



**USPS POST OFFICE
TUKWILA RETAIL AQ
1233 ANDOVER PARK E
TUKWILA, WA 98188
100% DESIGN**

September 22, 2023

FSM #G00571

CAG #282104



Cornerstone
ARCHITECTURAL GROUP

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000007

SEALS PAGE

PROJECT

Name: Tukwila Retail AQ
Location: Tukwila, WA
FMS Project Number: G00571

ARCHITECT OF RECORD

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Date

END OF DOCUMENT

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DOCUMENT 000010

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Last Revised

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Issued separately by U.S. Postal Service.

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

SECTION 011000
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE

- A. The contractor or 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. For purposes of this construction project, the terms "Landlord", "Lessor", "Owner", "Offeror", and "Contractor" are interchangeable and refer to the party whose proposal is accepted by the Postal Service. It is the Landlord's sole responsibility to clarify design and construction responsibilities among the Landlord's designers, contractors and other agents.
- B. The scope of work includes but is not limited to the following.
- Tenant improvement of existing building.
- Interior work includes new interior walls, finishes, hollow metal, overhead coiling door, folding closure and wood doors with HM jambs and hardware, ceilings, security film on existing windows installation of scissors lift with bollards, and installation of postal supplied equipment. Sawcut and remove then replace portion of slab required to access underfloor waste.
- Exterior work includes removal of sectional overhead door and tracks, enlarge opening in existing CMU wall, metal canopy over opening, steel channel jambs and steel structure for new opening.. Installation of flag pole.
- Postal equipment includes new USPS lighted sign on exterior wall and interior signage package, postal boxes, postal parcel lockers, casework for Service Lobby, and all associated mounting hardware.
- Fire sprinkler system work includes relocation of heads as required to cover new configuration.
- Mechanical scope of work includes installation of new ductwork and controls connected to existing roof top units.
- Plumbing scope of work includes construction of new toilet room, janitors sink and break area plumbing. Contractor responsible to locating connection points to existing water and sewer service to space.
- Electrical scope of work includes installation of new lighting, power distribution system, from existing electrical panel, etc.
- Low voltage electrical includes a complete new system and head end.
- Fire alarm system includes installation of bidder designed fire alarm interfaced with existing building system as required to accommodate new configuration.
- Intrusion detection system is a complete new system utilizing USPS protocol and panels as specified.
- 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	_____

- 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 101404 - Postal Signage
 - 2. Section 123504 - Postal Casework

1.5 USPS PRE-APPROVED VENDOR EQUIPMENT OR SUPPLIES

- A. The Contractor is solely responsible for contracting with the Pre-Approved Vendor and ordering, payment, receiving, accepting, storage and installation of United States Postal Service Pre-Approved Vendor equipment or supplies. Ordering instructions are included in each specification section.
- B. The Contractor will off-load, inspect the delivered equipment or supplies to make sure they are in good condition, acknowledge receipt, and accept the delivered goods.
- C. Pre-Approved Vendor items in this contract are limited to specific items, as shown in the drawings and listed below:
 - 1. Section 083500 - Folding Doors and Grilles

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
E300	Parcel Lockers 1'-3"	105526
E302	Parcel Lockers 2'-0"	105526
E401	Full Service Counter Base Unit (6'-8-5/8" Wide)	123504 (C721)
E402	Accessible Add-On Counter (34" Wide)	123504 (C720)
E403	6'-8" Accessible Full Service Counter - Option "B"	123504 (C728)
E404	5'-8" Accessible Full Service Counter - Option "C"	123504 (C729)
E405A	5' Accessible Full Service Counter - Option "D"	123504 (C726)
E405B	5' Non-Accessible Full Service Counter - Option "D"	123504 (C727)
E406	Pedestrian Guidance Barrier	111414
E506	Metal Wardrobe Lockers	105113
E511	Fire Extinguisher	104400
E512	Office ladder	124104
E530	Window Blinds	122000
E531	Bench	105113

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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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)			
	0912B	Cylinder for Corridor Doors opening directly into Inspector's private office within Inspection Suite; Evidence Storage; Interview Rooms.			
	0912C	Cylinder for Corridor Doors opening directly into Inspector's reception office; on all Inspector's Offices if not accessible through interconnecting doors.			
	0912D	Cylinder, Interior Lookout Gallery Doors			
	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.			
	C1864	Glow light for Lookout Gallery			
	Retail Items				
E101	218780	1577D Letter & Bundle Drop Unit, Blue	1		
	1054542	1170B Stand Alone Parcel Drop Unit for SSK – See Note 1			
	1054610	1577F In-Wall Parcel Drop Unit for SSK – See Note 1			
E301	1051183	2909 Rack Weldment (2900 Series PO Boxes)	verify		
	1051189	2910 Rack Cover (2900 Series PO Boxes)			
	1051191	2911 Side Trim (2900 Series PO Boxes)			
	1051279	2912A Lower Trim, 4-Bay (2900 Series PO Boxes)			
	1051278	2912B Upper Trim, 4-Bay (2900 Series PO Boxes)			
	1051184-1	2901 Module Assembly, 12 Compartment Box – See Note 2			
	1051185-1	2902 Module Assembly, 8 Compartment Box – See Note 2			
	1051186-1	2903 Module Assembly, 4 Compartment Box – See Note 2			
	1051187-1	2904 Module Assembly, Double Drawer – See Note 2			
		2905 Module Assembly, Single Compartment Box – See Note 3			
E502		Key Cabinet, Wall Mount (must be ordered off-catalog in eBuy2, sized appropriately for the building)			
E510		First Aid Cabinet (must be ordered off-catalog in eBuy2, in size appropriate to personnel count for the building)	1		
	Miscellaneous Items				
	None	Impact Cones (mechanization) - See Note 2			

