging System

1.2 REFERENCES

- A. Conform to the Current Edition of the following documents:
1. TIA-568.0-X - Generic Telecommunications Cabling for Customer Premises.
 2. TIA-568.1-X - Commercial Building Telecommunications Infrastructure Standard.
 3. TIA-568-C.X - Twisted Pair Copper Cabling and Components.
 4. TIA-568.3-X - Optical Fiber Cabling and Components.
 5. TIA-568-C.X - 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-X - 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.)

14. IEEE 1100 – Recommended Practice for Powering and Grounding Electronic Equipment (The Emerald Book).
- B. National Electrical Manufacturer's Association (NEMA):
 1. NEMA WC 26 - Wire and Cable Packaging (Current Version).
- C. National Fire Protection Association (NFPA):
 1. NFPA 70 - National Electrical Code (Current Version adopted by the State, per the NFPA website).
- 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.

1.3 PRE-CONSTRUCTION DESIGN REVIEW/MONTHLY STATUS MEETINGS

- A. Pre-Construction Review Meetings:
 1. Convene Issued for Construction (IFC) Review meeting with Raleigh IT Service Center representative.
 2. 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.
 3. Review conditions of operations, procedures and coordination with related Work.
 4. 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 SUBMITTALS

- A. Installer qualifications:
 - 1. Name and cell phone number of full time BICSI RCDD on staff and copy of RCDD certification. Provide RCDD monthly site visit schedule during the construction period and copies of reports.
 - 2. Name of full time BICSI TECH on staff and copy of TECH certification for the Lead Installer to be onsite, 5 days a week minimum.
 - 3. Name of full time BICSI Installers (INST1 minimum certified).
- B. 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. Including, but not limited to 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.

1.5 INSTALLER QUALIFICATIONS

- A. Installer: 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 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.
- B. Installer Company: Full time BICSI RCDD with current credentials on staff. Company specializing in the installation of Category 6, Category 6A and single mode, fiber optic Structured Cabling Systems with minimum 5 years documented experience. 50% of Low voltage installers must be trained by the manufacturer and currently certified to install manufactures product line of copper/fiber wiring. Provide current installer certifications before doing any copper or fiber installations. This certification is part of the 15 year warranty.
- C. Lead Installer: Minimum of BICSI Technician Certification.

1.6 LABELING

- A. Furnish and install machine generated labels.
- B. 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.
- C. Label the Telecommunications Equipment Room as ER and TR's as 01, 02, 03, etc.
- D. Label all copper patch panel ports in a horizontal fashion left to right in numerical sequence.
 - 1. 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.
- E. 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.
- F. Label telecommunications outlet faceplate in the same manner as the patch panel.
- G. Display cable identification number in black uppercase lettering on machine generated permanent adhesive self-laminating label of contrasting color from cable sheath.
- H. Place labels on each end of cable, maximum 6 inches from cable termination.

1.7 CLOSEOUT SUBMITTALS

- A. Test Reports: Submit to Raleigh Service Center IT SME through the USPS Project Manager from Testing Laboratory.
- B. Prepare reports in conformance with Section 014000 – Quality Requirements.
- C. Provide end-to-end tests.
- D. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
- E. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals. Deliver prior to Final Acceptance.
- F. 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 -single 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 are not acceptable. Paper test results are not acceptable. There is a USPS 10MB attachment limit. USPS cannot access file sharing sites.
- G. 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's (Telecommunication Rooms), Telecommunications Equipment Room (ER) and any other installed component of the cabling solution. Show actual routing of the cable bundles (pathways) and backbone cables on the floor plans. Provide master overall set plus one set for each TR which will detail T/O's served by that TR. As-built drawings will be provided to USPS IT electronically in a USPS compatible version of AutoCAD on a CD-ROM.
 - a. Labeling shall conform to the USPS labeling guidelines. All 48 port Copper Patch Panels in the ER or TR'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.
- H. 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.
- I. Total Systems Solution Warranty: 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.

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

- 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. All interior cables shall be CMP rated.
2. Sealing of openings for cable pass through between floors, through rated fire and smoke walls shall be provided in accordance with section 078400 - Firestopping.
 - a. The USPS Project Manager shall be the final authority in approving firestopping materials and methods.

- 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", TRs and exposed workroom areas.

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.
 - a. Provide equipment "drop off" fittings for cord drops and factory sweep corners for all changes in direction.
- D. Cabling routed underground, or exterior of the building, or through inaccessible ceilings 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 workroom floor where a suspended ceiling system is not present. Cabling within exposed workroom areas, not routed within cable trays, must be contained within conduit raceways (1 inch minimum).
 - 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"x18"x8" for up to 1 ½" 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 two 4-inch diameter, buried minimum of 36 inch 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 each conduit shall be provided with (3) cell, mesh innerduct equipped with individual pull strings.
 - a. Basis of Design: MaxCell "Edge"-Flexible, (3) cell, fabric innerduct.
- 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. All interior cabling installed shall be CMP plenum rated.
- 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 cable straps 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 ½ 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.

END OF SECTION

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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.

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, 10/24 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: 8 inch x 8 inch x 78 11/16 inch for the front side of the relay rack and no less than 8 inch x 8 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. Ortronic (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 hook and loop cable 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. Panduit (Preferred)
 2. Chatsworth Products, Inc.
 3. CommScope Uniprise
 4. Leviton
 5. Ortronics (Legrand)
 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 Structured Cabling System Best Practices document (located on most current BDS BlueShare Website – 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 Structured Cabling System 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 Structured Cabling System 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 8 inch x 8 inch deep on the front side and at least 8 inch x 8 inch 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-D)

- 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 #1/0/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 antioxidant 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. Test meter shall be Micro-Ohmmeter Model 6240 manufactured by AEMC Instruments or approved equal.

2.5 SECONDARY BONDING BUSBAR – SBB FOR ER, TR's (REFER TO TIA-607-D)

- 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 #1/0/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 #1/0/AWG/CU bond conductor. The SBB shall be utilized for all bonding needs within the ER.
- C. Each (2) lug compression connector shall have antioxidant 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 within each rack 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 two (2) 4 feet. x 8 feet 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 installed Secondary Bonding Busbar SBB. Interconnect the SBB to the PBB utilizing minimum #1/0/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. 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.
 6. All bonding in ER shall be made at the SBB installed by the contractor. This SBB shall be wall mounted below the acoustic ceiling if one is installed and shall not be installed on the plywood backboards. All bond wires will be on two lug compression fitting with full machine made labeling clearly showing where the bond originates.
 7. Contractor shall provide enough 10/24 mounting screws 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) 10/24 pitch screws.
 8. 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.
 9. Furnish and install needed 48-port Copper Patch Panels separated by 2RU Wire Managers.
 10. Furnish and install the following within the Telecommunications Room.
 - a. Each rack shall be equipped with separate #6 AWG bond conductor homerun to the Secondary Bonding Busbar (SBB) in that ER.
 - b. 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 #1/0/AWG/CU bonding conductor.
 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 10/24 screws for 32 connections per rack for the installation of USPS PFE active electronic components. Example: If 2 new relay racks are installed, provide 64 10/24 pitch screws.
- B. 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 relief 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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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.
- 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.

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.

3.2 CONSTRUCTION

- A. Specified in Section 270500 – Common Work Results for Communications.

3.3 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)
7. Panduit
8. Hitachi (Drybit)
9. Product options and substitutions. Substitutions: Not permitted.

- B. Conductors: 4 twisted pair -minimum 22 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. Hitachi (Drybit)
 6. Leviton
 7. Ortronics (Legrand)
 8. Panduit
 9. Product options and substitutions. Substitutions: Not permitted.
- B. Conductors: Straight through type 4 twisted pair minimum 22 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-XX.
 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 cable straps 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:
 - Wire Map
 - Length
 - Propagation Delay
 - Delay Skew
 - DC Loop Resistance
 - Insertion Loss (Attenuation)
 - Return Loss (RL), RL @ Remote
 - NEXT, NEXT @ Remote
 - Attenuation-to-crosstalk Ratio (ACR-N), ACR-N @ Remote
 - ACR-F (ELFEXT), ACR-F @ Remote
 - Power Sum ACR-F (ELFEXT), PS ACR-F @ Remote
 - Power Sum NEXT, PS NEXT @ Remote
 - Power Sum ACR-N, PS ACR-N @ Remote
 - Power Sum Alien Near End Xtalk (PS ANEXT)
 - Power Sum Alien Attenuation Xtalk Ratio Far End (PS AACR-F)
 - 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

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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 Structured Cabling System Best Practices, 01 October 2020.
 - 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 2.4 GHz and 5 GHz radio frequency operating mode.
- C. Work Room Floor mounting:
 - 1. The General Contractor shall provide Truss Mounted WAP mount utilizing a minimum 1 inch rigid galvanized, heavy-wall, steel conduit stem supported from structure using Uni-Strut, channels and dedicated duplex CAT 6A, telecommunication outlet, mounted 12 feet AFF. Contact Raleigh IT SME for any WAP mounted higher than 12 feet AFF.
 - a. If mounting height requires conduit stems greater than 4 feet long, then additional bracing shall be required. Stems longer than 10 feet shall utilize 1½ inch diameter, rigid aluminum, type IMC, threaded conduit stems.
 - b. 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 mount WAPs at 12 feet AFF on the Work Room Floor via 1 inch minimum conduit stems supported from structure utilizing Uni-strut channels. See USPS Structured Cabling System Best Practices for WAP mounted examples.
 - a. WAP's are normally mounted at 12 feet AFF. within the workroom, except immediately around FSS machines where the WAP's are mounted no lower than 16 ft. AFF
 - 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 PoE 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) CCR/TR/TE connected to, etc. Raleigh IT SME will provide needed Spreadsheet with required formatting.
- D. All WAP's shall be mounted with the PoE 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.

3.3 CABLE PATHWAYS

- A. Coordinate all cable pathway routes with other building services (electrical, mechanical, plumbing, etc.) to assure proper clearances and accessibility. Coordinate the cable pathway routes with the electrical distribution system. Where electrical and telecommunications cabling cross, it must be at right angles only. Avoid long runs of telecommunications cable in close proximity to parallel runs of electrical power cable. Maintain a minimum one foot separation between power and communications cables when running in parallel to power cables unless both power and communications cables are in conduit. Distribution of telecommunications cabling must conform to TIA-568-C and TIA-569-B. Install all telecommunications conduit with sweeping 90 degree bends; no LBs must be accepted unless approved by USPS design engineer.
- B. Install the majority of the structured cabling system above ceilings without conduit. All communications cabling used throughout this project must comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling must bare CMP and/or appropriate markings for the

environment in which they are installed. Interior cabling shall be CMP plenum rated. Refer to requirements of section 270500.

- C. Cabling routed underground, exterior of the building, or through inaccessible ceilings must be contained in conduit. Cabling within exposed workroom areas, not routed within cable trays, must be contained within conduit raceways (1 inch minimum). Provide 1 inch conduit risers (minimum) with 90 degree bends and bushings.

END OF SECTION

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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 programed 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] [surface] 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:
 - i. Female mini-XLR 10 kOhm balanced maximum level +4 dBu.
 - ii. Transformer isolated internally.
 - 8) Line Output:
 - i. Low impedance balanced output.
 - ii. Line level – 10 dBm / 0 dBm / +4 dBu.
 - iii. Transformer isolated internally.
 - iv. Male mini XLR connector and pluggable terminal block.
 - v. 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 Management
- 1. 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 [1] [2] [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: 10/1/2021
Last revised: 8/25/2021

SECTION 281600
INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Intrusion detection devices.
 - 2. Alarm control panel.
 - 3. Control stations (keypad).
 - 4. 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.

1.2 REFERENCES

- A. As specified in Section 260500 – Common Work Results for Electrical.

- B. National Fire Protection Association (NFPA):
 - 1. NFPA 70 – National Electrical Code.

- C. 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 (4th 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 “POTS” 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. A local 120 decibel siren is to be attached to alarm module Relay A output. Standard USPS programming as currently configured will not activate siren during alarms but installer tech should verify thru service interface that siren is functioning at time of installation.

1.5 SUBMITTALS

A. Submittal Procedures:

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 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 preparatory inspection, initial inspection, follow-up inspection and final inspection reports directly to USPS Project Manager from Manufacturer's Quality Control Inspector, with copy to Contractor.
- B. 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. 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.
- 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 (Bosch certified) installer shall be utilized.
 - 3. Installer shall be Electronic Security Association (ESA), Alarm Technician 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.
- C. 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.
- D. Comply with requirements of NFPA 70.
- 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. Installer will provide training to end user.
- B. Postal Inspection Service will provide final programming.

1.8 MAINTENANCE

- A. Extra Materials: Furnish extra materials described below that match products installed, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 1. 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 the 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. Postal Inspection Service through the USPS Project Manager 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:
 - a. Interlogix Magnetic Contacts, #1085TWN with 1K ohm resistor (surface mount).
 - b. Interlogix Roller Plunger, #3005-N with 1K ohm resistor (recessed - wood doors).
 - c. Interlogix Roller Plunger, #1076CW-N with 1K ohm resistor (recessed-steel doors).
 - d. Interlogix Overhead Door Magnetic Contacts, #2315A with 1K ohm resistor (track mounted, overhead door contact - closed loop).
 - 2. Dual-Technology Devices, Passive Infrared and Microwave:
 - a. Wall Mounted
 - 1) Bosch #ISC-CDL1-W15G.
 - 2) Visonic DUO 220AM
 - b. Ceiling Mounted
 - 1) Bosch DS9360.
 - 2) Visonic DUO 240
 - 3. Control Panel: Bosch: #B9512G-USA Control Panel.
 - a. 40 VA, 16.5 VAC, Plug-In Transformer: Bosch #D1640 (included with panel).
 - b. 12 VAC, 7 Ah Standby Battery: Bosch #D126.
 - c. Dual Battery Harness (17 inch; 18/AWG); Bosch #D122.
 - d. Battery Charger Module: Bosch #D8132 (included with panel).
 - e. Attack Resistant Enclosure: Bosch #D8108A (includes lock, tamper switch and key set).
 - f. Telephone Jack (RJ31X): Bosch #D166.
 - g. Modular Telephone Cord (2 ft.): Bosch #D162.
 - h. Plug-In Telephone Communicator (for POTS line interface): Bosch #B430 (included with panel).
 - i. Conettix IP Ethernet Communication Module: Bosch #B426 (included with panel).
 - j. Accessory Mounting Bracket: Bosch #D137.
 - 4. Expansion Boards: Bosch: # B208 Octo-Input Module (8 zone).

5. Control Stations (Keypad): Bosch: #B920 Command Center.

2.2 INTRUSION DETECTION EQUIPMENT

- A. Surge Protection: Comply with minimum requirements of UL Standard 1449 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.
- C. The 1K ohm resistors shall be installed at the end of line devices. Resistors for active zones shall not be installed within the control panel.

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: Dual Technology Devices (passive infrared and microwave) as required to perform functions. Single Technology Devices may not be used.
 - a. Intrusion is detected by monitoring both body motion and infrared energy emitted within protected zone. Units detect presence of an intruder and are sensitive to infrared wavelengths emitted by human body. Devices are insensitive to general area thermal variations.
 - 1) Wall-Mounted Units: Maximum detection range for individual units exceeds scheduled distance by 25 percent, but is not less than 50 feet (15m).
 - 2) Ceiling-Mounted Units: Full 360 degree conical spot-detection pattern. With device mounted at 8 feet (2500mm) above floor the pattern at floor level is minimum diameter of 7 feet (2000mm). With device mounted at 25 feet (7600mm) above floor the pattern at floor level is minimum diameter of 18 feet (5500mm).
 - b. Detection by either or both methods results in an alarm signal. A control in device selects operating mode.
 - 2. Power Source Characteristics: Dedicated 12 VDC from alarm control panel.
 - 3. Detection Indicator: LED in unit housing, latching-type where indicated.

4. Self-Testing Capability: Devices shall 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.
5. Anti-Masking Capability: Devices shall 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.
6. Addressability: Devices shall include communication transmitter and receiver with unique identification and status-reporting capability to system control panel.
7. Remote Controllability: Devices are individually monitored at system control panel for calibration, sensitivity, and alarm condition and are individually adjustable for sensitivity from panel.

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 #B9512G-USA Control Panel. The #B9512G-USA is the direct replacement for discontinued control panel #D7412GV4 and 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 (8) zone, expansion boards (#B208 Octo-Input) 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 #12AWG solid copper wire, minimum.
- H. Control Station Keypad (Bosch #B920): Individual LED annunciation for each zone. Alphanumeric display for each control panel section/area display devices on the keypad. Manual toggle test-switches or push test-buttons shall not require key to operate. Alarm and supervisory signals display 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 are arranged for entering and executing commands for system-status changes and for displaying system status and command-related data.

2.8 HORN

- A. 30 Watt, 12 VDC, 120 decibel, two-tone, siren type horn powered by control panel with battery backup (Bosch #D117).

2.9 WIRE AND CABLE

- A. Stranded copper. Size conductors as indicated but not less than recommended by system manufacturer.
- B. Cable for Low-Voltage Control and Signal Circuits: All sensors and keypad shall have homerun wired to the #B9512G-USA control panel. Wire will be class 3, type CL3P/CMP, unshielded, (8) conductor, 22 AWG, stranded copper wire (minimum), except where manufacturer recommends shielded cable. Use wire colors red, green, black, orange, yellow, blue, brown, and white.
 - 1. Basis of Design: Tappan/Southwire #P20018.1/575631.

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 low voltage cabling.
- D. Cabling routed underground, or exterior of the building, or 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 ¾ 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.
- C. The 120 volt feed to the control panel shall be equipped with surge protective device.

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 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. 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 Communications Centers (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, Physical Security Specialist, Technical Services Division – NLECC, Dulles, Virginia, LMartinez@uspis.gov.
- D. Connection and Programming Protocol:
 1. Connect the panel to a "POTS" voice line demark and include a RJ31x wired for line seizure.
 2. Contact 877-696-5322 Mon – Fri between 8am and 8pm (Eastern Time) and request to speak with a USPIIS Alarm Technician.
 3. Provide descriptive text for each point (zone) covered, and the point it was landed to on the Alarm Panel.
 4. Advise USPIIS which points need a delay for Entry/Exit.
 5. All keypads shall be addressed individually. (USPIIS can provide support for this).
 6. Advise USPIIS if any special code is needed to dial out on the Alarm Panel's phone line (9, 8, etc).
 7. Provide USPIIS with all system information necessary for the completion of the programming template by USPIIS. Upon completion of the template, USPIIS will transmit program to the panel for final testing.
 8. 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 FIELD QUALITY CONTROL

- A. 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.
- B. 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.
- C. 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.
- D. Retesting: Correct deficiencies and retest until total system meets the requirements of Specifications and complies with applicable standards.

3.4 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

USPS CSF Specifications issued: 10/1/2021
Last revised: 8/25/2021

SECTION 282304

ANALOG CCTV SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provide and install a complete analog CCTV System including, but not limited to;
 - a. Video Surveillance Cameras, housings, power supplies, cabling, and related equipment.
 - b. Video control equipment.
 - c. Video monitoring and recording equipment.
 - d. Equipment enclosures.

B. Providers:

1. In the Offer, include the cost of all equipment including the cameras, housings, mounts, servers, monitors, network switch, etc. that are to be procured directly from the providers listed in paragraph 2.1 utilizing the pass-through pricing (PTP) process. "PTP" allows you to directly order parts and equipment at prices leveraged by the Postal Service. Purchase parts and equipment in the name of your Company, which will be responsible for inspection, acceptance and payment to the "PTP" supplier.
2. The cameras, servers, monitors and associated equipment shall be supplied and installed by the providers listed in paragraph 2.1. The provider 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.

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 including:

1. System Installation Manuals

D. Related Sections:

1. Section 260500 - Common Work Results for Electrical.
2. Section 260533 - Raceway and Boxes for Electrical Systems.

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 (CCTV Provider) will be made.

1.2 REFERENCES

A. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

- ###### A. Design Requirements: Closed circuit television (CCTV) analog video communication system for no more than (16) analog cameras between points of surveillance indicated on Drawings and central monitoring station consisting of video cameras, camera outlets, camera controls, monitor, signal-processing equipment, distribution components, video recorder, and accessories.