Postal Service Furnished – Contractor Installed Equipment					
Equipment Number	Postal Stock Number (PSN)/eBuy2 Mfr Part No.	Description	Quantity	Desired Delivery Dates	
				After	Before
	None	Extendible Conveyor (mechanization) - See Note 2			
	None	PSDS Cable (linear feet) - See Note 2			
	None	Floor Scale Cable (linear feet) - See Note 2			
	None	10 feet, 61 Conductor Cable, Female Drop - See Note 2			
	None	15 feet, 61 Conductor Cable, Female Drop - See Note 2			
	None	10 feet, 61 Conductor Cable, Male Drop - See Note 2			
	None	15 feet, 61 Conductor Cable, Male Drop - See Note 2			
	None	PSDS Scales and Auxiliary Equipment			

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.

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SECTION 013300

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 SCHEDULE OF SUBMITTALS

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

Project _____

Contract No. _____

Project Description _____

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

*Submittal Type:

C – Certificate

S – Sample

SD – Shop Drawing

CD – Catalog Data

PL – Spare Parts List

MM – Maintenance Manual

1.2 SHOP DRAWINGS AND RELATED DATA

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

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

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

1.3 EQUIPMENT ROOM LAYOUT DRAWINGS

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

1.4 MATERIAL, EQUIPMENT, AND FIXTURE LISTS

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

1.5 CERTIFICATES OF COMPLIANCE

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

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

1.6 A-E'S REVIEW OF SUBMITTALS

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

1.7 SPARE PARTS DATA

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

1.8 SCHEDULE OF VALUES

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

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

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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

Schedule of Values

Facility:
Contractor:
Date:

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

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

Schedule of Values Definitions

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

Schedule of Values

Facility:

FSM Project Number:

Contractor:

Date:

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

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

Schedule of Values

Facility:

FSM Project Number:

Contractor:

Date:

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

SECTION 013543

ENVIRONMENTAL PROCEDURES

PART 1 – GENERAL

1.1 SCOPE

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

1.2 NOTIFICATION

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

1.3 ENVIRONMENTAL REGULATORY COMPLIANCE

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

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

1.4 ENVIRONMENTAL SITE CONTROLS

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

1.5 HEALTH AND SAFETY

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

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

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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

Safety and Health Guide for Contractors

Certificate of Understanding

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

Distribution

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

Contractor's Verification Statement

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

Contractor's Representative

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

Designated Postal Service Representative

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

Safety Representative (If Required by COR)

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

Postal Service CO, COR, or Project Manager

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

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

Safety and Health and Related Environmental Requirements

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

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

Emergency Procedures

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

Certificate of Asbestos and Lead-Based Paint

(New Work)

To: Contracting Officer, United States Postal Service

Subject: Certification for new construction

Postal facility name: _____

Postal facility address: _____

Certification for new construction:

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

Contractor/Owner name: _____

Signature: _____

Address: _____

Telephone: _____ Date executed: _____

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

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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: 10/1/2018
Last revised: 9/23/2015

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1 SUMMARY

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

1.2 PROJECT SIGN

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

1.3 BULLETIN BOARD

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

1.4 CONSTRUCTION-USE UTILITIES

- A. The Contractor may use existing utilities and make connections required for construction under this project and must pay all costs in connection with them. The Contractor must, at its own expense, make all temporary connections and install distribution lines. All temporary lines must be maintained by the

Contractor in a manner satisfactory to the COR and must be removed by the Contractor in like manner before final acceptance of the construction.

1.5 TEMPORARY ELECTRICITY

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

1.6 TEMPORARY HEATING AND VENTILATION

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

and conditions of the contract provisions and clauses, including those concerning *Heat*. If the permanent system is used to provide temporary heating and ventilation, the Contractor must replace all filters and restore the system to a condition satisfactory to the COR.

1.7 TEMPORARY WATER

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

1.8 SANITARY PROVISIONS

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

1.9 APPROACHES AND EXITS

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

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

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

USPS Specification issued: 10/1/2018
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SECTION 016000

PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1 PRODUCT OPTIONS AND SUBSTITUTIONS

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

1.2 PRODUCT DELIVERY REQUIREMENTS

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

1.3 PRODUCT STORAGE AND HANDLING REQUIREMENTS

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

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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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 CLEANING

- A. Refer to the terms and conditions of the contract provisions and clauses, including those clauses *Debris and Clean Up*.
- B. Cleaning During Construction:
 - 1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
 - 2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
 - 3. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
 - 4. Collect and remove waste materials, debris, and rubbish from site as specified in the Environmental Compliance and Management Plan as required in Section 013543 - Environmental Procedures.
- C. Final Cleaning:
 - 1. Use cleaning materials and agents recommended by manufacturer or fabricator of surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.
 - 2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's published instructions.
 - 3. Complete following cleaning operations before requesting COR inspection for Substantial Completion.
 - a. Clean Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
 - b. Remove tools, construction equipment, machinery and surplus material from Project Site.
 - c. Remove snow and ice to provide safe access to building.

- d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
- f. Broom clean concrete floors in unoccupied spaces.
- g. Provide final cleaning, waxing, and buffing of resilient tile, in accordance with manufacturer's requirements.
- h. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo if required.
- i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- j. Remove labels that are not permanent labels.
- k. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
- l. Wipe surfaces of mechanical and electrical equipment, and other similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
- m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- n. Replace air disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
- o. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
- p. Leave Project clean and ready for occupancy.
- 4. Engage an experienced licensed exterminator to make a final inspection, and rid Project of rodents, insects, and other pests. Comply with regulations of local authorities having jurisdiction.
- 5. Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction.
- 6. Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from Project Site and dispose of in accordance with requirements of local authorities having jurisdiction.
- 7. Where extra materials of value remain after completion of construction, they become Postal Service property and these materials should be stored as directed by COR.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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

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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:

Sound Level in dB

70

80

Time Duration of Impact Noise

More than 12 minutes in any hour

More than 3 minutes in any hour

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

END OF SECTION

USPS Master Specifications, issued: 10/1/2018
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Date: 10/1/2018

CONSTRUCTION WASTE
MANAGEMENT AND DISPOSAL

Appendix A

SUMMARY OF SOLID WASTE DISPOSAL AND DIVERSION

Project Name: _____

FMS Project Number: _____

Contractor Name: _____

License Number: _____

Contractor Address: _____

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

Signature: _____

Date: _____

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Date: 10/1/2018

CONSTRUCTION WASTE
MANAGEMENT AND DISPOSAL

RESOURCE CONSERVATION AND RECOVERY ACT - PROJECT SUMMARY.

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

1.0 EPA GUIDELINE ITEMS

A. Fly Ash:

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

 _____.

B. Building Insulation Products:

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

 _____.

C. Carpet:

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

 _____.

D. Floor Tiles (resilient):

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

a. If yes, please explain. _____

_____.

E. Floor Tiles (ceramic):

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

a. If yes, please explain. _____

_____.

F. Hydraulic Mulch:

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

a. If yes, please explain. _____

_____.

G. Compost:

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

a. If yes, please explain. _____

_____.

2.0 SPECIFICATIONS

NOT USED

3.0 SOLID WASTE PREVENTION

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

4.0 RECYCLING

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

5.0 COMMENTS

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

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

_____.

Signature: _____ Date: _____

SECTION 017704

CLOSEOUT PROCEDURES AND TRAINING

PART 1 – GENERAL

1.1 MANUALS

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

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

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

b. Table of Contents

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

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

- control. Prints of these drawings must be reduced to 11 inches x 17 inches for insertion in the manuals. Drawings must represent the "as-built" condition.
- b. Maintenance Procedures: The maintenance procedures must be divided into two categories: Preventive Maintenance and Corrective Maintenance.
1. Preventive Maintenance
 - a. Provide a schedule for preventive maintenance. State, preferably in tabular form, the recommended frequency of performance for each preventive maintenance task (cleaning, inspection, and scheduled overhauls).
 - b. Provide instruction and schedules for all routine maintenance cleaning and inspection, with recommended lubricants.
 - c. If periodic inspection of equipment is required for operation, cleaning, or other reasons, indicate the items to be inspected and give the inspection criteria for, but not limited to, the following:
 - 1.) Motors
 - 2.) Controls
 - 3.) Filters
 - 4.) Heat exchangers
 2. Provide instruction for minor repairs or adjustments required for preventive maintenance routines. Minor repair and adjustment must be limited to repairs and adjustments that may be performed without special tools or test equipment and that require no special training or skills. Identify test points and give values for each.
- c. Corrective Maintenance
1. Corrective Maintenance: Corrective maintenance instructions must be predicated upon a logical effect-to-cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime. Instructions and data must appear in the normal sequence of corrective maintenance, for example, troubleshooting first, repair and replacement of parts second, and then the parts list.
 2. Troubleshooting: This information must describe the general procedure for locating malfunctions and must give, in detail, any specific remedial procedures or techniques. The data shown are intended to isolate only the most common equipment deficiencies. Troubleshooting tables, charts, or diagrams may be used to present specific procedures. A guide to this type must be a three-column chart. The columns must be entitled Malfunction, Probable Cause, and Recommended Action. The information must be alphabetically arranged by component, and each component must, in turn, list deficiencies that may be expected. Each deficiency must contain one or more problems with a recommended correction.
 3. Repair and Replacement: Indicate the repair and replacement procedures most likely to be required in the maintenance of the equipment. Information included here must consist of step-by-step instructions for repair and replacement of defective items. Include all information required to accomplish repair or replacement, including information such as torque values. Identify all tools, special equipment, and materials that may be required. Identify uses for maintenance equipment. The paragraphs must contain headings to identify the topics covered.
 4. Safety Precautions: This subsection must comprise a listing of safety precautions and instructions to be followed before, during, and after repairs or adjustments are made or routine maintenance is performed.
- d. Manufacturers' Brochures: Include manufacturers' descriptive literature covering devices used in the system, together with illustrations, exploded views, and