1.4 DEFINITIONS

- A. Non "Blue Sky": The following camera locations are considered to be non blue sky applications:
 - 1. Interior cameras
 - 2. Exterior building mounted cameras (covered or uncovered)
 - 3. Exterior cameras covered by an overhang or canopy or similar protection.
- B. "Blue Sky": Exterior cameras mounted remote from the building exterior wall are to be considered "blue sky" applications.

1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures:
 - 1. Product Data: Manufacturer's specification sheets for each component shall not be required.
 - 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.
 - 4. The General Contractor shall submit dimensioned and scaled elevation drawings for each equipment enclosure showing the location of fiber media converters, fiber patch boxes, power supplies, receptacles, ethernet extenders, surge protectors and other CCTV components. Elevation drawings shall be submitted and approved prior to ordering the terminal cabinets and equipment enclosures.
- B. Shop Drawings:
 - 1. The CCTV Provider 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. Field Testing Reports for Coaxial, Cat-6 Copper.
 - 1. Test reports: Typewritten with complete listing of all required test parameters.
 - 2. Submit test reports prior to installation of any cameras or the headend.
- D. Construction Sequence, Scheduling and Testing:
 - 1. Installer shall provide installation scheduling plan for review and approval. Coordinate scheduling of software and any necessary revisions with the USPS.
 - 2. Testing Plan: If cabling is installed by others, the installer shall coordinate the testing schedule, the testing procedures and the test results with the Direct Vendor and USPS Project Manager. Communications with the USPS Project Manager and Direct Vendor is mandatory.
- E. 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: Installer shall provide field-accurate drawings that reflect actual locations of cameras and routing of signal cable, indicating cable identifiers, layout, location and numbering of system devices to reflect as-built conditions. The AutoCAD drawings of the facility shall be furnished by the A/E Design Team.

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. Provide a copy of all software including the operating system, product keys and copies of all product licensing. This information shall be supplied directly to the USPS by the Direct Vendor.
6. Project Completion Certification: Document signed by the installing integrator and a Postal Service representative indicating that the project is fully complete with all punch-listed items resolved.
7. 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.

1.6 QUALITY ASSURANCE

A. Contractor

1. Company with a minimum of five (5) years system design, engineering supervision, and installation experience in the CCTV industry.
2. Company that is trained and authorized to install manufacturer products and approved by the CCTV Direct Vendor. The CCTV wiring shall be installed by a CCTV systems installer trained and authorized to install and wire the manufactured products.
3. Company that has been successfully installing CCTV systems of equal size and complexity for a minimum of five (5) years. Submit a minimum of three (3) references. System references shall include projects where software and hardware installed is similar to the software and hardware proposed for this project.
4. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional CCTV system. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.
5. The Contractor shall furnish certification that the entire CCTV system has been inspected and tested, is installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and UL listings, and is in proper working order.
6. The USPS requires professional workmanship from an experienced "CCTV systems" contractor and will reject any faulty workmanship or installation methods not meeting their satisfaction.

1.7 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 manufacturer's requirements. Coordinate storage location with the Postal Service.
- D. The equipment delivered must be insured at the contractor's expense through acceptance.

1.8 CCTV PROVIDER WARRANTY/SERVICE/TECHNICAL SUPPORT PLAN

A. Warranty:

1. Provide manufacturer warranty for three (3) years after facility acceptance and project completion certification for materials and labor.

- a. Warranty 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 warranty period.
- b. USPS shall not be required to process any paperwork in order to be entitled to service plan coverage. It is the CCTV Provider'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 Postal Inspector or Station Manager.
 - 1) 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.
 - 2) 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.
- d. Turnaround time for all repairs (warranty and out-of-warranty) shall not exceed 72 hours.
 - 1) CCTV Provider shall make advance replacement units available in cases where USPS operational issues require immediate replacement of a unit while minimizing down time.
- e. In situations where a complete facility system is not being supplied but only replacements for certain aged equipment, the warranty will only apply to the equipment being replaced.

B. Technical Support:

- 1. CCTV Provider shall provide toll-free 24/7 technical support at no charge throughout the warranty period.
- 2. Data Recovery — CCTV Provider 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 CCTV Provider's data recovery center.

1.9 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 fixed camera: One camera.
 - 2. Outdoor fixed camera: One camera.
 - 3. Camera power supply transformer: Two power supplies.
- 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 CCTV Provider.

PART 2 - PRODUCTS

2.1 PROVIDERS

- A. Securitas Electronic Security, Inc.

Michael Tracey, USPS Account Manager
3 Westchester Plaza
Elmsford, NY 10523
Cell: 571-451-7629
www.Securitates.com
e-mail: michael.tracey@Securitates.com

1. Contract to Securitas should be addressed to:
Securitas Electronic Security, Inc.
1790 Graybill Road, Suite 100
Uniontown, OH 44685

- B. The following approved CCTV providers must be utilized for a repair or less than full system replacement on a (16) channel system:
 1. VICON INDUSTRIES, INC.
Christine Stone, USPS Program Manager
89 Arkay Drive
Hauppauge, NY 11788
(800) 645-9116 or (631) 952-2288
Fax (631) 951-2288
e-mail: USPS@vicon-cctv.com

 2. CO-STAR VIDEO SYSTEMS
101 Wrangler Drive,
Coppell, TX 75019
(888) 694-7827
Fax: (469) 635-6822
www.CostarVideo.com

 3. BOSCH SECURITY SYSTEMS, INC.
130 Perinton Parkway
Fairport, NY 14450
(800) 289-0096
Fax: (585) 223-9180
www.BoschSecurity.us

 4. PELCO, INC. (by SCHNEIDER ELECTRIC)
3500 Pelco Way
Clovis, CA 93612-5699
(800) 289-9100
Fax: (800) 289-9150
www.Pelco.com

 5. SPECO TECHNOLOGIES, INC.
200 New Highway
Amityville, NY 11701
(800) 645-5516
Fax: (631) 957-3880
www.Specotech.com

 6. EVERFOCUS ELECTRONICS CORP.
415 Oser Avenue, Unit S
Hauppauge, NY 11768
(631) 436-5070
Fax: (631) 436-5027

www.Everfocus.com

7. DIGITAL WATCHDOG (DW)
16220 Bloomingfield Ave.
Cerritos, CA 90703
(866) 446-3595
Fax: (813) 888-9262
www.sales@dwcc.tv

C. 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 Provider.
3. Systems and components shall have been thoroughly tested and proven in actual use.

2.2 VIDEO MONITORS

A. Provide 21.5-inch LCD flat-panel color monitors with the following minimum capabilities.

1. Product Requirements:
 - a. Video Interface Connections: 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 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.
 - 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.
 - p. Alternate Models:
 - 1) Orion #22RDHY
 - 2) Orion #23REDE

2.3 VIDEO CAMERAS

A. Provide solid-state, analog HD-TVI color cameras for video surveillance and monitoring of specific areas as shown on the drawings and confirmed with Postal Inspection Service and the USPS Project Manager with the following minimum capacities:

1. Fixed position, indoor, impact/vandal resistant, dome type video cameras shall meet or exceed the following minimum requirements:
 - a. Image Sensor, 1/3" Panasonic CMOS.
 - b. Resolution: 1920(H) x 1080(V), 2 megapixels.

- c. Auto Iris Control.
 - d. Minimum Illumination: 0.2 LUX.
 - e. Shutter Time: 1/60 to 1/60,000 seconds; 60 Hz.
 - f. Frame Rate: NTSC @ 30 fps.
 - g. Lens: 2.8 to 12 mm manual varifocal lens, application permitting.
 - 1) Lens substitution may be required to provide an acceptable image based on camera position, field of view, and distance to subject.
 - h. Up-The-Coax Control (UTC).
 - i. White Balance: Automatic.
 - j. Input Power: 12 VDC or 24 VAC, 4.5 W.
 - k. Automatic Gain Control.
 - l. Backlight Compensation (BLC).
 - m. BNC Video Connector, as required.
 - n. Casing: Indoor; IK10 impact resistant, aluminum dome with encapsulated electronics.
 - o. Operating Conditions: Indoor; 14 to 131 degrees F; 0 to 85 percent RH.
 - p. Accessories: Mounting plate, smoked transparent cover. Provide ceiling, pendant or wall bracket mounting and connector kits.
 - q. Basis of Design: Costar #CDT2S12VIFW (white finish).
 - r. Alternate Manufacturers:
 - 1) Bosch Security Systems, Inc.
 - 2) EverFocus Electronics Corp.
 - 3) Pelco, Inc.
 - 4) Speco Technologies, Inc.
 - 5) Vicon Industries, Inc.
 - 6) Digital Watchdog (DW)
2. Fixed position, outdoor, impact/vandal resistant, dome type video cameras shall meet or exceed the following minimum requirements:
- a. Image Sensor, 1/3" Panasonic CMOS.
 - b. Resolution: 1920(H) x 1080(V), 2 megapixels.
 - c. Auto Iris Control.
 - d. Minimum Illumination: 0.2 LUX
 - e. Shutter Time: 1/60 to 1/60,000 seconds.
 - f. Frame Rate: NTSC @ 30 fps.
 - g. Lens: 2.8 to 12 mm manual varifocal lens, application permitting.
 - 1) Lens substitution may be required to provide an acceptable image based on camera position, field of view, and distance to subject.
 - h. Up-The-Coax Control (UTC).
 - i. White Balance: Automatic.
 - j. Input Power: 12 VDC or 24 VAC, 4.5 W.
 - k. Automatic Gain Control.
 - l. Backlight Compensation (BLC).
 - m. BNC video connector, as required.
 - n. Casing: Outdoor; IP66, NEMA 4X, impact resistant, aluminum dome with encapsulated electronics.
 - 1) Integral heater and defogger.
 - 2) Provide three axis adjustment (pan, tilt & roll).
 - o. Operating Conditions: Outdoor; -5 to 145 degrees F; 20 to 95 percent RH.
 - p. Accessories: Mounting plate, smoked transparent cover. Provide ceiling, pendant or wall bracket mounting and connector kits.
 - q. Basis of Design: Costar #CDT2S12VIFW (white finish).
 - r. Alternate Manufacturers:
 - 1) Bosch Security Systems, Inc.
 - 2) EverFocus Electronics Corp.
 - 3) Pelco, Inc.
 - 4) Speco Technologies, Inc.
 - 5) Vicon Industries, Inc.

6) Digital Watchdog (DW)

- B. Products shall utilize internal or external surge protection such that a normally occurring power surge shall not void any manufacturer's warranty.
- C. 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. Cameras of equal or better specifications shall be provided for those cameras found to be discontinued by the manufacturer.

2.4 CAMERA POWER SUPPLIES:

- A. Interior and Exterior (Non "Blue Sky") Cameras: Camera power supplies shall be located within 500' of the camera, either in the CIO (distance permitting) or in another suitable protected area. Provide multiple outlet (4, 8, or 16) fused power supplies as required for interior and exterior (non "blue sky") cameras. Power supplies shall be rated to support 200% of the actual (nominal) power loading.
 - 1. A minimum of two (2) power supplies (fed from separate power circuits) shall be used on each project, regardless of camera count.
- B. Exterior building wall mounted cameras are considered non "blue sky" and shall be treated as is an interior camera.
 - 1. Building mounted exterior cameras shall be equipped with surge protection.
- C. Exterior ("Blue Sky") Cameras: Provide individual power supplies located at the camera.
 - 1. Enclosures shall be weatherproof and sealed to prevent water and/or insect infiltration.
 - 2. Camera enclosures shall be equipped with integral heaters and defoggers.
- D. Provide a means for disconnecting camera power supplies from incoming power at the power supply enclosure, either through a detachable power cord, master fuse or circuit breaker, or other UL approved switching device.
- E. Power supplies utilized shall be as recommended by the camera manufacturer and equipped with ESD protection for data and video feeds.

2.5 VIDEO CAMERA HOUSINGS AND MOUNTS

- A. 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 a variety of locations 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 standard threaded rigid aluminum (type IMC) pipes. Pipe are to be a minimum of 1-1/2 inch in diameter. General Contractor shall furnish and install 1-1/2 inch pipe to pendant kit at each camera (length as required).
 - e. All mounts shall incorporate installer provided safety chain or cable of sufficient endurance to support 2 times the weight of the equipment.
 - 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.
- d. Ambient Temperature Rating: -22 to 131 degrees F.
- e. Areas with more demanding environmental conditions will be granted a deviation from this specification.
- f. Exterior building mounted cameras shall be provided with surge protection at the camera and at the node or headend.
- g. All exterior housings, mounts and components including arm brackets, pendant kits, cabling, connectors, seals, etc. shall be rated NEMA 4 watertight. Provide factory termination kits and seals.

2.6 DIGITAL VIDEO RECORDER

- A. Provide Digital Video Recorder (16 channel maximum) with the following features:
 1. Recording must be continuous in nature, with a series of "key frames" which periodically refresh the entire video image. The frequency of these key frames must be sufficient to allow the full range of motion to be visible.
 2. Video images shall be recorded with sufficient resolution, color depth, and quality of image compression as to make the recorded image indistinguishable from a DVD sourced original.
 3. The DVR shall support event driven recording. Events may be internally generated (motion analysis, video loss or presence), or externally triggered (contact closure).
 4. Image Exporting — The system shall have the ability to export video images as follows:
 - a. Video Printing — The system shall allow for easy printing of still images.
 - 1) Images may be printed to standard, Windows™ based printer that does not require proprietary drivers.
 - 2) Printer may be directly connected to the DVR or may be connected to a workstation to view the image via USB or Parallel port.
 - b. Still Images — Still images may be saved using the JPEG file format, for printing at a later time or electronic distribution.
 5. The DVR shall auto restart on power failure.
 - a. The unit will automatically begin recording upon restoration of power.
 - b. The system must maintain all camera name and scheduling information and must return in the state it was programmed to be in at the time of the power failure.
 - c. The system must retain correct time and date information.
 6. Input Connections
 - a. The system must support a minimum of 4 analog HD-TVI cameras.
 - b. Video inputs shall use HDMI connections.
 - c. Capability shall be provided to loop each video input signal to an additional device, through the use of an adaptor cable.
 7. Output Connections
 - a. Composite video outputs (internal to the DVR or via an external device) shall be NTSC utilizing BNC connectors.
 - b. The system must utilize a HDMI computer monitor for main screen user navigation and video viewing.
 8. Record Duration – The DVR shall include online storage of 30 days with less than 30 seconds required to retrieve a video clip.
 - a. Assume (1) terabyte of storage capacity for each camera installed to accommodate 30 days of online storage.
 9. Power Requirements: 120 Volt, 120 Watt, 60 Hz.
 10. Duplex Operation — The system shall be capable of simultaneously performing a minimum of any two of the following functions:
 - a. recording video
 - b. displaying live video

- c. playing back recorded video
- d. exporting stored video
- 11. Video Monitoring
 - a. Images being played back may be synchronized or stopped (frozen) individually.
 - b. Provide multiple views on the same screen during playback or live video view.
 - c. Display software shall provide for multi-camera viewing using a variety of multi-screen display modes.
 - 1) These multiple images may be exported in such a manner as to allow later synchronized playback of the same series of images.
 - d. Provide the ability to digitally enhance video images, to increase or decrease contrast and brightness, correct image color characteristics, and digitally zoom in on the image.
 - e. Provide a full suite of search tools to allow the search and retrieval of images based on time, date, motion (within pre-defined screen areas), alarm, video loss, and video presence.
 - f. Provide the ability to sequence a number of individual video segments such that a composite video clip can be made of a series of individual clips or incidents.
 - g. Frame rate shall be adjustable on an individual camera basis in a range that extends from ~3 images per second (ips) to real-time which shall be indistinguishable from NTSC 30 ips video.
 - h. Basis of Design:
 - 1) Costar #CR4010ET-4TB (4 Channel)
 - 2) Costar #CR8000ET-8TB (8 Channel)
 - 3) Costar #CR1600ET-16TB (16 Channel)
 - i. Alternate Manufacturers:
 - 1) Bosch Security Systems, Inc.
 - 2) Speco Technologies, Inc.
 - 3) Vicon Industries, Inc.
 - 4) Digital Watchdog (DW)

2.7 UNSHIELDED TWISTED PAIR (UTP) MODULES

- A. Unshielded twisted pair (UTP) modules will be used for cable runs where a signal must be transmitted further than 500 feet unless Fiber Optic transmission is a requirement (see section 2.9).
 - 1. Passive Transceivers:
 - a. Signal Transmission: Units shall be used at the signal transmission end for all distances under 1,200 linear feet or less, unless the specific conditions outlined in section 2.9 exist. Signal transmission end is defined as the end of the cable run where a signal is generated (camera or video output).
 - b. Signal Reception: Units shall be used at the signal reception end for all distances less than or equal to 500 feet. Signal reception end is defined as the end of the cable where a signal is received (monitor or video input).
 - c. Specifications:
 - 1) Passive UTP Transceivers shall be capable of transmitting and receiving baseband type monochrome or color video signals over unshielded twisted pair Category 6 (UTP) cable, up to a maximum cable distance of 500 feet with a transceiver device connected at each end of the cable.
 - 2) The transceiver device shall be capable of driving a color video signal of NTSC standard 525 lines with an operating frequency range of DC to 10 MHz and common mode rejection to be greater than 60 dB.
 - 3) The transceiver devices shall not require power to operate as specified.
 - 4) The transceiver used as a transmitting device shall be designed to accept a baseband video signal from a 75 ohm impedance source and the transceiver used as a receiving device shall deliver a baseband video signal capable of driving a 75 ohm impedance load.

- 5) The transceiver device shall support bi-directional signal transmission, i.e.; video from the video source to the receiving equipment and control from the receiving end to the video source equipment over a single unshielded twisted pair (UTP) using equipment that provides such bi-directional operation during the vertical interval.
 - 6) Video connection to the transceiver device shall be by means of a BNC type female connector and connection to UTP cable shall be by means of two Phillips type head screw terminals. The screw terminals shall be plated with a rust preventive material to prevent corrosion.
 - 7) The transceiver device shall be capable of driving an active (powered) companion UTP receiver, operating at a distance of up to 1,200 feet over cables specified for that unit.
 - 8) The combination of the transceiver device and the active receiver shall provide a minimum of 500 lines of video resolution.
 - 9) The transceiver devices shall operate within specifications without causing interference or interfering with any other base band video, communication, data and/or other low-voltage signals operating in multi-twisted pair UTP cables.
- d. Receivers (transceivers used at the receiving end) shall be four-channel units and shall be secured to a rack panel or other permanent surface. Individual, loose receivers are not acceptable.
2. Active Receivers:
- a. Signal Reception: Units shall be used at the signal reception end for all distances greater than 500 feet, or where environmental conditions dictate the use of signal equalization. Signal reception end is defined as the end of the cable where a signal is received (monitor or video input).
 - b. Specifications:
 - 1) Active UTP receivers shall be capable of receiving baseband type monochrome or color video signals over Category 6 (UTP) cable, up to a maximum cable length of 1,200 feet, when connected to a passive video transceiver.
 - i. With a symmetrical and balanced composite input from the transmitter unit and using cables as specified at a cable length of 1,200 feet, the output shall be a 1 Vpp composite video signal into 75 ohms.
 - 2) The active receiver shall be capable of equalizing and delivering a baseband color video signal of NTSC standard 525 lines at the maximum specified distance with an operating frequency range of DC to 10 MHz and common mode rejection to be greater than 60 dB.
 - 3) The active receiver shall be provided with a companion power supply, which shall have provisions to plug directly into an AC wall outlet and connect to the receiver power terminals.
 - 4) The active receiver shall provide frequency equalization by means of eight dual in-line (DIP) switches which shall provide compensation for varying cable lengths. The effect of the frequency compensation shall be to both equalize and to amplify the video signal thereby providing loss compensation for video as cable length is increased.
 - 5) The active receiver shall have built-in transient protection, with a screw connection for earth ground.
 - 6) Video connection to the active receiver shall be by means of a BNC type female connector. A five-screw terminal block shall provide connection to the UTP cable (2), 12 VDC power supply (2) and earth ground (1).
 - 7) The active receiver shall operate within specifications without causing interference or interfering with any other base band video, communication, data and/or other low-voltage signals operating in multi-twisted pair UTP cables.
 - c. If four (4) or more active receivers are used in close proximity to each other, rack-mounted receivers with identical performance characteristics shall be substituted in their place.