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

1.2 POSTED OPERATING INSTRUCTIONS

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

1.3 TRAINING

- A. The Contractor must train Postal Service personnel in the operation and maintenance of mechanical and electrical equipment. Coordination must be maintained with systems designers for developing the hours of instruction and scope of material to be covered. Training of Postal Service personnel must not begin until the COR has approved the final submittal copy of each O&M manual.

- B. Schedule Submittal: The proposed scope of training and materials and instruction schedule must be submitted for review and approval approximately 30 days before the scheduled completion of the buildings. Mutually agreeable dates for training must be arranged with the COR, but the training must be completed before final acceptance of the facility.
- C. Scope of Training: Training must include classroom and on-the-job instructions by qualified installation and maintenance personnel having the necessary knowledge, experience, and teaching skills. The use of recording on digital media (DVD or CD discs) during the instruction.
- D. Time Period of Training: The minimum specific hours of training time required for each category of major equipment and systems is indicated below. Past experience indicates a workable ratio in the vicinity of approximately 25 percent classroom to 75 percent application, except that the ratio may be reversed for control systems. The COR must have the option of redistributing the training times, subject to the total time specified. Training must be presented on an 8-hour per day, 5-day per week schedule, with all reading assignments and review to be within this period.

1.4 TRAINING PERIOD

Item	Time (Hours)
1. Roofing	4
2. Special Doors	2
3. Dock Equipment	2
4. Security Equipment	2
5. Ventilation Covers air-handling units with heating and cooling coils, fans, and all other air-handling equipment, together with associated operating and limit controls.	4
6. 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.	4
7. Electrical System Covers all building services, lighting, lighting controls, and intercommunications, and security system.	4]
8. Elevators Covers operation of the different types installed, demonstrations in the machine room on the various operating and control equipment installed, and explanation of the use of the electric circuit diagrams (of sufficient size) to ensure proper operation and assistance in troubleshooting.	4
9. 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.	2
10. Miscellaneous Includes, but is not limited to, vehicle maintenance equipment, fire protection and alarm equipment, dust collection systems, compressed air systems, automatic door operators, dock levelers, truck scales, data collection center, and all other equipment not specifically covered above.	4

1.5 TRAINING PARTICIPATION SHEETS

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- 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.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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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 of 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 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

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.
- C. Following removal of flooring and floor slabs to create new surface to receive concrete densifier.

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. Interior Floor Finishes:
 - 1. Remove interior floor tile finish material where required.
- C. 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.
- D. Mechanical System:
 - 1. Remove all exhaust fans 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.
- E. Plumbing:
 - 1. Remove all plumbing fixtures and accessories including all exposed supply, waste, and vent piping.
- F. 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.
- G. Provide additional selective demolition as indicated and required by the Contract Documents and as required for indicated new construction.

END OF SECTION

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.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 FORMWORK INSTALLATION

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

- F. Provide chamfer strips on external corners of concrete members, to produce uniform, smooth lines and tight edge joints.

3.3 FORM RELEASE AGENT APPLICATION

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

3.4 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories in accordance with manufacturer's published instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- 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.

3.5 FORM CLEANING

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

3.6 CONSTRUCTION

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

3.7 FIELD QUALITY CONTROL

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

3.8 FORM REMOVAL

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

END OF SECTION

USPS CSF Specifications issued: 10/1/201~~8~~⁷
Last revised: 9/22/2015

SECTION 032000
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 - Structural Concrete for Buildings.
 - 2. ACI 318 - Building Code Requirements For Reinforced Concrete.
 - 3. ACI SP-66 - American Concrete Institute - Detailing Manual.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 2. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
 - 3. ASTM A 704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
- C. 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.

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.

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. Locate reinforcing splices not indicated on drawings, at point of minimum stress. Review location of splices with Contracting Officer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 PLACEMENT

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

3.3 FIELD QUALITY CONTROL

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

END OF SECTION

USPS CSF Specifications issued: 10/1/201~~8~~⁷
Last revised: 9/22/2015

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

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

10. ACI 305, "Hot Weather Concreting."
11. ACI 306, "Cold Weather Concreting."
12. ACI 306.1 "Standard Specification for Cold Weather Concreting."
13. ACI 308, "Standard Practice for Curing Concrete."
14. ACI 309R, "Guide for Consolidation for Concrete."
15. ACI 315, "Details and Detailing of Concrete Reinforcement."
16. ACI 318, "Building Code Requirements for Structural Concrete."
17. ACI 347, "Guide to Formwork for Concrete."
18. ACI 347.2R "Guide for Shoring/Reshoring of Concrete Multistory Buildings."
19. ACI 503.2, "Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive."
20. ACI SP-15, "Field Reference Manual" which includes ACI 301 "Specifications for Structural Concrete for Buildings" and reference standards specified therein.

D. American 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."

- E. 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. Resource Management:
 1. Recycled Content:
 - a. Concrete: Fly ash may be used as a substitute for a maximum of 25 percent of Portland cement.
 - b. Concrete: Ground granulated blast furnace slag (GGBFS) may be used as a substitute for a maximum of 30 percent of Portland cement.
- B. 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, Pozzoloth 220N, and Glenium 7500.
 - c. W.R. Grace: Daracem 55 and Daracem 65, WRDA 82 and WRDA with HYCOL.
 - d. Sika: Sikament HP, Plastocrete 161, and Sikament 686.
 - e. General Resource Technology: Polychem 400 NC and Polychem 1000.
 4. Water-reducing/accelerating admixtures: Conform to ASTM C494, Type C or E having long-term test results showing non-rusting on metal deck and reinforcing steel.
 - a. Euclid: Accelguard series.
 - b. BASF: Pozzutec 20+, Pozzoloth NC 534, and Rheocrete CNI.
 - c. Sika: Sika Rapid-1 and Plasocrete 161FL.
 - d. W.R. Grace: Lubricon NCA, Polarset, and DCI.
 5. Water-reducing/retarding admixtures: Conform to ASTM C494, Type D containing not more than 1 percent chloride ions.
 - a. Euclid: Eucon Retarder series.
 - b. BASF: Delvo Stabilizer, Masterpave series, and Pozzoloth 100XR, 200N, 220N and 322N.
 - c. Sika: Plastimet.
 - d. W.R. Grace: Daratard 17, WRDA-64, and WRDA-82.
 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, [below][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 rehandling or flowing. No concrete shall have a free fall of over three feet from truck, mixer, or buggies.
5. The concreting shall be carried on at such a rate that the concrete is plastic at all times and flows readily into the spaces between reinforcing bars. No concrete that has partially hardened or been contaminated by foreign materials shall be deposited in the work.
6. When concreting is started, it shall be carried on as a continuous operation until the placing of the section is completed.
7. Except as intercepted by joints, concrete shall be placed in continuous layers. The depth of layers shall not exceed 20 inches. Succeeding layers shall be placed while the previous layer is still plastic. Concrete placement shall begin at the lowest point in each section of concrete to be placed.
8. Protect adjacent surfaces from concrete drippings, spillage, and splashes. Hardened or partially hardened splashes or accumulations of concrete on forms or reinforcement shall be removed before the work proceeds. Clean all damaged surfaces immediately.
9. All conveyances shall be thoroughly cleaned at frequent intervals during the placement of the concrete, and before the beginning a new run of concrete all hardened concrete and foreign materials shall be removed from the surfaces.
10. The Superintendent or Foreman in charge of concrete work shall mark on the drawings the time and date of the placing of each concrete pour. Locations where concrete test cylinders are made shall also be noted on the drawings. Such drawings shall be kept on file at the job until its completion and shall be subject to the inspection of the Owner's Representative at all times.