2.8 CABLING

A. Cabling Requirements:

1. Interior cable runs (total horizontal and vertical length) from cameras to the CCTV headend that do not exceed 500 feet shall be RG-59/U; provide plenum rated where required.
2. Interior cable runs (total horizontal and vertical length) exceeding 500 feet but less than 1200 feet from cameras to the CCTV headend shall be Category 6; provide plenum rated where required.
3. Interior cable runs (total horizontal and vertical length) in excess of 1200 feet from the camera to the CCTV headend shall be (2) count 62.5/125, OM1, multi-mode, indoor rated fiber cable; utilize plenum rated where required.
4. Exterior cable runs, contained in conduit and 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.
5. All exterior cable runs shall be contained in conduit.
6. Where UTP video modules are used, all video shall be run utilizing the brown/brown-white pair of a CAT-6 unshielded twisted pair (UTP) cable. The remaining conductors shall be left open as spares.
7. Each cable shall be individually home run from the camera to the CCTV headend.

B. Camera Coax Video Cabling:

1. CCTV RG59/U coax cable shall be provided by the General Contractor.
2. Cable shall be solid, 23 gauge copper with 95 percent copper braid shield, gas injected foam polyethylene core and PVC insulation.
3. The General Contractor shall provide "BNC" connectors, terminate and test the cable assembly.
4. Cabling and wire ways shall be installed in accordance with section 260533.

C. 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. 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 with sections 260533.

D. 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.

E. Cable shall have footage markings to identify CCTV system cable lengths.

2.9 RG-59/U COAX CABLING

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

1. Belden - Preferred
2. Berk-Tek
3. CommScope Uniprise
4. General Cable
5. Leviton
6. Ortronics (Legrand)
7. Panduit

8. Product options and substitutions. Substitutions: Permitted if approved by manufacturer and CCTV provider.
- B. Conductor: Single conductor, RG-59/U, 23 AWG, solid copper - coax.
1. Bare copper, polyethylene foam insulated coax conductor with 95 percent bare copper braid shield and low smoke plenum rated PVC jacket. Provide plenum rated conductor unless entire area where cable is installed is not considered a return air plenum according to any applicable codes.
 2. Nominal Impedance: 75 ohms.

2.10 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 manufacturer and CCTV provider.
- B. Conductors: Category 6, 4 twisted pair, minimum 23 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.

2.11 ACCESSORIES

- A. Lightning/Surge Protection: Products shall utilize internal or external 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 to protect the coax or CAT-6 cabling serving exterior, building, wall mounted cameras.
- B. The DVR and monitor shall each be provided with a standalone UPS. The UPS shall be provided by the CCTV Provider.
1. The use of a single UPS to support multiple devices grouped at a single location is acceptable.
 2. Each UPS shall be line-interactive, rack or tower mounted and rated 1000 VA/900 Watt with a (18) minute battery reserve at 450 Watts; Tripp-Lite #SMART 1000RML2U.
- C. Rack: Furnish and install a floor or wall mounted equipment rack to provide sufficient mounting space for the required equipment. Upright rack and associated hardware shall be provided by the CCTV Provider.
1. Rack shall be all metal construction conforming to EIA standards with 19" equipment mounting opening and 1-3/4" vertical spacing of equipment. Rack rails shall be punched with captive nuts, 10-32 screws and nylon washers.

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 the 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 and the USPS Project Manager, prior to installation.

3.2 INSTALLATION

- A. Install all equipment in accordance with CCTV Provider's published instructions. Installation must be done by a CCTV Provider's certified dealer 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 a 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 tamper-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 written system documentation.
 - 8. All wiring to include coax, CAT-6 cables shall utilize hook and loop fasteners to eliminate the risk of over-tightening cable bundles and affecting the strength or rated performance of the cable. The use of tie wraps is unacceptable.

9. 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).
 10. 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.
 11. 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.
 12. 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.
 13. 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.
 14. Each camera shall be labeled by a numbering system requiring no more than three digits. The camera numbering system chosen shall be utilized by the A/E during preparation of the design drawings and by Securitas in preparation of their construction drawings to provide consistent, matching and accurate as-built documentation.
 - a. Each pendant mounted camera shall be labeled on three sides with 3 inch high numbers supplied by the Direct Vendor.
 - b. Each ceiling or wall mounted camera shall be labeled on two sides with 1-1/2 inch high numbers supplied by the Direct Vendor.
 - c. Labeling shall be stenciled or laminated vinyl in a contrasting color to the camera housing.
 - d. Labeling shall not be placed on lower dome or any area that would obstruct camera viewing.
 15. 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.
 16. Perform complete programming of the system, in coordination with the Postal Inspector and the USPS Project Manager, or his 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.
- 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 inspections are conducted.
 3. All necessary certificates are issued, obtained, and delivered to the Postal Service.
 4. 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 CCTV Provider 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 in the general vicinity of locations indicated on Drawings at final locations confirmed with USPIS and OIG during the camera placement site visit.

1. Provide 84-inch minimum headroom below cameras and their mountings. Where necessary modify mounting type to maintain clearance.
- G. Twist-on video connectors are not acceptable.
- H. When not installed in cable trays, cable (Coax, CAT-6, and low voltage power) shall be supported with wide base cable hangers rated for proper support of CAT-6, (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).

3.3 DOCUMENTATION

- A. The Contractor shall provide high definition photographs showing the interior components of all equipment enclosures and the headend rack. Photographs shall show wiring and placement of fiber media converters, surge protectors, fiber patch boxes and interconnect centers, power supplies, power strips and receptacles. Photographs shall be transmitted to the A/E and USPS Project Manager.

3.4 FIELD TESTING COAXIAL, CAT-6 COPPER CABLES

- A. Section 014000 – Quality Requirements: Field testing and inspection.
- B. Field Testing Procedures
1. Provide all equipment and services necessary to test the cabling.
 2. Test and calibrate instruments before testing.
 3. Re-terminate and retest any cable found to be defective.
 4. Perform testing and submit report prior to installation of any cameras or the headend.
- C. Coaxial Cable
1. Perform end-to-end tests of the center core conductor and copper shield. Test parameters include:
 - a. Mapping: Continuity shorts and opens.
 - b. Ground Fault.
 - c. Signal Strength at varying frequencies.
 - d. Proper Termination.
- D. Cat 6 Copper Cable Testing
1. Use Level III compliant test equipment.
 2. Test parameters include:
 - a. Wire map.
 - b. Insertion loss (attenuation).
 - c. DC loop resistance.
 - d. Return loss at camera.
 - e. NEXT, NEXT at camera.
 3. End-to-end tests of each 4-pair cable include:
 - 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.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Inspection and testing procedures.
- 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. Testing:
 - 1. Perform tests and provide test equipment, tools, and personnel required to conduct system tests and inspections. These tests shall include video quality for all cameras.
 - 2. Provide an actual demonstration of each system function.
 - 3. 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. Prepare all test procedures and submit the procedures for review by the Postal Service facility manager. Obtain test procedure approval prior to actual system tests.
 - 5. 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 Postal Service facility manager or authorized agent. The Postal Service reserves the right to accept any portion or activate any phase prior to acceptance of entire system.

3.6 OPERATING INSTRUCTION

- A. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance steps that are required to ensure normal operation.
- B. Provide one complete set of equipment operating, installation, and programming manuals that will remain in the installed location.

3.7 CLEANING AND ADJUSTING

- A. Clean installed items using methods and materials recommended by equipment manufacturers just before conducting acceptance test.
- B. Adjust manual lens irises to meet lighting conditions.
- C. Adjust field of view for each camera per Inspection Service direction.

END OF SECTION

USPS CSF Specifications issued: 10/1/2021
Last revised: 9/1/2021

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, mounts, 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. In the Offer, include the cost of all equipment including the cameras, housings, mounts, servers, monitors, network switch, etc. are to be procured directly from the Direct Vendor (Securitas Electronic Security) utilizing the pass-through pricing (PTP) process. "PTP" allows you to directly order parts and equipment at prices leveraged by the Postal Service. Purchase parts and equipment in the name of your Company, which will be responsible for inspection, acceptance and payment to the "PTP" supplier.
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. SES Inquiry Number: 855-331-0359
 - For any SES inquiries.

C. General Contractor

1. Responsible for providing power, conduit, cable tray, cable, and cable pulling and NEMA 1 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.

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. The references listed below form a part of this specification:

1. NFPA 70 - National Electrical Code.
2. ANSI / TIA / EIA 568-C Commercial Building Telecommunications Cabling Standard
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 DEFINITIONS

A. "Non Blue Sky": The following camera locations are considered to be non blue sky applications:

1. Interior cameras.
2. Exterior building mounted cameras (covered or uncovered).
3. Exterior cameras covered by an overhang or canopy or similar protection.

B. "Blue Sky": Exterior cameras mounted remote from the building exterior wall are to be considered "blue sky" applications.

1.5 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).
 - d. The General Contractor shall submit dimensioned and scaled elevation drawings for each equipment enclosure showing the location of fiber media converters, fiber patch boxes, power supplies, receptacles, ethernet extenders, surge protectors and other CCTV components. Elevation drawings shall be submitted and approved prior to ordering the terminal cabinets and equipment enclosures.
- C. Field Testing Reports for Cat-6 Copper
- 1. Test reports: Typewritten with complete listing of all required test parameters.
 - 2. Submit test reports prior to installation of any cameras or the headend.
- D. Sequence and Scheduling Plan: Direct Vendor shall provide installation scheduling plan for review and approval. Coordinate scheduling of software and revisions with the USPS.
- E. 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 and installation manuals that will be stored in the rack per USPS Project Manager.

1.6 QUALITY ASSURANCE

- A. Contractor
- 1. Company with a minimum of five (5) years system design, engineering supervision, and installation experience in the CCTV industry.
 - 2. Company that is trained and authorized to install manufacturer products and approved by the CCTV Direct Vendor. The CCTV wiring shall be installed by a CCTV systems installer trained and authorized to install and wire the manufactured products.
 - 3. Company that has been successfully installing CCTV systems of equal size and complexity for a minimum of five (5) years. Submit a minimum of three (3) references. System references shall include projects where software and hardware installed is similar to the software and hardware proposed for this project.
 - 4. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional CCTV system. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.
 - 5. The Contractor shall furnish certification that the entire CCTV system has been inspected and tested, is installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and UL listings, and is in proper working order.

6. The USPS requires professional workmanship from an experienced "CCTV systems" contractor and will reject any faulty workmanship or installation methods not meeting their satisfaction.

1.7 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.

1.8 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 annual "PM" service performed by the Direct Vendor shall include testing and exercising of the PTZ cameras. Direct Vendor shall provide 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.

1.9 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: One cameras.
2. Indoor/Outdoor PTZ camera: One cameras.
3. Indoor/Outdoor, multi-directional camera: One camera complete with housing.
4. Video decoder: One decoder.
5. Camera power supply transformer: Two power supplies.
6. Ethernet cable injector: Two PoE injector modules.

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@Securitates.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 continuous video with 30% expansion capability and motion identified assuming a frame rate of no less than 15 fps. 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. Software: "March Networks" Video Management System. Purchase one license per camera.
- 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 DECODERS

A. Video Decoders will support up to (2) remote monitors with full screen camera views; (4) camera views per monitor.

B. Camera displays approved only by OIG and CIS

- 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. Decoder shall be wall mounted behind the CCTV monitor(s) utilizing factory wall brackets. The decoder shall be supplied with 120 Volt obtained from the monitor's UPS unit.

D. Basis of Design: Costar #CV12MV2.

2.5 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.

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 1/2.8 inch (effective).
- 5. Lens: Varifocal, 3.4 to 8.9mm, F1.8: 100 degree to 36 degree horizontal/53 degree to 20 degree vertical.
- 6. Minimum illumination:
 - a. Color: 0.1 LUX @ 50 IRE, F1.8.
 - b. B/W: 0.02 LUX @ 50 IRI, F1.8.
- 7. Shutter time: 1/66,500 to 2 second; 60 Hz.
- 8. Pan/Tilt/Zoom: Digital PTZ, preset positions, guard tour.

9. Angle Adjustment: Pan ± 180 degrees, tilt ± 75 - degrees, rotation ± 175 degrees.
 10. Resolution: 1920x1080 (2 MP).
 11. Video compression:
 - a. H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles.
 - b. H.265 (MPEG-H Part 2/HEVC), Main Profile.
 - c. Motion JPEG.
 12. Frame Rate:
 - a. WDR; 30 fps in all resolutions; 60 Hz.
 - b. No WDR; 60 fps in all resolutions; 60 Hz.
 13. Support both unicast and multicast MPEG-4.
 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: Indoor/Outdoor; IP66, NEMA 4x and IK10 impact resistant, aluminum dome with encapsulated electronics (1.8 lbs).
 21. Processor and Memory: 1024 MB RAM, 512 MB Flash.
 22. Connectors: RJ45 10 BASE – T/100BASE-TX PoE terminal block for (1) alarm input and (1) alarm output.
 23. Operating Conditions: Indoor/Outdoor; -40 to 122 degrees F; 10 to 100 percent RH.
 24. Accessories: Mounting plate, smoked transparent cover. Provide ceiling, pendant or wall bracket mounting and connector kits.
 25. Basis of Design: Indoor/Outdoor, Axis #P3245-VE.
- D. Indoor/Outdoor PTZ camera shall be a network dome camera and shall incorporate 21x 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 21x optical zoom.
 5. Image Sensor: 1/2.8" Progressive scan RGB CMOS,.
 6. Lens: Varifocal, F1.6 to F4.5, 4.0 to 84.6 mm, angle of view: Horizontal – 77.0 to 3.6 degrees, Vertical – 43.1 to 2.0 degrees.
 7. Minimum Illumination:
 - a. Color: 0.11 LUX @ 50 IRE F1.6.
 - b. Color: 0.1 LUX @ 30 IRE F1.6.
 - c. B/W: 0.03 LUX @ 50 IRE F1.6.
 - d. B/W: 0.01 LUX @ 30 IRE F1.6.
 8. Shutter Time: 1/66,500s to 2s.
 9. PTZ:
 - a. E-Flip, 256 preset positions
 - b. 21x optical zoom and 12x digital zoom, total 252x zoom.
 - c. Pan: 360 degrees, 0.1 to 350 degrees/s.
 - d. Tilt: 180 degrees, 0.1 to 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).
 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: 1024 MB RAM, 512 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 to 122 degrees F; 10 to 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 16W 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/Outdoor, Axis #P5654-E.
- E. Indoor/Outdoor, multi-directional, fixed dome camera shall be (15) mega pixel (with (4) varifocal lenses), network type with WDR, light finder, remote focus and zoom and shall incorporate Power over Ethernet (PoE). The camera shall meet or exceed the following requirements:
1. Be equipped with 4 individually configurable camera lenses that can be individually positioned to monitor large areas.
 2. Be equipped with a 10BaseT/100BaseTX Ethernet interface.
 3. Include a vandal proof resistant casing with fan and heater.
 4. Equipped with pixel counter.
 5. Image Sensor: 1/2.5 inch progressive scan RGB CMOS (per lens).
 6. Lens: Varifocal, 3mm (F1.8) to 6mm (F2.6); (per lens).
 7. Angle of view:
 - a. 4 x 1440p: Capture mode.
 - b. 101 - 49 degrees: Horizontal.
 - c. 54 - 29 degrees: Vertical.
 - d. 116 - 58 degrees: Diagonal.
 - e. Motorized focus, motorized zoom.
 8. Angle adjustment:
 - a. Pan: ± 90 degrees.
 - b. Tilt: +25 to +95 degrees.
 - c. Rotation: -5 to +95 degrees.
 - d. Twist: ± 20 degrees.
 9. Minimum Illumination:
 - a. Color: 0.20 LUX @ F1.8.
 - b. BW: 0.04 LUX @ F1.8.
 10. Shutter time: 1/66,500s to 1/5s.
 11. Video compression: H264 (MPEG-4 part 10/AVC), main and high profiles, H265 (MPEG-H Part2).
 12. Resolutions: (4) 2560 x 1440 (4 x QHD 1440p) to 80 x 60.
 13. Frame rate: Up to 30 fps.
 14. Video Streaming: Multiple, individually configurable streams in H264 and H265.
 15. Support Power over Ethernet according to IEEE802.3at.
 16. Support both IPv4 and IPv6.
 17. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.

18. Be equipped with 1 alarm input and 1 alarm output.
19. Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.
20. Be supported by an open and published API.
21. Casing: Outdoor; IP66 and NEMA 4X, IK09 impact resistant aluminum and plastic casing with polycarbonate hard-coated dome and integrated dehumidifying membranes.
22. Processor and Memory: 2048 MB RAM, 512 MB Flash.
23. Connectors: RJ45 10 BASE – T/100BASE-TX PoE terminal block for (1) alarm input and (1) alarm output.
24. Power: Camera with built in fan and heater, 24 to 34 VDC, max 26 Watts, PoE (IEEE802.3af) class 2.
25. Operating Conditions: -22 to 122 degrees F, Humidity 10 to 100 percent RH (condensing).
26. Accessories: Outdoor, weather shield, cable shield, 16 ft. network cable with pre-mounted gasket. Provide pole attachment, pendant and recessed housing where indicated.
27. Basis of Design: Axis #P3719-PLE.

F. Exterior fixed camera shall be (2) 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: F1.2 varifocal, 2.8 to 8 mm, P – iris.
6. Day and Night: Automatic IR filter removal in low light conditions.
7. Angle of view: 107 to 42 degrees horizontal.
8. Minimum Illumination:
 - a. Color (HDTV): 0.05 LUX @ 50 IRE, F1.2.
 - b. BW (HDTV): 0.01 LUX @ 50 IRE, F1.2.
 9. Shutter Time – 1/66,000s to 2s.
 - a. WDR: 30 fps, 60 Hz.
 - b. No WDR: 60 fps, 60 Hz.
 10. Video Compression:
 - a. H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles.
 - b. H.265 (MPEG-H Part 2/HEVC), Main Profile.
 - c. Motion JPEG.
 11. Resolutions: 1920x1080 (2 MP).
 12. Frame Rate:
 - a. WDR: 30 fps, 60 Hz.
 - b. No WDR: 60 fps, 60 Hz.
 13. Video Streaming: Motion JPEG, H.264 and H.265, VBR/ABR/MBR H.264/H.265.
 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: 1 GB RAM, 512 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, 12 to 28 VDC max; 20.3 Watts, PoE (IEEE 802.3 af) class 4.
24. Operating Conditions: -40 to 140 degrees F, Humidity 10 to 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 #P1375-E.

G. Exterior, long range, bullet type fixed camera shall be (4) mega pixel, outdoor, network type with WDR, light finder, remote focus and zoom and shall incorporate Power over Ethernet (PoE). The camera shall meet or exceed the following requirements:

1. Be equipped with a 10BaseT/100BaseTX Ethernet interface.
2. Include a vandal proof resistant casing with fan and heater.
3. Equipped with pixel counter.
4. Image Sensor: 1/1.8" progressive scan RGB CMOS.
5. Lens: F1.4 to 4.0, 4.3 to 137 mm, auto-iris.
6. Day and Night: Automatic IR filter removal in low light conditions.
7. Angle of view: 60 to 2.3 degree horizontal; 39 to 1.3 degree vertical.
8. Minimum Illumination:
 - a. Color (HDTV): 0.18 LUX @ 50 IRE, F1.4.
 - b. BW (HDTV): 0.04 LUX @ 50 IRE, F1.4.
9. Shutter time: 1/100,000s to 2s.
10. Video compression:
 - a. H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles.
 - b. Motion JPEG.
11. Resolutions: 2560x1440 to 160x120 (4 MP).
12. Frame rate:
 - a. WDR: 30 fps, 60 Hz.
 - b. No WDR: 60 fps, 60 Hz.
13. Optical Zoom: 32x.
14. Video Streaming: Motion J-PEG and H.264, VBR/ABR/MBR H.264.
15. Support Power over Ethernet according to IEEE802.3af.
16. Support both IPv4 and IPv6.
17. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
18. Be equipped with 1 alarm input and 1 alarm output.
19. Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.
20. Be supported by an open and published API.
21. Casing: Outdoor; IP66 and NEMA 4X, IK10 impact resistant aluminum with integrated dehumidifying membrane.
22. Processor and Memory: 1024 MB RAM, 512 MB Flash.
23. Connectors: RJ45 10 BASE – T/100BASE-TX PoE terminal block for (1) alarm input and (1) alarm output.
24. Power: Camera with built in fan and heater, 20 to 28VDC, max 12.95 Watts, PoE (IEEE802.3af) class 3.
25. Operating Conditions: -40 to 140 degree F, Humidity 10 to 100 percent RH (non-condensating).
26. Accessories: Outdoor, weather shield, cable shield, 16 ft. network cable with pre-mounted gasket. Provide NEMA 4, watertight factory, cast aluminum backbox.
27. Basis of Design: Axis #Q1786-LE.

H. Products shall utilize internal or external surge protection such that a normally occurring power surge shall not void any manufacturer's warranty.

I. 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. Cameras of equal or better specifications shall be provided for those cameras found to be discontinued by the manufacturer.

2.6 VIDEO MONITORS

- A. Provide 21.5-inch LCD flat-panel color monitors with the following minimum capabilities.
1. Product Requirements:
 - a. Video Interface Connections: 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.
 - p. Alternate Models:
 - 1) Orion #22RDHY.
 - 2) Orion #23REDE.
- 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.

2.7 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. Camera enclosures shall be equipped with integral heaters and defoggers.
3. Equip environmental enclosures for exterior cameras with individual 120 VAC / 12 VDC power supplies when required.

F. 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. There are two options for providing power to the cameras:

1. Provide dedicated 120VAC lockable panelboards as required, located in the Criminal Investigative Office (CIO) to serve all Investigative CCTV cameras. Comply with National Electric Code clearance requirements.
2. Provide circuit breakers equipped with padlockable, handle attachments in the panelboards that contain surge protection and do not supply motor loads. These handle attachments must be capable of padlocking in the "on" or "off" position. Circuit breaker trip function must remain operational when locked in the ON position.

H. Power supplies shall be rated to support 200% of the actual (nominal) power loading and shall be as recommended by the camera manufacturer, equipped with ESD protection for data and video feeds.

I. Enclosures housing camera power supplies, media converters, fiber patch box and 120 Volt receptacles shall contain interior back planes for mounting of all components and shall be provided by the General Contractor. NEMA type 4X, stainless steel, hinged and lockable enclosures shall be provided for exterior applications.

2.8 VIDEO CAMERA HOUSINGS AND MOUNTS

A. Direct Vendor shall provide arm brackets, recessed housings, surface mounts, ceiling mounts, pendant kits and surface conduit back boxes 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 standard threaded, rigid aluminum (type IMC) pipes. Pipes are to be a minimum of 1½-inch diameter. General Contractor shall furnish and install 1 ½ inch pipe to pendant kit at each camera (length as required).

e. All pendant mounts shall incorporate installer provided safety chain or cable of sufficient endurance to support 2 times the weight of the camera and mounting hardware. Safety chain or cable shall be securely attached to the building structure at one end and to the bottom of the pendant stem at the other end.

- f. The General Contractor shall terminate the Ethernet to the patch panels provided by the Direct Vendor and located in the headend 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.
 - f. Exterior building mounted cameras shall be provided with surge protection at the camera and at the node or headend.
 - g. All exterior housings, mounts and components including arm brackets, pendant kits, cabling, connectors, seals, etc. shall be rated NEMA 4 watertight. Provide factory termination kits and seals.

B. Patch Cables

- 1. Direct Vendor will provide fiber optic patch cables for patched connections within the node cabinet.

2.9 MIDSPAN INJECTORS / ETHERNET CABLE EXTENDERS

- A. Direct Vendor shall provide Ethernet Midspan Injectors and 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 midspan cable extenders where the total camera cable length (including horizontal and vertical distances) exceeds 300 ft. but is not more than 800 ft.
 - 2. Camera cable runs exceeding 800 ft. shall be fiber optic.
- C. Modules located at the cameras shall be located within a properly sized junction box mounted near the camera. Field device modules require local 120 volt power.
 - 1. The power cords shall be no longer than 24 inches to avoid large cable bundles within the enclosures.
- D. Modules located at the headend and node cabinets are standalone modules rack mounted within the equipment rack.

2.10 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. Provide midspan cable extenders for runs exceeding 300 feet, but less than 800 feet.
 - 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 male jack with coupler jack module attached at the camera end and RJ45 male jack at the patch panel end of each cable as

indicated in paragraph 3.2 G. The General Contractor shall terminate and test the CAT-6 cable and RJ 45 jacks.

- a. Basis of Design: Belden #AX104210 (coupler jack).
- b. Acceptable Alternate Manufacturer: ICC #IC107CP6BK (coupler jack).
 - 3. CAT-6 cable shall be terminated utilizing male RJ45 jacks on both ends of the cable to facilitate cable testing prior to installation of the node cabinets or headend. All testing shall be performed only after the cables have been terminated with the male RJ45 jacks.
 - 4. Complies with individual characteristics established in ANSI/TIA/EIA-568-B terminated to T568A and all addendums for Category 6 cable performance specification.
 - 5. Cabling and wire ways shall be installed in accordance with section 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.

2.11 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 23 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.
 - 5. 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.

2.12 SECONDARY BONDING BUSBAR – SBB BEHIND HEADEND (REFER TO TIA-607-D)

- 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 TMGB
 - 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 behind the CCTV headend rack(s), 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 #1/0/AWG/CU bonding conductor. Minimum size will be 2 inch H x 0.25 inch W x 12 inch L.

- C. Each headend rack shall be bonded to the SBB using a #6/AWG/CU stranded bond wire.
- D. Each (2) lug compression connector shall have antioxidant coating applied to lug and busbar prior to attachment.

2.13 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. Modular surge protectors shall also be provided at the camera end of the CAT-6 cable.
- 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 and NEMA L5-30R twist-lock receptacle.
 - 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.
 - 2. Provide quad-plex Telecommunications Outlet (T/O) bottom mounted at 24 inch AFF behind the headend rack.
- 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 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. All wiring to include CAT-6 cables shall utilize hook and loop fasteners to eliminate the risk of over-tightening cable bundles and affecting the strength or rated performance of the cable. The use of tie wraps is not acceptable.
 9. 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).
 10. 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.
 11. 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.
 12. 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.
 13. 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.
 14. Each camera shall be labeled by a numbering system requiring no more than three digits. The camera numbering system chosen shall be utilized by the A/E during preparation of the design drawings and by Securitas in preparation of their construction drawings to provide consistent, matching and accurate as-built documentation.
- a. Each pendant or arm mounted, PTZ camera shall be labeled on three sides with 3 inch high numbers supplied by the Direct Vendor.

- b. Each ceiling, wall or pendant mounted, multi-directional camera shall be labeled on three sides with 1 inch high numbers supplied by the Direct Vendor.
 - c. Each ceiling, standard wall or pendant mounted, fixed camera shall be labeled on two sides with 1 ½ inch high numbers supplied by the Direct Vendor
 - d. The outer shroud of each wall or pole arm mounted, fixed camera shall be labeled on two sides with 2 inch high numbers supplied by the Direct Vendor
 - e. The flange of each recessed ceiling mounted PTZ, fixed or multi-directional camera shall be labeled on two sides with 1 inch high numbers supplied by the Direct Vendor.
 - f. Labeling shall be stenciled or laminated vinyl in a contrasting color to the camera housing.
 - g. Labeling shall not be placed on lower dome or any area that would obstruct camera viewing.
 - 15. 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.
 - 16. 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.
 - 17. 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 coupler jacks at the device and to 8 pin, feed-thru coupler jack patch panels at the head end[or node cabinets per T568A standard. Patch panel shall be terminated per Direct Vendor.
- 1. The CAT-6 CCTV cabling shall be equipped with an RJ45/CAT-6 male jack with coupler jack attached at the camera end ready for final patch cord connection to the camera. The node or headend connection of the cable shall be a CAT-6/RJ45 male jack. Terminations provided by the General Contractor.
 - 2. The remote node cabinets and headend rack(s) shall be equipped with feed-thru, coupler jack patch panels to accept the RJ45 male jacks terminated on the camera cabling. The feed-thru

coupler jack patch panels (complete with the coupler jack modules) shall be provided by the Direct Vendor.

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.

I. The entire CCTV system shall utilize an independent wiring system not shared with any other building system. The structured cabling system racks, the TE's, the fiber backbone, cable trays, etc. cannot be utilized for any CCTV system purpose. Cable trays installed for the CCTV cabling may be utilized to contain the ePACS wiring.

3.3 DOCUMENTATION

A. The Contractor shall provide high definition photographs showing the interior components of all equipment enclosures, remote node cabinets and the headend rack(s). Photographs shall show wiring and placement of the midspan injectors, fiber media converters, surge protectors, fiber patch boxes, power supplies, power strips and receptacles. Photographs shall be transmitted to the A/E and USPS Project Manager.

3.4 FIELD TESTING CAT-6 COPPER

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

B. Field Testing Procedures:

1. Provide all equipment and services necessary to test the cabling.
2. Test and calibrate instruments before testing.
3. Re-terminate and retest any cable found to be defective.
4. Perform cable testing and submit report prior to installation of any cameras or node cabinets.

C. CAT-6 Copper Cable Testing:

1. Use Level III Compliant test equipment.
2. 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.

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.

3.5 CONSTRUCTION COORDINATION

A. The Direct Vendor shall interface with Other Work.

3.6 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.

3.7 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

SECTION 283100

FIRE DETECTION AND ALARM SYSTEM (HORN/STROBES)

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification provides the minimum requirements for the Life Safety 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. Protected premises fire alarm systems.
 2. Initiating devices.
 3. Notification appliances.
 4. Inspection and testing.
 5. Auxiliary fire alarm equipment.
- B. Related Sections:
1. [Section 210000 - Fire Suppression.]
 2. Section 260500 - Common Work Results for Electrical.
 3. [Section 281304 - Enterprise Physical Access Control System (ePACS).]

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 reference 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. American National Standards Institute (ANSI):
1. ANSIS3.411, Audible Emergency Evacuation Signals.
 2. ANSI/UL 1971, Standard for Safety Signaling devices for Hearing Impaired.
- C. National Fire Protection Association (NFPA):
1. [NFPA 13, Installation of Sprinkler Systems.]
 2. NFPA 70, National Electrical Code.
 3. NFPA 72, National Fire Alarm Code.
 4. NFPA 101, Life Safety Code.
 5. NFPA 720, Installation of Carbon Monoxide (CO) Detection and Warning Equipment.
- D. Underwriters Laboratories, Inc.(UL):
1. UL864 – Control Units for Fire Protective Signaling Systems.
 2. UL 268 - Smoke Detectors for Fire Protective Signaling Systems.
 3. UL 268A - Smoke Detectors for Duct Applications.
 4. UL 217 - Single and Multiple Station Smoke Alarms.
 5. UL 521 - Heat Detectors for Fire Protective Signaling Systems.
 6. [UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.]
 7. UL 464 - Audible Signaling Appliances.
 8. UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems.
 9. [UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.]
 10. UL 1971 - Signaling Devices for the Hearing-Impaired.

11. UL 1481 - Power Supplies for Fire Protective Signaling Systems.
12. [UL 1635 - Digital Alarm Communicator System Units.]

- E. Federal Codes and Regulations
1. Americans with Disabilities Act (ADA)

- F. International Standards Organization (ISO)
1. ISO-9000
 2. ISO-9001

- G. Factory Mutual (FM)
1. Provide factory mutual approval.

1.3 DEFINITIONS:

- A. Authority Having Jurisdiction: See Public Authorities.
- B. Engineer of Record: A Professional Engineer Registered in the State where the project is located who undertakes final 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: Building Departments, Fire Departments, Fire Marshals Offices, Aviation Authorities, Insurance Regulatory Boards, etc.
- E. 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.

1.4 SYSTEM DESCRIPTION

- A. General
1. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional protected premises fire alarm system consisting of horn and strobe (System). The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.
 2. Certification that the entire system has been inspected and tested, is installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and UL listings, and is in proper working order. Contractor shall use "Fire Alarm System Certification and Description" as required by NFPA 72.
- B. 24VDC NACs
1. Provide and install a new fire detection and alarm system that shall consist of:
 - a. Fire Alarm Control Panel.
 - b. LCD remote annunciator(s).
 - c. Area heat detectors.
 - d. Duct smoke detectors.
 - e. Sprinkler system waterflow(s) and valve supervisory switch(s).
 - f. Interface ancillary shutdown system(s)
 - g. Audible notification appliances.
 - h. Synchronized visual notification appliances.

- i. Provide elevator recall functions for primary and alternate floors and elevator power shunt trip activation.
- j. Connection to a central station remote monitoring company. Provide digital alarm communicator transmitter, 3rd party digital cellular communicator and remote antenna. The contractor shall arrange for a monitoring service contract with a U.L. listed, central station remote monitoring company. Refer to paragraph 3.5C.

1.5 SEQUENCE OF OPERATIONS

A. General 24 VDC NACs

1. The alarm activation of any area smoke detector, heat detector, manual pull station, sprinkler waterflow 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 documented in system history.
 - d. Any remote or local annunciator LCD/LED's associated with the alarm shall be illuminated.
 - e. Activate notification audible appliances throughout the building.
 - f. Activate visual strobes notification appliances throughout the building. The visual strobe shall continue to flash until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.
 - g. Transmit "Contact ID – Point Address" alarm signal to the central station remote monitoring company.
 - h. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
 - i. All exit doors shall unlock throughout the building.
 - j. All self-closing fire/smoke doors held open shall be released.

B. 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 in the system history file.
 - d. Any remote or local annunciator LED's associated with the alarm shall be illuminated.
 - e. Transmit "Contact ID – Point Address" alarm signal to the central station remote monitoring company.
 - f. Shutdown the local air handling unit.
 - g. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.

C. Supervisory Operation

1. Upon supervisory activation of any sprinkler valve supervisory switch, 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 supervisory condition including; device type, device location and time/date.
 - c. All system activity/events shall be documented in the system history file.
 - d. Any remote or local annunciator LCD/LED's associated with the supervisory activation shall be illuminated.
 - e. Transmit "Contact ID – Point Address" supervisory signals to the central station remote monitoring company.

D. Trouble Operation

1. Upon activation of a trouble condition or signal from any device on the system, 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 trouble condition including; device type, device location and time/date.
 - c. All system activity/events shall be documented on the system printer and system history file.
 - d. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
 - e. Transmit "Contact ID – Point Address" trouble signals to the central station remote monitoring company.

1.6 SYSTEM CONFIGURATION

A. General

1. All Life Safety System equipment shall be 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 System shall utilize independently addressed, smoke detectors, heat detectors and input/output modules as described elsewhere in this specification.

B. Power Supply

1. The power supply shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. The automatic battery charger shall have low battery discharge protection. The power supply shall provide internal power and 24 VDC at 4.5A continuous for notification appliance circuits. All outputs shall be power limited. The battery shall be sized to support the system for 24 hours of supervisory and trouble signal current plus general alarm for 15 minutes.
2. Auxiliary power supplies shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. The automatic battery charger shall have low battery discharge protection. The power supply shall provide internal power and 24 VDC at 6.4 continuous for notification appliance circuits. The power supply shall be capable of providing 8A to output circuits for a maximum period of 100 ms. All outputs shall be power limited. The battery shall be sized to support the system for 24 hours of supervisory and trouble signal current plus general alarm for 15 minutes. All supervision of the auxiliary supply shall be transmitted via addressable analog loop without additional equipment.

C. Display

1. The display module shall be of membrane style construction with a 4 line by 20 character Liquid Crystal Display. The LCD shall use super-twist technology and backlighting for high contrast visual clarity. In the normal mode display the time, the total number of active events and the total number of disable points. In the alarm mode display the total number of events and the type of event on display. Reserve 40 characters of display space for user custom messages. The module shall have visual indicators for the following common control functions; AC Power, alarm, supervisory, monitor, trouble, disable, ground fault, CPU fail, and test. There shall be common control keys and visual indicators for; reset, alarm silence, trouble silence, drill, and one custom programmable key/indicator. Provide four pairs of display control keys for selection of event display by type (alarm, supervisory, monitor and trouble) and forward / backward scrolling through event listings. The operation of these keys shall be integrated with the related common control indicator that lights when an event of its type is active. Allow the first event of the highest priority to capture the LCD for display so that arriving fire fighters can view the first alarm event "hands free". Provide system function keys; status, reports, enable, disable, activate, restore, program, and test. The module shall have a numeric keypad, zero through nine with delete and enter keys.

- D. 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,] [and fire pump functions shall be Class B.
- E. 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.
- F. 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. When a signaling line circuit covers more than one fire/smoke compartments, a wire-to-wire short shall not affect the operation of the circuit from the other fire/smoke compartments.
 - 4. The signaling line circuit (SLC) connecting all components Class B (style 4).
- G. [DACT
 - 1. The panel shall contain a dialer alarm communicator transmitter (DACT) module to transmit "Contact ID – Point Address" alarm, supervisory and trouble signals to a central station remote monitoring company. The DACT shall support digital 3rd party cellular communications.

1.7 SUBMITTALS

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Provide electrical characteristics and connection requirements.
 - b. Power and battery calculation.
 - 2. Shop Drawings: Provide annunciator layout and system wiring diagram showing each device and wiring connection required. Prior to commencement of installation, submit licensed Professional Engineer's system drawings (signed and sealed by Delegated Engineer) specified in "Quality Assurance" Article to Designated Reviewers. Include system calculations and equipment data. Submittals shall be complete and in bound sets. System drawings, prepared according to Contract Documents. Submittals shall be made to Designated Reviewers. Designated Reviewers are:
 - a. Additional Submittal: Submit shop drawings, product data, and calculations to Public Authorities for approval. Submit proof of approval to USPS Project Manager.
 - b. Submittals to USPS Project Manager:
 - c. Submittals to Engineer of Record:
 - 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 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:
 - 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.
 - 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.
 - f. All drawings shall be reviewed and signed off by an individual having a minimum of a NICET certification in fire protection engineering technology, subfield of fire alarm systems.
 - g. A copy of the installing technician's NICET certification shall be provided.
 - h. System Calculations: Complete calculations shall be provided which show the electrical load on the following system components:
 - 1) Each system power supply including standalone booster supplies.
 - 2) Each standby power supply (batteries).
 - 3) Each notification appliance circuit.
 - 4) Each auxiliary control circuit that draws power from any system power supply.
- C. 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. Project Record Documents: As-Built drawings consisting of a scaled plan of entire building showing the placement of each individual item of the Life Safety System equipment as well as cable and/or raceway sizes and routings. All drawings must reflect point to point wiring, device address and programmed characteristics. All drawings shall be provided in AutoCAD format. A vellum plot of each sheet shall also be provided. Provide the application program listing for the system as installed at the time of acceptance (disk, hard copy printout, and all required passwords).
 - 3. Record of Completion: Figure 4.5.2.1 NFPA 72.

1.8 QUALITY ASSURANCE

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Manufacturer Qualifications: Firm 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: 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.
- 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 installers with NICET Level III or higher shall be utilized.

D. 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.
7. Provide Smoke detector in room containing Fire Alarm Control Panel per NFPA 72, section 4.4.5.

E. 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 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 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Materials: Furnish extra materials described below that match products installed, packaged with protective covering for storage and identified with labels clearly describing contents.
1. Fire Alarm 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. 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, such as control panels, shall be responsible for the satisfactory installation of the complete system.
- B. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Siemens, (800) 262-7976.
 2. Edwards, (800) 655-4497.
 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 PANEL COMPONENTS AND FUNCTIONS

A. General

1. The control panel shall be a multi-processor-based system designed specifically for fire and releasing system applications. The control panel shall be listed and approved for the application standard(s) as listed under the General section.
2. The control panel shall include all required hardware, software and system programming to provide a complete and operational system. The control panel(s) shall assure that life safety takes precedence among all panel activities.
3. The control panel shall include the following capacities:
 - a. Support up to 1,000 analog/addressable points per panel.
 - b. Support up to 5 fully supervised network remote annunciators.
 - c. Support a DACT (dialer) for off premise cellular notification.
 - d. Support up to 576 chronological events in history.
4. The control panel shall include the following features:
 - a. Provide auto programming and electronic addressing and mapping of analog/addressable devices.
 - b. Provide an operator interface display that shall include functions required for annunciation, command and control system functions.
 - c. Provide a discreet system control switch provided for reset, alarm silence, local silence, drill switch, up/down switches, status switch, program switch, enable and disable switches, activate and restore switches, reports switch and test switch.
 - d. Provide an authorized operator with the ability to operate or modify system functions like system time, date, passwords; and auto-program, enable mapping, restart the system and clear control panel event history file.
5. Supervision of system components, wiring, initiating devices and software shall be provided by the control panel. Failure or fault of system component or wiring shall be indicated by type and location on the LCD display. Software and processor operation shall be independently monitored for failure.
6. Basis of Design: Control Panel - Edwards io1000 Series.