C. Conveyor Belts and Chutes

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

8. If a conveyor belt is used, it shall be wiped clean by a device operated so that none of the mortar adhering to the belt will be wasted.
- D. Pumping of Concrete
1. The type and operation of a concrete pump shall be subject to the approval of the Engineer. The equipment used in placing the concrete and the method of its operation shall introduce the concrete into the forms without high velocity. Placing equipment shall be operated only by experienced operators.
 2. During pumping, the Contractor shall have on-site a standby placing system, acceptable to the Engineer, to ensure that in the event of breakdown of the primary placing equipment, the concrete placement can continue without cold joints.
 3. The minimum diameter of the hose or conduit shall be 4 inches unless otherwise approved by the engineer. Aluminum conduits shall not be used for conveying the concrete. Pumping equipment, hoses, and conduits that are not functioning properly shall be replaced.
- E. Joints
1. Joints shall be vertical in walls and horizontal in slabs.
 2. Dowel bars and tie bars shall be inspected
 3. Control joints for controlling concrete shrinkage shall be provided in floor slabs, walls, decks, conduits, and channels as shown on the plans or approved by the Engineer.
 4. Joint spacing and sawcut depth for slab-on-grade and concrete pavement shall conform to that shown on the pour sequencing plan and/or drawings.
 - a. Sawed control (contraction) joints for pavements and slab-on-grade shall be installed as soon as practical so as not to ravel the concrete but less than 12 hours.
 - b. The minimum sawcut joint depth shall be 1/4 of the slab thickness unless an early-entry SOFF-CUT saw is used in accordance with manufacturer recommendations (typically sawed between 1 to 4 hours after finishing to a 1-inch minimum depth).
 - c. Joint spacing shall not exceed 15 feet on center each way unless otherwise approved by the Engineer.
 - d. The long dimension of a slab shall not exceed 1.5 times the short dimension unless otherwise approved by the Engineer.
 5. Joints in slabs shall align with column lines and joints in adjoining walls unless otherwise approved by the Engineer or shown in the drawings. Joints shall also line up with architectural reveals and form lines. All corners shall be relieved by cutting joint to adjacent control joint.
 6. When not otherwise shown on the drawings or specified, concrete placement for walls shall be constructed in segments no longer than 30 unless otherwise approved by the Engineer.
 7. If there is a delay in casting but prior to concrete initial set, the concrete placed after the delay shall be thoroughly spaded and consolidated at the edge of that previously placed to avoid cold joints. Concrete shall then be brought to correct level and struck off with a straight edge. Bullfoats shall be used to smooth slab surfaces, leaving it free of humps or hollows.
 8. Where placing concrete is interrupted long enough for the concrete to take its initial set, the working face shall be made a construction joint.
 - a. Preparation and disposition of unplanned cold joints in walls shall be approved by the Engineer.
 - b. For slab-on-grade, pavements, sidewalk, and curb and gutter, concrete shall be removed back to the nearest planned joint and a construction joint installed.
 9. Unless otherwise noted on the drawings, where concrete is to be placed against existing concrete, except in the case of expansion joints, the joint face of the existing concrete shall be roughened.
 - a. Before new concrete is placed against hardened concrete, the bonding surface of the existing concrete shall be roughened to an amplitude of 0.25 inch using bush hammers, abrasive blasting, or high-pressure water blasting.
 - b. Fresh concrete may be green-cut with water blasting and hand tools to remove concrete laitance and spillage and to expose sound aggregate.
 - c. The prepared surfaces of hardened concrete shall be kept thoroughly wet during the 24-hour period immediately prior to the placement of the new concrete. Wetting shall be accomplished by continuous sprinkling or by covering exposed surfaces with wet burlap.
 - d. Where shown on the drawings or permitted by the Engineer, bond-preventing compound shall be applied by brush in accordance with the manufacturer's printed instructions.

10. Corner sections of walls shall not be placed until the adjoining wall sections have cured at least 14 days.

F. Consolidation

1. All concrete shall be thoroughly consolidated by internal mechanical vibrators during the placing operation and shall be thoroughly worked around the reinforcement and embedded fixtures and into corners of the forms.
2. Concrete for slabs 8 inches thick or less may be consolidated with vibrating screeds. Slabs between 8 to 12 inches thick shall be compacted with internal vibrators and (optionally) with vibrating screeds.
3. Concrete shall be consolidated by vibration to the maximum practicable density. The concrete shall be free from pockets of coarse aggregate and entrapped air.
4. Vibrators shall have a minimum diameter of 3 inches with a frequency of at least 7000 vibrations per minute and with an amplitude adequate to consolidate the concrete in the section being placed.
5. Forms shall contain sufficient windows or shall be limited in height to allow visual observation of the concrete during placement. Sufficient illumination shall be provided in the interior of forms so that at the places of concrete deposition the concrete shall be visible from the deck or runway.
6. Vibrators shall not be secured to forms or reinforcement.
7. Keep a minimum of two standby vibrators in operable condition on the job during concreting operations.
8. Consolidation shall be carried on continuously with the placing of concrete.
9. The number of vibrators employed shall be sufficient to consolidate the concrete within 15 minutes after it is deposited in the forms.
10. When consolidating each layer of concrete, the vibrator shall be operated at regular and frequent intervals 18 to 30 inches apart.
11. The vibrator shall be kept in nearly a vertical position as practical. 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 1/4 inch.
 - c. Floor Slabs: Steel trowel finish unless otherwise noted on the plans. As soon as the moisture sheen has disappeared from the floated surface and the concrete has hardened sufficiently to prevent drawing moisture and fine materials to the surface, the surface shall be steel troweled to produce a smooth, hard, uniform finish. Final steel troweling shall be conducted after the concrete is hard enough that no mortar accumulates on the trowel when manipulated with heavy pressure. Machine finishing may be used for troweling.
 - d. Exposed concrete slabs sealed or sealed and hardened using a liquid compound compatible with the curing method used.
 - e. Exterior Concrete Finishes: Unless otherwise noted on the drawings, floors, walkways, and roof finishes shall be sloped a minimum 0.125 inch per foot to drain water. A light steel trowel with broom finish unless otherwise noted on the plans. Apply exterior sealer to surfaces exposed to deicer chemicals that is compatible with the curing method used.
 - f. Exposed Ramps, Landings and Stair Treads: A light steel trowel with broom finish unless otherwise noted on the plans. Surfaces shall be sealed or sealed and hardened using a liquid compound compatible with the curing method used.
 - g. A heavy broom finish shall be provided on disabled person ramps, utility ramps, and around exterior loading docks.