B. Annunciation

1. The system shall be designed and equipped to receive, monitor, and annunciate signals from devices and circuits installed throughout the building. Manufacturer's standard control switches shall be acceptable if they provide the required operation, including performance, supervision and position indication. If the manufacturers' standard switches do not comply with these requirements, fabrication of custom manual controls acceptable to the USPS Project Manager is required.
2. Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciator panel.
3. The control panel and remote annunciator(s) shall contain the following system status indicators:
 - a. 80 character Backlit Liquid Crystal Display.
 - b. System Power Indicator - green LED.
 - c. System Common Alarm - red LED.
 - d. System Common Trouble - yellow LED.
 - e. System Common Supervisory - yellow LED.

- f. System Common Monitor - yellow LED.
 - g. System Ground Fault - yellow LED.
 - h. System CPU Fault - yellow LED.
 - i. System Disabled - yellow LED.
 - j. System Test Point(s) - yellow LED.
 - k. System Reset Switch with Integral yellow LED.
 - l. System Alarm Silence Switch with Integral yellow LED.
 - m. System Local Silence Switch with Integral yellow LED.
 - n. System Drill Switch with Integral yellow LED
 - o. System Message Queue Scroll Switches.
 - p. Additional buttons as required to provide system control and operator functions.
4. Basis of Design: Edwards io1000 series.
- C. Power Supply
- 1. Each system power supply shall be a minimum of 6 amps @ 24 VDC.
 - 2. Upon failure of normal (AC) power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any alarm, trouble or operator acknowledgment signals.
 - 3. Each system power supply shall be individually annunciated and shall identify the inoperable power supply in the event of a trouble condition.
 - 4. All standby batteries shall be continuously monitored by the system. Low battery and disconnection of battery power supply conditions shall immediately annunciate as a trouble signal, identifying the deficient batteries.
 - 5. All system power supplies shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, in 48 hours maximum.
 - 6. All AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of Section 4.4.1.4 of NFPA 72. The AC power circuit shall be installed in conduit raceway. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside each control panel.
 - 7. Basis of Design: Edwards modelBPS6 or BPS10.
- D. Display
- 1. System Message Processing and Display Operations:
 - a. [The system shall allow message routing to be configured to any or all annunciators.]
 - b. All system printer port(s) shall be configurable to output any combination of alarm, supervisory, trouble, or monitor, event messages.
 - c. Each LCD display on each annunciator shall be configurable to display the status of any combination of alarm, supervisory, trouble, or monitor, event messages.
 - d. Clear distinction shall be provided between alarm, supervisory, trouble, and monitor status messages.
 - 2. The system shall provide the ability to retrieve data from the analog/addressable detectors to a PC while the system is on-line and operational in the protected premises. The uploaded data may then be analyzed in a diagnostic program supplied by the system manufacturer.
- E. [Dialer -- DACT
- 1. The system shall provide an off premise digital alarm communications transmitter (DACT) capable of transmitting system "Contact ID – Point Address" alarm, trouble and supervisory events to a central station remote monitoring company. The DACT shall support digital 3rd party, U.L. listed, cellular communications.
 - 2. Basis of Design:
 - a. Edwards model SA-DACT.
 - b. Honeywell, Telguard, Bosch, DSC (cellular communicator and antenna).]
- F. Reports

1. The system shall provide the operator the ability to attain system reports that give detailed chronological description of the last 576 system events. The system shall provide a listing of the sensitivity and environmental compensation usage of all of the detectors on the system, or specified analog/addressable circuit.
2. The system report shall include facility name, compiled date, compiler revision, project revision and report date. The system shall output these reports via the main LCD, and reports shall be capable of being printed on a remote printer, (not part of this work).

2.3 FIELD-MOUNTED SYSTEM COMPONENTS

A. Smoke Detectors and Accessories

1. Analog Addressable Smoke General
 - a. Each analog addressable smoke detector's sensitivity shall be capable of being programmed individually as: most sensitive, more sensitive, normal, less sensitive or least sensitive.
 - b. An alternate alarm sensitivity level shall be provided for each detector, which can be set to any of the five (5) sensitivity settings manually or automatically using a time of day event.
 - c. The detector's sensing element reference point shall automatically adjust, compensating for background environmental conditions such as dust, temperature, and pressure. Periodically, the sensing element real-time analog value shall be compared against its reference value. The detector shall provide a maintenance alert signal that 80 percent to 99 percent compensation has been used. The detector shall provide a dirty fault signal that 100 percent compensation has been used.
 - d. The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced. System shall display an off-normal condition until the proper detector type has been installed or change in the application program profile has been made.
2. Smoke Detector - Multi-Sensor Photo Thermal (Ceiling Mounted)
 - a. Provide analog/addressable multi-sensor combination photoelectric, thermal smoke detectors for all ceiling mounted locations. Alarm condition shall be based upon the combined input from the photoelectric and thermal detection elements. Separately mounted photoelectric detectors and heat detectors in the same location, clustered at the manufacturer's listed spacing is not an acceptable alternative. The system shall have the ability to set the sensitivity and alarm verification of each individual detector on the circuit. It shall be possible to automatically set the sensitivity of individual analog/addressable detectors for the day and night periods.
 - b. 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.
 - c. Basis of Design: Edwards model SIGA-PHD.
3. 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.
4. 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.

B. Heat Detectors

- 1. Fixed Temperature Heat Detector (Equipment Rooms)
 - a. Provide analog/addressable fixed temperature heat detectors within all equipment rooms. The heat detector shall have a nominal fixed temperature alarm point rating of 135°F (57°C). The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.
 - b. Basis of Design: Edwards model SIGA-HFD.
- 2. Fixed Temperature-ROR Heat Detector (Ceiling Mounted)
 - a. Provide analog/addressable combination fixed temperature / rate-of-rise detectors for all ceiling mounted locations. The heat detector shall have a nominal fixed temperature alarm point rating of 135°F (57°C) and a rate of rise alarm point of 15°F(9°C) per minute. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.
 - b. Basis of Design: Edwards model SIGA-HRD.
 - c. Equipment rooms containing permanently installed fuel burning appliances and equipment shall be equipped with analog/addressable, combination, fixed temperature heat and carbon monoxide sensors. Sensors shall be equipped with a sounder base and temporal pattern generator for early detection.
 - 1) Basis of Design: Edwards model SIGA-PHCD with SIGA-AB4GT and SIGA-TCDR.

C. Detector Bases

- 1. Detector Base - Standard
 - a. Provide detector mounting base suitable for mounting on single gang, 3½ or 4 inch octagon box or 4 inch square box. The base shall, contain no electronics and support all series detector types.
 - b. Basis of Design: Edwards model SIGA-SB4.
- 2. Detector Base - Relay
 - a. Provide relay detector mounting base suitable for mounting on single gang, 3½ or 4 inch octagon box and 4 inch square box. The relay base shall support all detector types and have the following minimal requirements.
 - b. The relay shall be a bi-stable type and selectable for normally open or normally closed operation.
 - 1) The position of the contact shall be supervised.
 - 2) The relay shall automatically de-energize when a detector is removed.
 - 3) The operation of the relay base shall be controlled by its respective detector processor. Detectors operating standalone mode shall operate the relay upon changing to alarm state. Relay bases not controlled by the detector microprocessor shall not be acceptable.

- 4) Form "C" Relay contacts shall have a minimum rating of 1 amp @ 30 VDC and be listed for pilot duty.
 - 5) Removal of the respective detector shall not affect communications with other detectors.
 - c. Basis of Design: Edwards model SIGA-RB.
- D. Manual Stations
- 1. Manual Station - Double Action Single Stage
 - a. Provide analog/addressable double action, single stage fire alarm stations at the locations shown on the drawings. The fire alarm station shall be of polycarbonate construction and incorporate an internal toggle switch. A locked test feature shall be provided. The station shall be finished in red with silver "PULL IN CASE OF FIRE" lettering. The manual station shall be suitable for mounting on 2 ½ inch (64mm) deep single gang boxes and 1 ½ inch (38mm) deep 4 inch square boxes with single gang covers.
 - b. Provide factory manufactured boxes for all surface mounted applications.
 - c. Basis of Design: Edwards model SIGA-278.
- E. Notification Appliances
- 1. General
 - a. All appliances which are supplied for the requirements of this specification shall be UL Listed for Fire Protective Service, and shall be capable of providing the "equivalent facilitation" which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA(AG)), and shall be UL 1971 Listed.
 - b. All appliances shall be of the same manufacturer as the fire alarm control panel specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturer's instructions.
 - c. All notification appliances shall be red unless noted otherwise on the drawings.
 - 2. Heavy Duty Horns (Exterior Locations)
 - a. Provide heavy duty electronic horns for exterior locations. Horns shall be selectable for high or low dBA output and steady or temporal output. At the high output setting, the horn shall provide a 85 dBA continuous sound output or a 82 dBA temporal sound output, when measured in reverberation room per UL-464. In and out screw terminals shall be provided for wiring. Weatherproof wall boxes shall be provided for outdoor applications.
 - b. Basis of Design: Edwards Integrity series.
 - 3. Low Profile Horns (Interior Locations)
 - a. Provide low profile wall mount horns within interior locations. The low profile horn shall not extend more than 1 inch (2.5cm) past the finished wall surface.
 - b. When the cover is installed, no mounting hardware shall be visible. In and out screw terminals shall be provided for all wiring. The low profile speaker shall mount in a 4 inch x 2 1/8 inch square electrical box, without trims or extension rings.
 - c. Provide factory manufactured boxes for all surface mounted applications.
 - d. Basis of Design: Edwards Genesis series.
 - 4. Low Profile Horn-Strobe
 - a. Provide low profile wall mount horn/strobes at the locations shown on the drawings. The low profile horn/strobe shall not extend more than 1 inch (2.5cm) past the finished wall surface.
 - b. Strobes shall provide synchronized flash output, that shall be switch selectable for output values of 15cd, 30cd, 75cd & 110cd. Wattage and candela settings shall be visible with the cover installed. When the cover is installed, no mounting hardware shall be visible. In and out screw terminals shall be provided for all wiring. The low profile horn/strobes shall mount in a 4 inch x 2 1/8 inch square electrical box, without trims or extension rings.
 - c. Provide factory manufactured boxes for all surface mounted applications.
 - d. Basis of Design: Edwards Genesis series.
 - 5. Low Profile Strobes

- a. Provide low profile wall mounted strobes at the locations shown on the drawings. In and out screw terminals shall be provided for wiring. Strobes shall provide synchronized flash outputs. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 60cd, 75cd, or 110cd devices. Low profile strobes shall mount in a single gang box.
- b. Provide factory manufactured boxes for all surface mounted applications.
- c. Basis of Design: Edwards Genesis series.
- 6. Horn-Strobe Ceiling Mount
 - a. Provide low profile, 7 inch diameter ceiling mounted horn/strobes at the locations shown on the drawings. Device shall be round and shall not extend more than 1.6 inches past the finished ceiling surface. Strobes shall provide synchronized flash outputs. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 75cd, and 110cd devices.
 - b. Low profile ceiling horn/strobe shall mount to a 4 inch square x 2 1/8 inch deep box.
 - c. Basis of Design: Edwards Genesis "GC" series.
- 7. Strobe Ceiling Mount
 - a. Provide low profile, 7 inch diameter ceiling mounted strobes at the locations shown on the drawings. Devices shall be round and shall not extend more than 1.6 inches past the finished ceiling surface.
 - b. Strobes shall provide synchronized flash outputs. Strobe output shall be from a family of 15cd, 30cd, 75cd, and 110cd devices.
 - c. Low profile ceiling strobes shall mount to a 4 inch square x 2-1/8 inch deep box.
 - d. Basis of Design: EST Genesis "GC" series.
- 8. Horn-Strobe Weatherproof
 - a. Provide low profile, weatherproof, wall mounted horn-strobes or horns at the exterior locations shown on the drawings.
 - b. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections for horn with clear fire strobe.
 - c. Rated for outdoor use and wall mounted.
 - d. The weatherproof horn-strobe or horn shall mount in a factory supplied back box.
 - e. Strobe lights rated light output shall be 15/30/75/110 CD, field selectable and synchronized.

2.4 INITIATION AND CONTROL MODULES

A. General

- 1. It shall be possible to address each intelligent module without the use of DIP or rotary switches. Devices using DIP switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller. Modules requiring EPROM, PROM, ROM changes or DIP switch and/or jumper changes shall not be acceptable. The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished coverplate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:
 - a. Temperature: 32oF to 120oF (0oC to 49oC)
 - b. Humidity: 0-93 percent RH, non-condensing.

B. Control Relay Module

- 1. Provide intelligent control relay modules at the locations shown on the drawings. The Control Relay Module shall provide one form "C" dry relay contact rated at 2 amps @ 24 VDC to control external appliances or equipment shutdown. The control relay shall be rated for pilot duty and

releasing systems. The position of the relay contact shall be confirmed by the system firmware. The control relay module shall be suitable for mounting on 2 ½ inch (64mm) deep single gang boxes or 1 ½ inch (38mm) deep 4 inch square boxes with single gang covers.

2. Basis of Design: Edwards model SIGA-CR.
- C. Dual Input Module
1. Provide intelligent dual input modules at the locations shown on the drawings. The Dual Input Module shall provide two (2) supervised Class B input circuits each capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on 2 ½ inch (64mm) deep single gang boxes or 1 ½ inch (38mm) deep 4 inch square boxes with single gang covers. The dual input module shall support the following circuit types:
 - a. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
 - b. Normally-Open Alarm Delayed Latching (Waterflow Switches)
 - c. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
 - d. Normally-Open Active Latching (Supervisory, Tamper Switches)
 2. Basis of Design: Edwards model SIGA-CT2.
- D. Dual Input Signal Module
1. Provide intelligent dual input signal modules at the locations shown on the drawings. The Dual Input (Dual Riser Select) Signal Module shall provide a means to selectively connect one of two (2) signaling circuit power risers to one (1) supervised output circuit. The module shall be suitable for mounting on 2 ½ inch (64mm) deep 2-gang boxes or 1 ½ inch (38mm) deep 4 inch square boxes with 2-gang covers. The dual input signal module shall support the following operation:
 2. Audible/Visible Signal Power Selector (Polarized 24 VDC @ 2A, 25 Vrms @ 50w or 70 Vrms @ 35w of Audio).
 3. Basis of Design: Edwards model SIGA-CC2.
- E. Isolator Module
1. Provide intelligent fault isolators modules at the locations shown on the drawings. The Isolator Module shall be capable of isolating and removing a fault from a class A data circuit while allowing the remaining data loop to continue operating. The module shall be suitable for mounting on 2 ½ inch (64mm) deep 2-gang boxes or 1 ½ inch (38mm) deep 4 inch square boxes with 2-gang covers.
 2. Basis of Design: Edwards model SIGA-IM.
- F. Single Input Module
1. Provide intelligent single input modules at the locations shown on the drawings. The Single Input Module shall provide one (1) supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on 2 ½ inch (64mm) deep 1-gang boxes or 1 ½ inch (38mm) deep 4 inch square boxes with 1-gang covers. The single input module shall support the following circuit types:
 - a. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
 - b. Normally-Open Alarm Delayed Latching (Waterflow Switches)
 - c. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
 - d. Normally-Open Active Latching (Supervisory, Tamper Switches)
 2. Basis of Design: Edwards model SIGA-CT1.
- G. Single Input Signal Module
1. Provide intelligent single input signal modules at the locations shown on the drawings. The Single Input (Single Riser Select) Signal Module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation. When selected as a telephone power selector, the module shall be capable of generating its own "ring tone". The module shall be suitable for mounting on 2 ½ inch (64mm) deep 2-gang boxes or 1 ½ inch (38mm) deep 4 inch square boxes with 2-gang covers. The single input signal module shall support the following operations:

- a. Audible/Visible Signal Power Selector (Polarized 24 VDC @ 2A, 25Vrms @ 50w or 70 Vrms @ 35 Watts of Audio)
 - 2. Basis of Design: Edwards model SIGA-CC1.
- H. Suppression System Releasing Module
 - 1. Provide addressable suppression system releasing interface modules at the locations shown on the drawings. The interface shall be suitable for preaction and deluge sprinkler systems and clean extinguishing agent release. The interface shall provide supervised Class B circuits required for solenoid activation, manual release, system abort, and audible and visible notification of pending release. The interface shall provide all required release and abort timing functions. The interface shall be listed for use with solenoid releasing valves that has both ULI listing and FM approval. The solenoid release circuit shall be provided with a manual disconnect switch for system maintenance.
 - 2. Basis of Design: Edwards model SIGA-REL.
- I. Universal Class AB Module
 - 1. Provide intelligent class A/B modules at the locations shown on the drawings. The Universal Class A/B Module shall be capable of a minimum of fifteen (15) distinct operations. The module shall be suitable for mounting on 2 ½ inch (64mm) deep 2-gang boxes or 1 ½ inch (38mm) deep 4 inch square boxes with 2-gang covers. The universal class A/B module shall support the following circuit types:
 - a. Two (2) supervised Class B Normally-Open Alarm Latching.
 - b. Two (2) supervised Class B Normally-Open Alarm Delayed Latching.
 - c. Two (2) supervised Class B Normally-Open Active Non-Latching.
 - d. Two (2) supervised Class B Normally-Open Active Latching.
 - e. One (1) form "C" dry relay contact rated at 2 amps @ 24 VDC.
 - f. One (1) supervised Class A Normally-Open Alarm Latching.
 - g. One (1) supervised Class A Normally-Open Alarm Delayed Latching.
 - h. One (1) supervised Class A Normally-Open Active Non-Latching.
 - i. One (1) supervised Class A Normally-Open Active Latching.
 - j. One (1) supervised Class A 2-wire Smoke Alarm Non-Verified.
 - k. One (1) supervised Class B 2-wire Smoke Alarm Non-Verified.
 - l. One (1) supervised Class A 2-wire Smoke Alarm Verified
 - m. One (1) supervised Class B 2-wire Smoke Alarm Verified
 - n. One (1) supervised Class A Signal Circuit, 24 VDC @ 2A.
 - o. One (1) supervised Class B Signal Circuit, 24 VDC @ 2A.
 - 2. Basis of Design: Edwards model SIGA-UM.

2.5 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. Installed in conduit or enclosed raceway.
- D. 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. All notification appliance circuit conductors shall be solid copper or bunch tinned (bonded) stranded copper. Where stranded conductors are utilized, a maximum of 19 strands shall be permitted for #12/AWG and larger conductors. Minimum size conductor shall be #14 AWG.
5. All visual notification appliance circuits shall be #14 AWG minimum THHN or twisted pairs or twisted shielded pairs or per manufacturer's requirements.
6. Color code fire alarm conductors as follows:

ITEM	COLOR
Initiating Device	Orange/Brown
Horn (Exterior)	Blue and Yellow
Flashing Lights	Blue and Yellow
Control Panel Power	Black, White and Green
Air Handler Shutdown	Purple
[Door Holders]	White

7. 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.

2.6 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 entire 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.

2.7 OPEN CABLE

- A. Power-limited cable in accordance with NEC Article 760, where used, not installed in UL listed metal conduit or raceway shall be mechanically protected by building construction features:
- B. Installation shall be in areas not subjected to mechanical injury.

- C. All circuits shall be supported by the building structure. Cable shall be attached by straps to the building structure at intervals not greater than 10 feet. Wiring installed above drop ceilings, cable shall not be laid on ceiling tiles. Cable shall not be fastened in a manner that puts tension on the cable.
- D. Cable type shall be FPLP, FPLR or FPL, or permitted substitutions, selected for the installation application as required by NEC 70, Section 760-61.
- E. All cable that is not enclosed by conduit shall be supported and anchored with nylon straps or clamps. The use of staples is prohibited.

2.8 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 of the sizes and types specified.
- D. 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.
- E. 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.
- F. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40 percent.
- G. 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.
- H. 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.
- I. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

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. Riser conduits, AC power conduits and control cabinets.
 - b. Control panel(s), control component(s), remote annunciator(s), and printer(s).
 - c. Conduits and wiring for complete notification circuits and appliance installation throughout facility.
 - d. Pre-test the audible and visual notification appliance circuits.
 - e. Install all new detection devices.
 - f. Terminate between field devices and the associated control equipment.
 - g. Complete the interface to all suppression and ancillary shutdown systems.
 - h. Complete contractor pre-test of system.
 - i. Complete system testing.

C. Install products in accordance with NFPA Standards and manufacturer's published instructions.

D. Install manual station with operating handle 44 inches above floor. Install audible and visual signal devices in accordance with NFPA 72 and ANSI/UL 1971.

E. Mount end-of-line device at the last easily accessible device or within separate box adjacent to the last device.

F. Flush mount outlet box for electric door holder to withstand 80 pounds pulling force.

G. Make wiring connections to door release devices, sprinkler flow switches, sprinkler valve tamper switches, fire suppression system control panels, and other devices. Conduct all testing, including HVAC Equipment shutdown, initiated by fire alarm devices.

H. Surge suppression shall be provided for all 120 Volt fire alarm equipment and all low voltage wiring exiting or exterior of the facility.

I. Automatic Detector Installation: Conform to NFPA 72.

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. Test in accordance with NFPA 72 and local fire department requirements. Use "Record of Completion" Figure 4.5.2.1 (NFPA 72).

C. 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.

- D. 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.

- E. 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.

- F. Acceptance Operational Tests:
 - 1. Perform operational system tests to verify conformance with specifications:
 - a. Each alarm initiating device installed shall be operationally tested in the presence of a USPS Project Manager's representative. Each device shall be tested for alarm and trouble conditions. Contractor shall submit a written certification that the Fire Alarm System installation is complete including all punch-list items. Test battery operated emergency power supply. Test emergency power supply to minimum durations specified. [Test remote monitoring DACT and cellular communications transmitter. Coordinate testing with the Public Authority and central station remote monitoring firm/entity. Submit written documentation from central station remote monitoring firm/entity that fire alarm communications are operating properly.]
 - b. Test each Signal Appliance installed for proper operation. Submit written report indicating sound levels at specified distances.
 - c. Test Fire Alarm Control Panel [and Remote Annunciator].
 - 2. Provide minimum [10] days notice of acceptance test performance schedule to USPS Project Manager, central station remote monitoring firm/entity, and local fire authorities having jurisdiction.
 - 3. The Contractor shall provide certification that the system is installed entirely in accordance with the system manufacturer's recommendations and within the limitations of the required listings and approvals, that all system hardware and software has been visually inspected and functionally tested by a manufacturer's certified representative, and that the system is in proper working order.

- G. Retesting: Correct deficiencies and retest until total system meets the requirements of Specifications and complies with applicable standards.

3.5 WARRANTY AND MAINTENANCE

- A. Warranty: The contractor shall warranty all materials, installation and workmanship for 18 months year 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.
- B. Remote Monitoring
 - 1. The contractor shall select a central station remote monitoring company that is UL listed and approved, and approved by the AHJ. The contractor shall pay for the first year of remote monitoring service and the cost of the service after the initial first year will be borne by the USPS. Additionally, the contractor must provide certification of the company's qualifications to the USPS Project Manager.

3.6 TRAINING

- A. The System Supplier shall schedule and present a minimum of four (4) hours of documented formalized instruction for the building owner, detailing the proper operation of the installed System.

- B. The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.
- C. The instruction shall cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer.
- D. Instruction shall be made available to the Local Municipal Fire Department if requested by the AHJ.

END OF SECTION

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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 024113 - Selective Site Demolition: Demolition and removal of site structures.
 - 3. 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 1/2 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
- 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

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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, except where Rock Excavation is required. Rock Excavation criteria is as follows:
 - a. Rock Excavation: Igneous, metamorphic, or sedimentary rock that cannot be removed by rippers or other mechanical methods requiring drilling and blasting.
 - b. Rock Excavation Indicated by Report of Subsurface Exploration: N/A
 - c. Rock Excavation Not Indicated in Report of Subsurface Exploration:
 - 1) Notify Contracting Officer immediately, and in writing, prior to start of Rock Excavation operations.
 - 2) Contracting Officer will visit Project Site, verify requirement for Rock Excavation, determine estimated quantity Rock Excavation required, and provide Contractor written authorization to proceed.
 - 3) Contracting Officer will verify measurements and quantities of actual Rock Excavation required and make adjustments to Contract as specified in Section 012600.
 - d. Rock excavation specified in Section 312317.
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. Excavated and re-used material Imported Borrow Select or local borrow Structural.
 - 2. Graded.
 - 3. Free of lumps larger than 1/2 inches, rocks larger than 1/2 inches, and debris.
 - 4. Conforming to ASTM D 2487 CL OL .
- B. Aggregate: Approved by Testing Laboratory and Contracting Officer.
 - 1. Coarse Aggregate: Recycled Crushed Concrete, Coarse Stone, Limerock 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 Group Symbol GM GC; 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 Group Symbol SW SP SM SC; 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 Group Symbol OH PT.
- 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 Group Symbol OH PT.
 7. Limit decaying matter to 1 percent of total content by volume.
- 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 1557.
 2. Aggregate: Perform in accordance with ASTM D 1557.
- 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 98 percent optimum density in accordance with ASTM D 698 or 95 percent optimum density in accordance with ASTM D 1557 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 10 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 98 percent optimum density in accordance with ASTM D 698 or 95 percent optimum density in accordance with ASTM D 1557 at minimum moisture content of 1 percent below and maximum moisture content 3 percent above optimum moisture content.
- 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 5,000 square feet.
 - b. Fill Areas: Minimum one compaction test for every 5,000 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: 10/1/2021
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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.
 - 3. Section 313200 - Soil Stabilization: Lime, cement, fly ash, and geotextile subgrade stabilizers.

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 98 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 10 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 98 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.
 2. Maximum allowable values for plasticity index (PI) and liquid limit (LL) of suitable fill materials to be used as fill in the specified areas, unless indicated otherwise on Drawings:

a.	LOCATION	PI	LL
b.	Building area, below upper 4 feet	30	40
c.	of proposed subgrade elevation		
d.	Building area, upper 4 feet	20	30
e.	of proposed subgrade elevation		
f.	Paving area, below upper 4 feet	30	40
g.	of proposed subgrade elevation		
h.	Paving area, upper 4 feet	20	30
i.	of proposed subgrade elevation		
- 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,
- C. Site Tests:
 - 1. Specified in Section 312000.
 - 2. Tests for 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.
 - 3. Tests for areas outside building area subgrade pad 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

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SECTION 313100

SOIL TREATMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Soil treatment for termite control.
 - 2. Application below grade and at interior and exterior foundation perimeter.
- 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. United States Environmental Protection Agency (EPA):
 - 1. EPA - Federal Insecticide, Fungicide, and Rodenticide Act.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - a. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, and intended application rate.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record moisture content of soil before treatment, date and rate of application, areas of application, diary of meter readings and corresponding soil coverage.
 - 2. Warranty: Submit manufacturer warranty with forms completed in United States Postal Service name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience and licensed in accordance with regulations of authorities having jurisdiction for application of chemical toxicant.
- B. Regulatory Requirements: Conform to applicable code for application requirements, application licensing, authority to use toxicant chemicals, and in accordance with EPA regulations.

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 with labels intact, identifying Product and manufacturer, application instructions, and EPA federal registration number.
- C. Do not store Products on site. Deliver Products to site at time of application.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Do not apply soil treatment to frozen or wet soils or during rain or snow.

1.7 WARRANTY

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Special Warranty:
 - 1. Submit written warranty signed by soil treatment applicator and Contractor certifying that applied chemical toxicant treatment will prevent infestation of subterranean termites.
 - a. State that application was made at concentration, rates, and methods as specified.
 - b. State that if subterranean termite activity is discovered during warranty period, Contractor will retreat soil and repair damage caused by termite infestation at no additional cost to United States Postal Service.
 - 2. Cover against invasion or propagation of subterranean termites, damage to building or building contents caused by termites; repairs to building or building contents so caused.
 - 3. Provide for inspection of Work annually; report in writing to designated U.S. Postal Service personnel.
 - 4. Warranty Period: 5 years.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. EPA and local authority having jurisdiction approved chemical toxicant; water based emulsion, uniform composition, with synthetic dye to permit visual identification of treated soil, bearing Federal registration number of the EPA.
- B. Specially formulated to prevent infestation by termites.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MIX DILUTION

- A. Dilute and mix toxicant chemical to manufacturer's published instructions.

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 the soil surfaces are unfrozen, sufficiently dry to absorb toxicant, ready to receive treatment.
 - 2. Verify final grading is complete.

- 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. Remove foreign matter, loosen, rake, and level soil to be treated, except previously compacted areas under slabs and foundations.

3.3 APPLICATION

- A. Apply toxicant within 12 hours before installation of vapor retardant under slab-on-grade.
- B. Apply toxicant to soil in strict accordance with federal and local jurisdiction requirements and manufacturer's printed application rates.
- C. Apply toxicant as a coarse spray; provide uniform metered distribution.
- D. Post signs in areas of application to warn workers that toxicant has been applied to soil. Remove signs after areas are covered by other construction.
- E. Reapply toxicant to areas disturbed by subsequent excavation, landscape grading, or other construction activities occurring after initial toxicant application.

3.4 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate application of toxicant at foundation perimeter with finish grading and landscaping work; avoid disturbance of treated soil.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect and test soil areas where toxicant was applied to determine the presence of any remaining termites before covering with subsequent construction.
- C. Reapply toxicant to areas where inspection or testing identifies the presence of termites. Use same toxicant as for original treatment.

END OF SECTION

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SECTION 313200
SOIL STABILIZATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Lime stabilized subgrade.
 - 2. Cement stabilized subgrade.
 - 3. Fly ash stabilized subgrade.
 - 4. Geotextile fabric stabilized subgrade.

- 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 site improvements.
 - 2. Section 313200 - Excavation and Fill: Earthwork for structures., utilities, and pavement.

1.2 REFERENCES

- A. American Society for Testing Materials (ASTM):
 - 1. ASTM C 150 - Specification for Portland Cement
 - 2. ASTM C 618 - Specification for Fly Ash and Raw of Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
 - 3. ASTM C 977 - Specification for Quicklime and Hydrated Lime for Soil Stabilization
 - 4. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 Pound Rammer and 12 Inch Drop.
 - 5. ASTM D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10 Pound Rammer and 18 Inch Drop.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
 - 1. Material Source:
 - a. Submit name of imported materials suppliers.
 - b. Provide materials from same source throughout the work. Change of source requires Contracting Officer approval.
 - 2. Samples: Submit two samples of each type of imported off-site fill material in air-tight, 10 pound container for Contracting Officer testing or submit gradation and certification of aggregate material for Contracting Officer review.
 - 3. Mix Design: Submit mix design and materials mix ratio that will achieve specified requirements for soil stabilization by state and local agencies.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Perform soil stabilization work in accordance with applicable requirements of governing authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Examine soil stabilization materials upon delivery to site. Verify that materials are as specified and match approved samples. Remove non-complying materials from site.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Do not begin mixing operation when subgrade is frozen or when air temperature is less than 40 degrees F.
 - 2. Do not install mixed materials in wind above 10 miles per hour.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Quicklime or Hydrated Lime: ASTM C 977.
- B. Portland Cement: ASTM C 150.
- C. Fly Ash: ASTM C 618.
- D. Fine and Coarse Aggregate: In accordance with applicable State Highway Standard Specification regarding source, quality, gradation, liquid limit, plasticity index, and mix proportioning.
- E. Subsoil: Existing reused.
 - 1. Candler Sand.
 - 2. [_____].
- F. Degradable natural fiber erosion control blankets
 - 1. Provide and install materials in accordance with applicable state highway standard specification.

2.2 EQUIPMENT

- A. Perform operations using suitable, well maintained equipment capable of excavating subsoil, mixing and placing materials, wetting, consolidation and compaction of material.

2.3 SOIL MIX

- A. Mix materials in accordance with referenced State Highway Standard Specification.
- B. Mix materials as follows:
 - 1. All areas to be paved should be prepared as previously outlined. Prior to pavement base installation, the subgrade soil compaction should be verified for a depth of 12 inches (i.e., compacted to at least 98 percent of the modified Proctor (ASTM D-1557, AASHTO T-180) maximum dry density value).
 - 2. The limerock should have a minimum Limerock Bearing Ratio (LBR) value of 100 and should be compacted to at least 98 percent of the modified Proctor (ASTM D-1557, AASHTO T-180) maximum density value.
 - 3. An 8-inch thick subbase having a minimum Limerock Bearing Ratio (LBR) value of 40 must be

achieved beneath the limerock base. The natural soils may have to be stabilized with suitable clayey soil in order to achieve the required LBR value. The stabilized subbase must be compacted to at least 98 percent of the modified Proctor maximum dry density (ASTM D-1557, AASHTO T-180).

- C. Add water to mix to achieve a consistent mixture without lumping yet not create a wet plastic consistency.
- D. Addition of lime may be specified or approved to facilitate mixing fly ash with soil materials. When specified, or directed by Contracting Officer in writing, use lime to prevent fly ash "flash set" or retard soil-fly ash reactivity occurring during final mixing.
 - 1. Uniformly blend lime additive with fly ash on surface for incorporation with soil materials during first mixing operations unless other methods of application are approved.
 - 2. Proportion of lime additive with the fly ash will be based on laboratory testing and field trial procedures necessary to determine proper soil modification.
 - 3. Addition of lime will permit a reduction of fly ash requirement on a replacement basis as approved by Contracting Officer.
- E. Obtain Contracting Officer approval of mix before proceeding with placement.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of 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 existing site soils and soil conditions encountered are as indicated in Geotechnical Data.
 - 2. Verify quantity and type of soil stabilization materials before beginning material installation.
- 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. Obtain Contracting Officer approval of mix design before proceeding with placement.
- B. Do not start stabilization without weather and soil conditions being favorable for successful application of proposed material.
- C. Proof roll subgrade to identify areas in need of stabilization.
- D. Prior to stabilization of soils, prepare surface areas in accordance with applicable State Highway Standard Specifications.

3.3 EXCAVATION

- A. Excavate subsoil to a depth sufficient to accommodate soil stabilization.
- B. Remove lumped subsoil, boulders and rock that interfere with achieving uniform subsoil conditions.

3.4 SOIL TREATMENT AND BACKFILLING

- A. Do not backfill over frozen or spongy subgrade surfaces.
- B. Lime Stabilized Subgrade: Where indicated on Drawings, treat prepared subgrade with hydrated lime in accordance with applicable State Highway Standard Specification. Compact to minimum 98 percent optimum density in accordance with ASTM D 698 or 95 percent optimum density in accordance with ASTM D 1557.
- C. Cement Stabilized Subgrade: Where indicated on Drawings, treat prepared subgrade with Portland cement in accordance with applicable State Highway Standard Specification. Compact to minimum 98 percent optimum density in accordance with ASTM D 698 or 95 percent optimum density in accordance with ASTM D 1557.
- D. Fly Ash Stabilized Subgrade: Where indicated on Drawings, treat prepared subgrade with fly ash in accordance with applicable State Highway Standard Specification. Compact to minimum 98 percent optimum density as determined by ASTM D 698 or 95 percent optimum density, in accordance with ASTM D 1557.
- E. Fine and Course Aggregates: Treat prepared subgrade with fine or course aggregates in accordance with applicable State Highway Standard Specification. Compact to minimum 98 percent optimum density as determined by ASTM D 698 or 95 percent optimum density, in accordance with ASTM D 1557.
- F. Maintain optimum moisture of mix materials to attain required stabilization and compaction.
- G. Finish subgrade surface as specified in Section 312000.

3.5 GEOTEXTILE FABRIC

- A. Place fabric in areas indicated on Drawings or in areas requiring additional stabilization prior to placement of base course.
- B. Place fabric in accordance with manufacturers published instructions.

END OF SECTION

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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 321313 - Concrete Paving: Concrete paving, curbs and sidewalks.
 - 3. 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
- 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 that 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 321218

ASPHALT SEALING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Section 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Asphalt patching.
 - 2. Asphalt surface preparation.
- B. Related Requirements:
 - 1. Section 321313, 2.4 JOINT MATERIALS
- 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.

1.3 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to pavement sealing including, but not limited to, the following:
 - a. Review proposed sources of sealing materials.
 - b. Review requirements for protecting work, including restriction of traffic during installation period and for remainder of construction period.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product
 - 1. Include technical data and tested physical and performance properties.
 - 2. Provide product data of compatibility of sealer with joint sealants and pavement markings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and testing agency.
- B. Material Test Reports: For each paving material, by a qualified testing agency.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Tack Coat: Minimum surface temperature of 60 deg F.
- B. Do not proceed with installation of sealer under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by sealer manufacturer.
2. When joint substrates are wet.
3. Where contaminants capable of interfering with adhesion have not yet been removed from existing pavement.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **Compatibility:** Provide sealer and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealer manufacturer, based on testing and field experience.
- B. **Polytar Sealer:** 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. Gem Seal, Inc.
 2. Neyra Industries; Jennite
 3. Or approved equal.
- C. **Joint Sealant:** ASTM D 6690 Type I or Type II, hot-applied, single-component, polymer-modified bituminous sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine pavement to receive sealer, with Installer present, for compliance with requirements for sealer installation tolerances and other conditions affecting sealer performance.
- B. Verify that surface is dry and in suitable condition to begin sealing.
- C. Proceed with sealing only after unsatisfactory conditions have been corrected.

3.2 PATCHING

- A. **General:** Patch bituminous pavement surfaces which have been softened by petroleum derivatives or have failed due to any other cause and leading to potholes and spalling of pavement.
- B. **Asphalt Pavement:** Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or square patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertical. Remove excavated material. Recompact existing unbound-aggregate base course for form new subgrade.
- C. **Tack Coat:** Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd.
 1. Allow tack coat to cure undisturbed before applying patch material.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings.
 3. Remove spillages and clean affected surfaces.
- D. **Placing Patch Material:** Fill excavated pavement areas with patch material base mix for full thickness of patch and compact in layers. Compact with hand tampers or with vibratory-plate compactors flush with adjacent surface.

3.3 REPAIRS

- A. Crack and Joint Filling: Remove existing joint filler material, vegetation, and debris from cracks or joints to a depth of at least ¼ inch.
 - 1. Clean cracks and joints in existing asphalt pavement.
 - 2. Use hot-applied joint sealant to seal cracks and joints more than ¼ inch wide. Fill flush with surface of existing pavement and remove excess.

3.4 SURFACE PREPARATION

- A. Remove oil and grease spots: oil and grease spots that have not permanently damaged or softened the pavement shall be removed by scrubbing with a detergent and flushing with water until a water-break-free surface is obtained. After cleaning, treat these areas with an oil spot primer.
 - 1. Oil and grease spots with deeper penetration shall be treated by burning with hand held propane torch, and then coating the spot with an approved oil spot primer.
 - 2. Oil and grease spot so severe as to cause permanent deterioration of the pavement, or if the pavement has failed due to other causes, the pavement shall be removed to the full depth of the damage and replace with new asphalt pavement.
- B. Immediately before application of sealer, clean the surface of all loose dust, dirt, leaves, and any other foreign materials by sweeping, blowing, pressure washing, or any combination of the three.

3.5 INSTALLING OF SEALER

- A. Comply with sealer manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply, ensuring, that equipment used has mixing capability to ensure homogeneous mix of material. Application equipment must be adequate to provide uniform coating at manufactured specified rates.

3.6 PROTECTION

- A. Protect sealer, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealer is without deterioration or damage at time of Substantial Completion.

3.7 WASTE HANDLING

- A. General: Handle asphalt-paving waste and dispose of in a legal manner.

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.

- 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.
 - 2. Section 321313 - Concrete Paving: Concrete paving substrate for marking application.
 - 3. Section 099100 – Painting: Painting exterior bollards.