3.7 CURING, PROTECTION, LIQUID HARDNERS AND SEALERS

A. Temperature, Wind, and Humidity

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

B. Curing Compound

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

C. Protection

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

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

3.8 PATCHING AND REPAIR

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

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

3.9 GROUTING

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

3.10 EVALUATION AND ACCEPTANCE OF CONCRETE

- A. Comply with ACI 301 and modifications in this section.
- B. Compressive strength
1. Sets of standard-cured quality assurance cylinders will be taken by the Engineer during the progress of the work. The number of cylinder sets taken for each concrete mix design placed each day shall not be less than one set per day, nor less than one set for each 150 cu yds of concrete nor less than one set for each 5000 sq ft of surface area for slabs or walls.
 2. A set of cylinders consists of five cylinders cured in accordance with ASTM C31: one to be tested at 7 days and two to be tested and their strengths averaged at 28 days in accordance with ASTM C31. The fourth and fifth cylinders may be used to test at other ages or to verify strength after 28 days in the event the 28-day strengths are low.
 3. A 28-day compressive strength test shall consist of the average strength of at least two cylinders fabricated from a single load of concrete.
 4. The strength level of the concrete will be considered satisfactory so long as the averages of all sets of three consecutive strength tests equal or exceed the specified strength, f'_c , by more than

- 500 psi, not more than 10 percent of the tests are less than the specified 28-day strength, and no individual test is more than 500 psi below the 28-day specified strength.
5. Should cylinder tests fail to meet the strength acceptance requirements or if deficient construction is suspected, core tests may be required and the costs of such tests paid by the Contractor. The Engineer shall identify core locations to least to impair the strength of the structure. Four-inch diameter cores shall be tested in accordance with ASTM C42.
 6. At least three representative cores shall be drilled from each member or area of concrete that is considered potentially deficient. If before testing, one or more cores shows evidence of having been damaged subsequent to or during the removal from the structure, it shall be replaced.
 7. Concrete in the area represented by core tests will be considered adequate if the average strength of the cores is equal to or at least 85 percent of and if no single core is less than 75 percent of the specified strength.
 8. Concrete that is deficient shall be isolated and retested to establish the boundary of deficient concrete. Concrete in the deficient area shall be removed and replaced.
 9. Core holes shall be repaired as directed by the Engineer.
- C. Air content will be determined in accordance with ASTM C231. The air content shall be taken with each set of test cylinders. If the air content is outside the specified range, the concrete shall be rejected. If concrete is to be air entrained for freeze-thaw durability, cores will be located to isolate deficient concrete by evaluating the air-void system in accordance with ASTM C457. Concrete in the deficient area shall be removed and replaced.
 - D. Slump tests will be performed prior to placing the concrete. Such tests shall be made for each set of test cylinders defined for compressive strength. If the slump is outside the specified range, the concrete shall be rejected.
 - E. The frequency of testing shall be increased if concrete fails to meet the acceptance criteria or if deemed by the Engineer to be too variable.

3.11 ACCEPTANCE OF STRUCTURE

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

3.12 MISCELLANEOUS CONCRETE

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

3.13 FIELD QUALITY CONTROL

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

B. Requirements:

1. Provide and maintain an adequate program of quality control for the materials, production methods, and workmanship to assure conformance of all work to the project contract documents. ACI 121R outlines the essential elements of the Material Control portion of the QA program.
2. All materials, equipment, and methods shall be subject to verification inspections and/or testing as specified herein; ACI 121R.
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: 10/1/2018
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033000- 24

033000- 25

USPS CSF SPECIFICATION

Date: 10/1/2020

CAST- IN -PLACE CONCRETE

SECTION 042210

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of the Bidding Requirements, Conditions of the Contract and Division 1 apply to all Sections of this Project Manual. Refer to Table of Contents for complete list of Bidding Requirements, Conditions, and Sections included in the Project Manual.
- B. Work Included in This Section: Provide all concrete unit masonry work as shown on drawings and as specified herein including the installation of steel door jamb, anchors, inserts, and other miscellaneous items built into masonry.
- C. Related Work in Other Sections:
 - 01 45 00 Quality Control
 - 03 30 00 Cast-In-Place Concrete
 - 05 50 00 Metal Fabrications

1.2 REFERENCE STANDARDS

- A. Listed publications form a part of this Section.
- B. American Standards for Testing and Materials (latest applicable edition):
 - ASTM A82: Standard Specification for steel wire, plain for concrete reinforcement.
 - ASTM A615: Standard Specification for deformed and plain billet steel bars for concrete reinforcement.
 - ASTM C109: Standard Test Method for compressive strength of hydraulic cement mortars (using 2-inch or 50-mm cube specimens.
 - ASTM C145 CMU used for veneer.
 - ASTM C270: Standard Specification for mortar for unit masonry.
 - ASTM C476: Standard Specification for grout for masonry.
 - ASTM C780: Standard Method for preconstruction and construction evaluation of mortars for plain and reinforced unit masonry.
 - ASTM E447: Standard Test Method for compressive strength of masonry.
- C. International Building Code: Used edition approved by governing authorities. Follow methods and procedures as outlined in Chapters 24 and 30.