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 Safety Data Sheets (SDS) 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. Sherwin-Williams Company, Cleveland, OH (800) 321-8194.
 - 2. Benjamin Moore
 - 3. PPG

- 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. Sherwin-Williams: Pro-Park Waterborne Traffic Marking Paint, B97 Series MDF 9 mils.
 - b. Benjamin Moore: SuperSpec HP Safety & Zone Marketing Paint P58, MDF 9 mils
 - c. PPG Xoneline Traffic & Marking Paint, 11-50 Series, MDF 9 mils
 - 2. 2nd Coat:
 - a. Sherwin-Williams: Pro-Park Waterborne Traffic Marking Paint, B97 Series MDF 9 mils
 - b. Benjamin Moore: SuperSpec HP safety & Zone Marking Paint P58, MDF 9 mils
 - c. PPG Zoneline Traffic & Marking Paint, 11-50 Series, MDF 9 mils

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. Fire Lanes: Red or per local code.
 - 3. Lane Striping Where Separating Traffic in Opposite Directions: Yellow.
 - 4. Lane Striping Where Separating Traffic in Same Direction: White.
 - 5. Handicap Symbols: Per local code.
 - 6. Parking Stall Striping: White

END OF SECTION

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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 and interior.
- 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.
 - 3. 13 Foot and Over Fabric Height (If required):
 - a. Type I Posts: Round; 4.0 inch outside diameter pipe, 9.10 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.
 - 3. Between 10 Feet and 15 Feet Width:
 - a. Type I Posts: 6.625 inch outside diameter pipe, 8.97 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, 2.27pounds 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.
3. For 31 feet to 40 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 3.0 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 at the ends of the opening portion of the frame shall be "P" shaped in cross section with a nominal base dimension of no less than 2 inch x 2 inch and weighing not less than 1.6 lbs/lf. The intermediate 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 two 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, 8-wheeled, sealed lubricant, ball-bearing truck assemblies. These are to be attached to double 4 inch O.D. support posts. The bottom of the support posts shall be equipped with

- two pairs of 3 inch rubber guide wheels. Openings of 28 feet or less shall use 4-wheeled truck assemblies.
- 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.
4. For 41 feet to 65 feet opening:
- a. Frame shall be fabricated from 6063-T6 aluminum alloy extrusion. The top and bottom members shall be "P" shaped in cross section with no less than 2 inches on a side and weighing not less than 1.6 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 members shall be no greater than the height of the gate. Intermediate vertical members shall be 1 inch x 1 inch in cross section weighing not less than 0.52 lbs/lf. And spaced at a maximum 3 feet on center. The gate shall be constructed in "box" form with the width between the frames measuring 2'-0" from outside to outside. Between these frames there shall be a continuous series of 1 inch x 1 inch diagonal and horizontal bracing with the diagonals welded at 45 degrees to the frame.
- d. The gate frame shall have a semi-enclosed "keyed" track, extruded from 6105-T5 aluminum alloy, weighing not less than 2.9 lbs/lf. Track member to be located on each side of the frame. 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 four swivel type, self aligning, 8-wheeled, sealed lubricant, ball-bearing truck assemblies. The bottom of the support posts shall be equipped with a single 3 inch rubber guide wheel.
- 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. A ground roller assembly shall be included to support the back end of the gate in the open position, as required.

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.

3.5 CONTINUED SERVICE AND DOCUMENTATION

- A. Train owner's personnel on how to safely shut off electrical power, release and manually operate the gates. Additionally, demonstrate the general maintenance of the gate operator and accessories and provide one copy of "Installation and Reference" manual for the owner's use (a second manual is available upon request). Manuals will identify parts of the equipment for future procurement. Direct maintenance personnel to HySecurity's website, specifically the technical support sections.

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 pH ADJUSTERS

- A. Lime:
 - 1. Commercial grade ground limestone containing not less than 50 percent of total oxides, [_____] percent calcium and [_____] percent magnesium oxide.
 - 2. Gradation: Minimum 75 percent passing 100-mesh sieve and 100 percent passing 20-mesh sieve.
- B. Ferrous Sulfate: Commercial grade.

2.3 SOIL CONDITIONERS

- A. Use singly or in combinations required to meet requirements for topsoil.
- B. Soil Conditioners: Nontoxic to plants.
- C. Peat:
 - 1. Sphagnum moss peat Peat moss Hypnum moss peat Reedsedge peat Peat humus 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 or 1200 degrees F to the following graduation:
 - 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.

2.4 FERTILIZER

- A. Specified in Section 329200 and 329300.

2.5 PESTICIDES

- A. Soil Fumigant Herbicide Insecticide and Fungicide: EPA registered and approved, for pre-emergence and broadleaf weed control.

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. Immediately prior to placing topsoil, scarify subgrade to a 2 inch depth for bonding of topsoil with subsoil.
- B. Lawns: Spread topsoil evenly to indicated depth a minimum depth of 4 inches. Do not spread topsoil when frozen or excessively wet or dry.
- C. Plant Beds: Till to minimum depth of 6 inches. Spread peat uniformly over bed to minimum depth of 6 inches and thoroughly incorporate into existing soil to a minimum depth of 6 inches to obtain a uniform and well pulverized soil mix. During tillage operations remove all sticks, stones, roots, and other objectionable materials, Bring plant beds to a smooth and even surface conforming to established grades.
- D. Plant Beds: Excavate existing soil in plant beds to minimum depth of 4 inches and replace with topsoil. Bring plant beds to smooth and even surface conforming to established grades.
- E. Correct irregularities in finished surfaces to eliminate depressions.
- F. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.4 FERTILIZER, pH ADJUSTERS, AND SOIL CONDITIONERS

- A. Application:
 - 1. Apply fertilizer pH adjuster and soil conditioner at rates and analysis determined by laboratory soil tests of topsoil supplied.
 - 2. Apply at rates 2 pounds per 1000 square feet.
- B. Tillage: Incorporate fertilizer, pH adjusters, and soil conditioners into soil to minimum depth of 6 inches. This may be done as part of the subgrade tillage operation specified above.

END OF SECTION

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SECTION 329200
TURF AND GRASSES

PART 1 - 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. State-Certified of 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 SPRIGS

- A. Healthy living stems, stolons, or rhizomes and attached roots of locally adapted grass without adhering soil, including two to three nodes, from 4 to 6 inches long, obtained from heavy and dense sod.
 - 1. Provide sprigs which have been grown under climatic conditions similar to those in locality of Project Site.
 - 2. Coordinate harvesting and planting operations to prevent exposure of sprigs to sun for more than 30 minutes before covering and moistening.
 - 3. Sprigs containing weeds or other detrimental material or that are heat damaged will be rejected.

2.4 MULCHES

- A. Provide mulch free from noxious weeds, mold, and other deleterious materials.
- B. Straw: Stalks from oats, wheat, rye, barley, or rice. Air-dry condition of proper consistency for placing with commercial mulch blowing equipment.
- C. Hay: Use only marsh hay for lawn areas. Air-dry condition of proper consistency for placing with commercial mulch blowing equipment.
- D. 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.

2.5 TABILIZING 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.

2.6 WATER

- A. Suitable quality for irrigation.

2.7 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.
- C. Blanket: Fiber

2.8 TOPSOIL

- A. Topsoil:
 - 1. Containing organic matter as needed to support establishment of plants; minimum 4 percent and maximum 20 percent organic matter as determined by soil testing service. 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
 - f. Gypsum: [____] to [____] .
 - g. pH: 5.5 to 7.0.

2.9 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.

2.10 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:
 - 1. Composition: 1 pound per 1000 square feet of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

- D. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorous, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from qualified soil-testing agency.

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. Drill Seeding:
 - 1. Use grass seed drills.
 - 2. Drill seed uniformly to an average depth of 1/2 inch and at a rate of N/A pounds per 1,000 square feet.
- D. 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.
 - 3. Immediately following application of slurry mix, make separate application of wood cellulose mulch at the rate of 800 pounds, dry weight, per acre.
 - 4. Apply cover so that rainfall or applied water will percolate to underlying soil.
- E. Mulch:
 - 1. Spread evenly at rate of N/A tons per acre.
 - 2. Anchor by crimping mulch with serrated disc, or by spraying asphalt emulsion on mulched surface.
 - 3. Take precautionary measures to prevent asphalt materials from marking of defacing structures, pavements, utilities, or plantings.
- F. 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.
- G. 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. Spot Sodding:
 - 1. Cut sod into plugs 2 inches square or 2 inches in diameter. Place individual pieces on 3 inch centers and press firmly into soil by foot pressure or by tamping.
 - 2. Overseed for erosion control on all spot sodded areas.
 - 3. Place seed, as specified above, at the rate of N/A pounds per 1,000 square feet.
- C. 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.

- D. Finishing: After completing sodding, blend edges of sodded area smoothly into surrounding area.
- E. 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.

3.6 SPRIGGING

- A. Rate:
 - 1. Perform a maximum 36 hours after initial harvesting. Inspect sprigs for heat damage during planting operation.
 - 2. Plant groups of sprigs at 12 inch maximum intervals. Limit interval between dropping sprigs and covering with soil to 10 minutes.
- B. Planting:
 - 1. Broadcast sprigs by hand, manure spreader, or other suitable devices over prepared surface. Force sprigs into soil to a depth of approximately 4 inches with disk harrow or other recommended equipment.
 - 2. Plant sprigs in furrows spaced a maximum 12 inches apart. Immediately after opening furrows, place sprigs. Fill furrows so that surface is flush with designated grade and a live portion of each sprig is exposed.
 - 3. Plant to a depth of approximately 4 inches and cover sprigs so that surface is flush with designated grade and a live portion of each sprig is exposed.
- C. Overseeding: Broadcast additional seed as specified above, at the rate of N/A pounds per 1000 square feet.
- D. Rolling: Immediately after completion of sprigging operations and additional seeding, if required, roll planted area with cultipacker or roller not exceeding 90 pounds for each foot of roller width.
- E. Watering: Apply at time of sprigging operations at a rate sufficient to ensure thorough wetting of soil to a depth of 4 inches.

3.7 CLEANING AND PROTECTION

- F. 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.
- G. Immediately after seeding, sodding or sprigging, protect the area against traffic or other use.
- H. Restore existing lawn and grass areas which have been damaged during execution of this work to original condition.
- I. 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.

3.7 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 6 inches.
2. Promotion of growth: Mow, remove excess clippings, eradicate weeds, water, fertilize, overseed, and perform other operations necessary to promote growth.
3. Post-fertilize areas with commercial grade fertilizer approximately 30 days after planting and at intervals of N/A weeks thereafter until accepted. Apply fertilizer uniformly at the rate of 2 pounds per 1,000 square feet.

3.8 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.
2. Final acceptance will be based upon a satisfactory stand of lawns and grasses as defined in the paragraph entitled, "Establishment Period." Prior to final acceptance apply 2 pounds per 1,000 square feet of controlled release fertilizer.

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

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SECTION 331100

WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Domestic water system pipe and fittings.
 2. Connection of domestic water system to municipal water system.
 3. Fire protection water system pipe, fittings, valves, and hydrants.
 4. Connection of fire protection water system to municipal water system.
- 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 033000 - Cast-In-Place Concrete: Concrete for thrust blocks.

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- B. American Society for Testing and Materials (ASTM):
1. ASTM B 88 - Specification for Seamless Copper water Tube.
 2. ASTM D 1785 - Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 3. ASTM D 2241 - Specification for Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series).
 4. ASTM D 3034 - Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 5. ASTM D 3139 - Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
- C. American Water Works Association (AWWA):
1. AWWA C 110 - Gray-Iron Fittings, 3 inches Through 48 Inches, for Water and Other Liquids.
 2. AWWA C 111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 3. AWWA C 151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
 4. AWWA C 504 - Rubber Seated Butterfly Valves.
 5. AWWA C 509 - Resilient Seated Gate Valves 3 inch through 12 inch NPS, for Water and Sewage Systems.
 6. AWWA C 600 - Installation of Ductile-Iron Water Mains and Appurtenances.
 7. AWWA C 900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water.

1.3 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
Product Data: Data for each type of pipe, pipe fitting, valve and accessory specified.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Locations of piping mains, valves, connections, and top of pipe elevations.
 - b. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Perform work in accordance with utility company requirements and local authority having jurisdiction requirements.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 PIPE

- A. Pipe sizes less than 3 inch that are installed below grade and outside building shall comply with one or combination of following:
 - 1. Seamless Copper Tubing: Type "K" soft copper to comply with ASTM B 88 latest edition and installed with wrought copper (95-5 Tin Antimony solder joint) fittings in accordance with ASME B16.22.
 - 2. Polyvinyl Chloride (PVC) Water Pipe: Pipe shall conform to ASTM D 2241 with an SDR 21 rating and shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 1785 classification. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3139 with factory supplied elastomeric gaskets and lubricant.
- B. Pipe sizes 3 inch and larger that are installed below grade and outside building shall comply with one of the following:
 - 1. Ductile Iron Water Pipe: In accordance with AWWA C 151, Fittings shall be either mechanical joint or push-on joint complying with AWWA C 110 or AWWA C-111 (CLASS 50).
 - 2. Polyvinyl Chloride (PVC) Water Pipe: Pipe shall meet the requirements of AWWA C-900 and comply with ASTM D 2241, rated SDR 21 (Class 150). Pipe shall be continually marked as for smaller pipes. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.

2.2 GATE VALVES - 2 Inches and Larger

- A. Manufacturers: Mueller Resilient Seat Gate Valves.

- B. AWWA C509, Iron body, bronze mounted double disc, parallel seat type, non-rising stem with square nut, single wedge, resilient seat, flanged or mechanical joint ends, control rod, post indicator where indicated on Drawings, extension box and valve key.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.3 BALL VALVES - 2 Inches and Smaller

- A. Manufacturers: Mueller Oriseal.
- B. Brass body, Teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA compression inlet end, compression outlet with electrical ground connector, with control rod, extension box and valve key.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.4 BUTTERFLY VALVES - 2 inches to 24 inches

- A. AWWA C504, iron body, bronze disc, resilient replaceable seat, water or lug ends, infinite position lever handle.

2.5 CHECK VALVES, POST INDICATOR VALVES, AND BACKFLOW PREVENTORS

- A. Specified in Section 210000 - Fire Suppression.

2.6 HYDRANTS

- A. Hydrant: Type as required by utility company, local authority having jurisdiction, and as indicated on Drawings.
- B. Hydrant Extensions: Provide in multiples of 6 inches with rod and coupling to increase barrel length.
- C. Hose and Stream Connection: Match sizes with utility company, two hose nozzles, one pumper nozzle. Provide connection type as required by local fire marshall and by governing agencies having jurisdiction.
- D. Finish: Primer and two coats of enamel or special coating to color as required by utility company.

2.7 ACCESSORIES

- A. Concrete for Thrust Blocks: Section 033000. Place thrust blocking consisting of 2,500 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 pounds per square foot when water main pressure is 100 psi.

MINIMUM THRUST BLOCKING BEARING AREAS

Pipe Diameter	Tees Sq. Ft.	90° Bend Sq. Ft.	45° Bend Sq. Ft.	22° Bend Sq. Ft.	11° Bend Sq. Ft.
3"	1.0	1.0	1.0	1.0	1.0
4"	1.0	1.0	1.0	1.0	1.0
6"	1.5	2.0	1.0	1.0	1.0
8"	2.5	3.5	1.8	1.0	1.0
10"	4.0	5.5	2.8	1.5	1.0
12"	6.0	8.0	4.0	2.0	1.5
14"	8.0	11.0	5.5	3.0	2.0
16"	10.0	14.2	7.0	4.0	3.0
18"	21.0	21.0	12.0	6.0	4.0

- B. Locked Mechanical Joint fittings shall be installed where vertical changes in direction are required and, if approved by Contracting Officer, can be installed in lieu of the above thrust blocking requirements.

- C. Trace Wire: Magnetic detectable conductor, clear brightly colored plastic covered, imprinted with "DOMESTIC WATER SERVICE" in large letters.

- D. Trace Wire: Magnetic detectable conductor, clear brightly colored plastic covered, imprinted in large letters.
 - 1. Domestic Water Lines: "DOMESTIC WATER SERVICE"
 - 2. Fire Protection Water Lines: "FIRE PROTECTION WATER SERVICE"

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 trench cut, 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 pipe or impede consistent backfilling or compaction.

- C. Cut pipe ends square, ream pipe and tube ends and remove burrs.

- D. Remove scale and dirt, on inside and outside, before assembly.
- E. Prepare pipe for connections to equipment with flanges or unions.

3.3 BEDDING

- A. Excavate pipe trench and place bedding material in accordance with Section 312300 for work of this Section. Provide trench wall shoring as required.
- B. Form and place concrete for pipe thrust restraints at any change of pipe direction and at fittings as indicated on Drawings. Place concrete to permit full access to pipe and pipe accessories. Provide thrust restraint bearing on subsoil per schedule on Drawings.
- C. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, each layer. Place compacted bedding material to elevation of paving subgrade as indicated on Drawings.
- D. Maintain optimum moisture content of bedding material to attain required compaction density.
- E. Remove excess backfill and excavated material from site.

3.4 INSTALLATION - PIPE AND FITTINGS

- A. Maintain separation of water main from sanitary and storm sewer piping in accordance with state or local code.
- B. Install pipe and fittings in accordance with AWWA C600.
- C. Install pipe to allow for expansion and contraction without stressing pipe or joints or as specified by pipe manufacturer.
- D. Install access fittings in accordance with local codes to permit disinfection of water system performed under this Section.
- E. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline and in compliance with the local utility company.
- F. Form and place concrete for thrust blocks or other specified methods of retainage at each change of direction or end of pipe main.
- G. Establish elevations of buried piping in accordance with Section 312300 for work in this Section.
- H. Backfill trench in accordance with Section 312300.
- I. Install trace wire continuous buried 10 inches below finish grade, above pipe line. Trace wire shall be in accordance with local utilities standards.

3.5 INSTALLATION - VALVES AND HYDRANTS

- A. Install gate valves as indicated on Drawings and supported on concrete pads with valve stem vertical and plumb. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.
- B. Install fire hydrant assemblies as indicated on Drawings in vertical and plum position with stream/pumper nozzle pointed perpendicular to traffic where hydrant is adjacent to a street, roadway or parking lot drive or toward the protected building unless otherwise directed by local authorities. Support hydrant assembly on concrete pad and firmly braced on side opposite inlet pipe against undisturbed soil and concrete blocking. Place minimum of 6 cu. ft. of crushed stone or gravel around hydrant base and barrel after thrust blocking has cured at least 24 hours. Exercise care when backfilling and compacting so proper vertical position will not be altered.
- C. Provide a drainage pit 36 inches square by 24 inches deep filled with 2 inch washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.
- D. Paint hydrants in accordance with local utility company requirements.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect distribution system with chlorine before acceptance for domestic operation. Amount of chlorine shall be such as to provide dosage of not less than 50 parts/million. Thoroughly flush lines before introduction of chlorinating materials and after contact period of not less than 24 hours, system shall be flushed with clean water until residual chlorine content is not greater than 1.0 part/million. Open and close valves in lines being disinfected several times during contact period. After disinfection, take water sample and bacteriological test in accordance with AWWA specifications. Do not place distribution system in service until approval is obtained from applicable governing authorities.

3.7 SERVICE CONNECTIONS

- A. Provide water service connection in compliance with utility company requirements including reduced pressure backflow preventer if required and water meter with by-pass valves and sand strainer.

3.8 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Site Tests:
 - 1. Compaction:
 - a. Perform inspections prior to and immediately after placing bedding.
 - b. Perform tests as specified in Section 312300.
 - 2. Piping: Water distribution system pipe installed below grade and outside building shall be tested in accordance with following procedures:
 - a. Perform the testing of pipe materials, joints, and/or other materials incorporated into the construction of water mains and force mains to determine leakage and watertightness. All pressure pipeline shall be tested in accordance with Section 4 of AWWA C600 latest edition. In the event any state or local code requires a more stringent test, the more stringent shall apply.
 - b. Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working

pressure at the point of testing and not less than 1.25 times the working pressure at the highest point along the test section.

- c. Leakage Test: The leakage test shall be conducted concurrently with the pressure test. Leakage is defined as the quantity of water that must be supplied into the newly laid pipeline, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipeline has been filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time. No pipeline installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SDP}{133200}$$

L = allowable leakage, (gallons per hour)

S = length of pipe tested, (feet)

D = nominal diameter of pipe, (inches)

P = average test pressure during test, (psig)

- d. Visible Leakage: All visible leaks shall be repaired regardless of the amount of leakage.
- e. Acceptance of Installation: If any test of pipe laid in place discloses leakage greater than that specified, the Contractor shall, at his own expense, locate the leak and make repairs as necessary until the leakage is within the specified allowance. Contractor shall supply all water for testing at no additional cost to United States Postal Service.
- f. Provide one copy of results of meter test and hydrostatic pressure test to Contracting Officer and utility company upon completion of water distribution backfilling operations.

END OF SECTION

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SECTION 333000

SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sanitary sewer drainage piping, fittings, accessories and bedding.
 - 2. Connection of project sanitary drainage system to the municipal sanitary sewer system.
 - 3. Clean-out and access structures.
- 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 033000 - Cast-In-Place Concrete: Concrete for cleanout and manhole base pads.

1.2 REFERENCES

- A. American Association of State Highway and transportation Officials (AASHTO):
 - 1. AASHTO M294 - Corrugated Polyethylene Pipe, 300-1200 mm Diameter.
 - 2. AASHTO M252 - Corrugated Polyethylene Drainage Pipe.
- B. American National Standards Institute (ANSI):
 - 1. ANSI A21.14 - Ductile Iron Fittings, 3-Inch Through 24-Inch, for Gas.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 12 - Practice for Installing Vitrified Clay Pipe Lines.
 - 2. ASTM C 14 - Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 - 3. ASTM C 76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 4. ASTM C 425 - Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
 - 5. ASTM C 443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 6. ASTM D 3034 - Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
 - 7. ASTM A 746 - Specification for Ductile Iron Gravity Sewer Pipe.
 - 8. ASTM C 700 - Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength and perforated.
 - 9. ASTM F 477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.3 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.

1. Product Data: Data for each type of pipe and pipe accessory specified.
- B. 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, 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: Perform work in accordance with utility company requirements and applicable health codes and authority having jurisdiction requirements.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

- A. Polyvinyl Chloride (PVC) Pipe:
1. ASTM D 3034, Rated SDR 35 unless otherwise required by local utility having jurisdiction. Continuously mark pipe with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification.
 2. ASTM D 3034, Table 2; pipe joints with integrally molded bell ends and factory supplied elastomeric gaskets and lubricant.
- B. Corrugated Polyethylene (CPP) Pipe:
1. Pipe: AASHTO designation #M294 and #M252; smooth interior, 4 inches through 18 inches as indicated on Drawings.
 2. Fittings: ASTM D 3034, rated SDR 35; with thermo-molded PVC.
 3. Gaskets: ASTM F 477; with thermo-molded PVC fittings and CPP pipe joint assembly.
- C. Vitrified Clay (VCP) Pipe:
1. Pipe: ASTM C 700.
 2. Joints: ASTM C 425.
 3. Gaskets: ASTM C 425; high grade vulcanized elastomeric compound consisting of basic natural or synthetic rubber. Provide gaskets manufactured in compliance with Rubber Manufacturer's Association tolerances for gaskets.
 4. Lubricant: Suitable for lubricating joint components; no deteriorating effects on gasket or pipe material, will not support growth of fungi or bacteria, and of type recommended by gasket manufacturer.
- D. Ductile Iron Pipe:
1. Pipe: ASTM A 746; Extra Heavy type, inside nominal diameter as indicated on Drawings with bell and spigot end.
 2. Pipe Joint: ANSI A21.14, rubber gasket joint devices.
- E. Concrete Pipe:
1. Pipe: ASTM C 14, Class 1, 2, or 3; bell and spigot pipe with inside nominal diameter as indicated on Drawings.
 2. Pipe Joint: ASTM C 443; rubber compression gasket joint devices.
- F. Reinforced Concrete Pipe:

1. Reinforced Concrete: ASTM C 76, Class I, II, III, IV, or V as indicated on Drawings, with Wall type A, B, or C; mesh reinforcement; inside nominal diameter as indicated with bell and spigot end.
2. Reinforced Concrete: ASTM C 443; rubber compression gasket joint devices.

2.2 PIPE ACCESSORIES

- A. Pipe Joints: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.
- B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- C. Trace Wire: Magnetic detectable conductor, clear brightly colored plastic covered, imprinted with "SEWER SERVICE" in large letters.

2.3 CLEANOUTS AND MANHOLES

- A. Lid and Frame: Heavy duty cast iron with removable lid as indicated on Drawings.
- B. Shaft Construction: Cast Iron shaft of internal diameter as indicated on Drawings with 2500 psi concrete collar for cleanouts.
- C. Base Pad: Concrete specified in Section 033000.

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 trench cut, 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 pipe or impede consistent backfilling or compaction.

3.3 BEDDING

- A. Excavate pipe trench and place bedding material in accordance with Section 312300 for work of this Section.
- B. Place bedding material at trench bottom, level materials in continuous layer 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 C 14, 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. Refer to Section 312300 for trenching requirements. Do not displace or damage pipe when compacting.
- E. Connect to building sanitary sewer outlet and municipal sewer system as indicated on Drawings.
- F. Install trace wire continuous over top of pipe buried 6 inches below finish grade, above pipe line.

3.5 INSTALLATION - CLEANOUTS

- 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 sanitary sewer pipe to be placed at required elevations.
- C. Mount lid and frame level in grout, secured to top section at elevation indicated.

3.6 SERVICE CONNECTIONS

- A. Coordinate the Work with termination of sanitary sewer connection outside building including connection to municipal sanitary sewer system.
- B. Connect to existing municipal sanitary sewer system in compliance with utility requirements for new service connections.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- 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 333600
UTILITY SEPTIC TANKS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Septic tank.
 - 2. Distribution box.
 - 3. Filter drainage field system.

- 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: Provide data on tank accessories.
 - 2. Shop Drawings: Indicate tank size and configuration; plan, location and inverts of filter field; inverts of connecting piping.
 - 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: Indicate special procedures for septic tank installation.

- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - 2. Actual locations and inverts of buried pipe, components, and connections.

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.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Septic Tank: Reinforced precast concrete construction, 4,000 psi 28 day minimum strength, concrete partitioned chambers, concrete lid with lift rings, vent, inlet inspection hole, inlet turned down minimum 12 inches below effluent level.
 - 1. Tank Capacity: Indicated on Drawings.

- B. Distribution Box: Reinforced concrete, single inlet, two outlets, gate, removable cover with lift ring.

2.2 CONNECTING PIPE MATERIALS

- A. Vitrified Clay Pipe: ASTM C700 Standard strength, bell and spigot joint with seal; nominal inside diameter indicated on Drawings.
- B. Fittings: Same material as pipe, tee bends, elbows, clean-outs, reducers, ends to suit pipe joint.
- C. Pipe Joint Cover: Geotextile fabric.

2.3 FILTER FIELD PIPE MATERIALS

- A. Vitrified Clay Pipe: ASTM C700, Standard strength, plain end joint; nominal inside diameter indicated on Drawings.
- B. Use perforated pipe at filter field system; unperforated through sleeves and at junction with distribution box.

2.4 BEDDING MATERIALS

- A. Aggregate Bedding Material: Fill as specified in Section 312000.

2.5 FILTER AGGREGATE

- A. Filter Aggregate Materials: Fill as specified in Section 312000.

2.6 ACCESSORIES

- A. Geotextile Fabric: Non-woven fabric, polypropylene.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe ends and remove burrs.
- B. Remove scale and dirt from components before assembly.
- C. Establish invert elevations for all components in the system.
- D. Hand trim excavation to suit septic tank, distribution box and field tile arrangement. Remove stones, roots or other obstructions.

3.2 TANK AND TANK BEDDING

- A. Excavate in accordance with Section 312300 for work of this section. Hand trim excavation for accurate placement of tank to elevations indicated.
- B. Place bedding material level in one continuous layer not exceeding 8 inches compacted depth, compact to 95 percent.
- C. Backfill around sides of tank, tamp in place and compact to 95 percent.
- D. Maintain optimum moisture content of bedding material to attain required compaction density.
- E. Install septic tank and distribution box and related components on bedding in accordance with manufacturer's instructions. Position components to permit access to inspection ports.

3.3 CONNECTING PIPING

- A. Install vitrified clay pipe in accordance with ASTM C12.
- B. Connect outlet between building sanitary piping and septic tank, between septic tank and distribution box, between distribution box and filter field header [with Type [] pipe and fittings].
- C. Place pipe and fittings on clean excavated subsoil.
- D. Slope piping to each successive component, minimum of 1:50.
- E. Cover pipe with aggregate, sides and top. Place geotextile fabric over cover prior to backfilling.
- F. Coordinate the work with connections to building sanitary sewer piping outlet.

3.4 INSTALLATION - FILTER FIELD

- A. Install vitrified clay pipe in accordance with ASTM C12.
- B. Place field pipe header at constant elevation sloping down from header inlet 1:100.
- C. Place aggregate bed 18 inch thick, tamp compact firm. Establish slope of bed to suit established invert elevations.
- D. Place pipe sloping away from header minimum of 1:200, with perforations facing down.
- E. Wrap pipe joints with paper, cover with aggregate, sides and top. Place geotextile fabric over cover prior to backfilling.
- F. Cover entire field with aggregate 12 inch, lightly compact. Level prior to placement of subsoil cover as specified in Section 312000.

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 Utilites: 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

- A. Reinforced Concrete Pipe:
 - 1. Pipe: ASTM C 76, Class III unless indicated otherwise on Drawings.
 - 2. Gaskets: ASTM C 443; rubber compression gaskets installed in accordance with manufacturer's published instructions.
- B. Corrugated Steel Pipe:
 - 1. Pipe: ASTM A 760; galvanized, aluminized or bituminous coated round pipe, arch pipe, or slotted drain pipe as indicated on Drawings., 16 gage unless otherwise indicated.
 - a. Provide slotted drain pipe with 1.75 inch wide drain guide waterway openings and 6 inch minimum height drain guide.
 - 2. Fittings:
 - a. Matching band connectors.
 - b. Sleeve gaskets in accordance with manufacturer's recommendations.
- C. Spiral Rib Metal Pipe:
 - 1. Pipe: ASTM A 760, Type 1R; Galvanized, aluminized or bituminous coated as indicated on Drawings.
 - 2. Fittings: Provide re- corrugated pipe ends with semi-corrugated Hugger-type bands and "O" ring gaskets in accordance with manufacturers recommendations.
- D. Polyvinyl Chloride (PVC) Pipe:
 - 1. Pipe: ASTM D 3034, SDR 35 Rated.
 - a. Continuously mark pipe with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification.
 - 2. Joints: ASTM D 3034, Table 2; integrally molded bell ends with factory supplied elastomeric gaskets and lubricant.
- E. High-Density Polyethylene (HDPE) Pipe:
 - 1. Pipe: AASHTO M252, M294 & MP7-97 Type "S" (Corrugated Polyethylene Pipe).
 - a. Pipe shall have a smooth interior and a corrugated annular exterior.
 - b. Continuously mark pipe with manufacturer's name, pipe size and AASHTO classification.
 - c. Pipe shall be installed per manufacturer's recommendations.
 - d. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1) Hancor, Findlay, OH (888) 367-7473: Sure-Lok F477.
 - 2) Section 016000 - Product Requirements: Product options and substitutions. Substitutions: permitted.
 - 2. Joints: Pipe shall be joined with a bell and spigot joint incorporating ASTM F477 gasket material insuring a leak resistant performance.

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. Oil/Sediment Separator
 - 1. Separator shall remove oil and sediment from storm water during frequent wet weather events. Separator shall treat a minimum of 75 to 90 percent of the annual runoff volume and be capable of removing 50 to 80 percent of the total suspended sediment load and greater than 90 percent of the floatable free oil. Separator must be capable of trapping silt and clay size particles in addition to large particles. Separator shall be installed underground as part of the storm sewer system and be structurally designed for (HS-20 min.) traffic loading at the surface. Storage in the separator shall be vertically oriented. Separator shall be maintainable from the surface via one access point.
 - 2. Separator shall be equipped with an internal high flow bypass that regulates the flow rate into the treatment chamber and conveys high flows directly to the outlet such that scour and/or re-suspension of material previously collected in the separator does not occur. External bypasses are not acceptable. Bypass area shall be physically separated from the separation area to prevent mixing. Separator shall be circular, and constructed from either fiberglass or precast concrete risers. Concrete separator shall be designed and manufactured in accordance with ASTM C-478. Concrete joints shall be oil resistance, water tight and meet the design criteria according to ASTM C-443. In the concrete separator, a fiberglass insert, bolted and sealed watertight to the inside of the bypass chamber, shall divert low to normal stormwater flows into the treatment chamber. A minimum of 12 inches (30 cm) of oil storage shall be lined with fiberglass to provide secondary containment of any hydrocarbon materials.
 - 3. Difference between the inlet pipe elevation to the separator and the outlet pipe elevation from the separator shall be 1 inch (2.5 cm). For a multiple inlet pipe or inlet design there shall be a 3 inch (7.5 cm) difference between horizontal inlet pipe inverts and the outlet pipe invert. Separator shall be able to be used as a bend structure in the storm sewer system. Access cover for all non-inlet type separators shall clearly indicate that it is an oil/sediment separator.
 - 4. Separator shall be capable of containing spills of floatable substances such as free oil and not be compromised by temporary backwater conditions (i.e., trapped pollutants should not be re-suspended and scoured from the separator during backwater conditions).
 - 5. Capabilities of the selected separator must be documented with scientific studies and reports. Preference will be given to devices that have been verified by a state or federal stormwater verification program.
 - 6. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - a. Stormceptor manufactured by Carder Concrete Products, Littleton, CO (888) 220-9190.
 - b. Stormceptor manufactured by Rinker Stormceptor, Kansas City, MO (800) 909-7763.
 - c. Baysaver manufactured by Baysaver Technologies, Mount Airy, MD (800) 229-7283.

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 Utilites: 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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SECTION 337173

ELECTRICAL UTILITY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Electrical service entrance.
 - 2. Transformer and pad.
 - 3. Service entrance equipment.
 - 4. Service entrance section.

- 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 015000 - Temporary Facilities and Controls.
 - 2. Section 312300 - Excavation and Fill.
 - 3. Section 251104 - Metering Devices.
 - 4. Section 251304 - EMS Communication to Remote Enterprise Server.
 - 5. Section 260500 - Common Work Results for Electrical.
 - 6. Section 262413 - Switchboards.

1.2 REFERENCES

- A. As specified in Section 260500 – Common Work Results for Electrical.

- B. National Electrical Manufacturer's Association (NEMA):
 - 1. NEMA PB 2 - Dead Front Distribution Switchboards.
 - 2. NEMA PB 2.1 - Instructions for Safe Handling, Installation, Operation, and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.
 - 3. Std Pub No. AB 1: Molded-Case Circuit Breakers.
 - 4. Std Pub No. SG 3: Low-Voltage Power Circuit Breakers.
 - 5. Std Pub No. SG 5: Power Switchgear Assemblies.

- C. Underwriter's Laboratories
 - 1. UL 50: Electrical Cabinets and Boxes.
 - 2. UL 489: Molded-Case Circuit Breakers and Circuit-Breakers Enclosures.
 - 3. UL 854: Service-Entrance Cables.
 - 4. UL 869: Electrical Service Equipment.

- D. IEEE
 - 1. Std 241; pertaining to service entrances.

1.3 SYSTEM DESCRIPTION

- A. System Characteristics: 208Y/120 volts, three phase, four wire, 60 hertz.

- B. Provide service entrance equipment and accessories which are UL listed and labeled, and marked "SUITABLE FOR USE AS SERVICE EQUIPMENT".

1.4 SUBMITTALS

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Service entrance section electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of equipment and components.
 - 2. Shop Drawings:
 - a. Utility company drawings, details, and data for service to Project.
 - b. Service entrance section front and side views of enclosures with overall dimensions indicated; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground.
 - 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. Section 017704 - Closeout Procedures and Requirements: Procedures for closeout submittals.
 - 1. Operation and Maintenance Data: Service entrance section spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 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 approved by Utility company for installation of electrical utility service.
- C. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Products: Listed and classified by Underwriters Laboratories Incorporated as suitable for the purpose specified and indicated.
- D. 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 Project Site and location of utility service point.
 - b. Review electrical service entrance design and requirements.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review Utility company drawings, details, and data.
 - e. Review and finalize construction schedule related to electrical service 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.
 - g. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
 - h. Review safety precautions relating to electrical service installation operations.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 SERVICE ENTRANCE EQUIPMENT AND ACCESSORIES

- A. Provide service entrance equipment and accessories (of types, sizes, ratings and electrical characteristics indicated) which comply with manufacturer's standard materials, design and construction in accordance with published product information and as required for complete installation; and as herein specified.

2.2 MANUFACTURERS

- A. Approved by Utility company for use on electrical service entrance Work; included on Utility company list of approved Products.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not Permitted.

2.3 ELECTRICAL SERVICE

- A. Products conforming to Utility company requirements as indicated on Utility company prepared Drawings, Details, and Data.

2.4 SERVICE ENTRANCE EQUIPMENT

- A. Meter Cabinet and Base: Cabinet and base of size, type, and configuration furnished and installed as required by Utility company.
- B. Meters: Furnished and installed by Utility company.

2.5 SERVICE ENTRANCE SECTION

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Eaton Corporation; Cutler-Hammer Products, Pittsburgh, PA (800) 525-2000.
 2. General Electric Company (800) 626-2000.
 3. Siemens Energy & Automation, Inc., Alpharetta, GA (800) 964-4114.
 4. Square D Company, Palatine, IL (800) 392-8781.
 5. Substitutions: Not permitted.
- B. Description: NEMA PB 2 and UL 891 with electrical ratings and configurations as indicated and specified.
- C. Section Devices: Panel mounted.
- D. Bus Material: Copper (tin plated).
- E. Bus Connections: Bolted, accessible from front for maintenance.

- F. Fully insulate load side bus bars.
- G. Ground Bus: Extend width of distribution panel.
- H. Line and Load Terminations: Accessible from front only of distribution panel, suitable for conductor materials and sizes indicated.
- I. Pull Section: Size as indicated on Drawings. Arrange as indicated on Drawings.
- J. Enclosure: NEMA 1.
 - 1. Align sections at front and rear.
 - 2. Distribution Panel Height: As indicated on Drawings, lifting members and pull boxes.
 - 3. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

2.6 OVERCURRENT PROTECTIVE DEVICES

- A. Provide overcurrent protection devices as indicated on the drawings and specified within related electrical specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 – Common Work Results for Electrical.

3.2 PREPARATION

- A. Arrange with Utility Company to obtain permanent electric service to Project.
- B. Coordinate with USPS Project Manager and Utility Company service contact person for execution of required Utility Company documents.

3.3 INSTALLATION

- A. Install service entrance equipment as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that service entrance equipment fulfills requirements. Comply with applicable installation requirements of NEC and NEMA Standards.
- B. Electrical Service Conduit:
 - 1. Furnished and installed by Contractor in conformance with Utility Company requirements in locations indicated on Drawings.
 - 2. Trenching, backfilling, and compacting for utilities specified in Section 312300.
 - 3. Install service in accordance with manufacturer's published instructions, Utility Company requirements, and as indicated on Drawings.
- C. Electrical Service Wiring:
 - 1. Primary: Furnished and installed by Utility Company.
 - 2. Secondary: Furnished and installed by Contractor.

- D. Transformer and Pad:
 - 1. Transformer: Furnished and installed by Utility Company.
 - 2. Transformer Pad: Furnished and installed by Utility Company at location indicated on Drawings in conformance with Utility Company requirements.
- E. Service Entrance Section:
 - 1. Install distribution panel in locations indicated on Drawings, in accordance with NEMA PB 2.1.
 - 2. Tighten accessible bus connections and mechanical fasteners after placing distribution panel.
 - 3. Ground as specified in Section 260500 and as indicated on Drawings.

3.4 FIELD QUALITY CONTROL

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Section 014000 - Quality Requirements: Field testing and inspection.
- C. Obtain service entrance quality control inspection and approval of installation by Utility Company.
- D. Inspect and test distribution panel in accordance with NETA ATS, except Section 4.
- E. Test service entrance equipment and electrical circuitry upon completion of installation work and after energizing circuitry, and demonstrate its capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest. Engineer's or Owner's presence at test is required.
- F. Perform distribution panel inspections and tests listed in NETA ATS, Section 7.1.

END OF SECTION

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