1.3 SUBMITTALS

- A. Refer to Section 01 33 00 for general submittal requirements.
- B. Product Data: Include admixtures, adjustable anchors, control joint filler, insulation inserts, moisture barrier and wall flashing as applicable. Submit product literature of all products to be used for work in this section.
- C. Samples: Include 2 masonry units showing color and pattern. Include mortar samples in specified color.
- D. Certificates:

1. Concrete Masonry Units: Certify conformance to specified moisture content.
 2. Ready Mixed Mortar (if used): Mixing plant certify that mortar delivered to site meets specification.
 3. Bulk Aggregate: Submit certified screen analysis showing conformance to specification.
- D. Color Mixes: Record of approved color mixes.
- E. Safety Data Sheets (SDS): Submit SDS (or MSDS) for all products to be used in the system.

1.4 QUALITY ASSURANCE

- A. Asbestos Free Certification: All new materials and products installed as part of this work shall be certified to be free of asbestos in accordance with the requirements of Section 00 72 00. Each Supplier and subcontractor shall warrant to the Contractor that materials and products provided by them are free of asbestos.
- B. Inspections and Testing: Inspection of reinforcement shall be made by an independent testing agency hired under separate contract by the Owner. Contractor shall coordinate and schedule all inspections and tests by Owner's inspection agency and building department prior to all grout pours and otherwise as required for complete inspection.
- C. Installer shall provide all personnel trained in the application of the materials and systems and shall maintain supervision as specified elsewhere.
- D. Installer Qualifications: A single contractor/installer shall perform the work of this section; and shall be a firm with successful experience in the installation of CMU wall systems similar to those required for this project. The contractor/installer must be able to show examples of work that are in a water tight condition within a 100 mile radius of the job site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. All materials shall be so delivered, stored, and handled as to prevent the inclusion of foreign materials and the damage of materials by water or breakage. Package materials shall be delivered and stored in original packages until ready for use.

1.6 ENVIRONMENTAL CONDITIONS

- A. Wet Weather: Provide suitable cover over work exposed to weather, protect materials. Maintain cover over finished work for 48 hours after completion. It is up to the Contractor to provide cover for work for a reasonable number of days to accommodate normal weather conditions.
- B. Cold Weather: When outside temperature is below 40 degrees F. or is expected to fall below freezing within 48 hours (Weather Bureau forecast), comply with IBC Section 2104.3, Cold Weather Construction.
- C. Daily Requirements: Contractor responsible for providing cover over finished and unfinished work at the end of each day's work regardless of weather.

1.7 MASONRYCLEANING QUALITY CONTROL

- A. Test Cleaning: Contractor shall demonstrate materials, methods and dilution to be used for cleaning the concrete surface on one (1) sample panel of approximately 25 sq. ft. each for both existing and new masonry. Test areas shall be chosen by Owner and/or Architect.
 1. Use manufacturer's application instructions. Let the test panel dry 3 to 7 days before inspection. Keep test panels available for comparison throughout the cleaning project.

- B. No cleaning, including test cleaning, shall be performed until sealant joints, if any, have been installed and cured a minimum of seven (7) days and adhesion has been verified by means of a standard field adhesion test.
- C. Cleaning work shall utilize low pressure rinsing methods and materials so as not to damage sealant joints.
- D. Test adjacent non-concrete materials for possible reaction with cleaning agents. Test procedures shall include evaluation and techniques for protection of surrounding and adjacent non precast concrete surfaces from cleaning solutions and rinse waters.
- E. The necessary water and electricity shall be furnished to the contractor by the building owner for these test areas.
- F. The Architect and Owner shall approve all test areas and application procedures prior to the start of full-scale cleaning operations.
- G. Completed and approved test areas shall serve as standards by which all subsequent work in this section will be judged.

PART 2 – PRODUCTS

2.1 CONCRETE MASONRY UNITS (CMU)

- A. General: Grade N Type I, for general use in exterior walls above and below grade that may or may not be exposed to moisture penetration of the weather.
 - 1. Masonry units to have wall thickness that obtain 2500 psi prism strength.
 - 2. Provide medium weight units, 115 pcf minimum per ASTM C-90, Type 1.
- B. Sizes: Provide other sizes as required to carry out the work.
- C. Colors: Colors as selected.

2.2 MORTAR

- A. Mortar Proportions, Mixing: Follow ASTM C 270 Proportion Specifications.
- B. Workability: Maintain workability and consistency of mortar on the board to produce easy working under the trowel. Keep water for tempering available on the scaffold at all times. Discard mortar not used within two hours after mixing. Do not retemper mortar at the mixer.
- C. Mortar Colors: Match existing.

2.3 GROUT

- D. Grout Materials:
 - 1. Coarse Grout: ASTM C476. Provide for Concrete Masonry Unit cells, lintels, and bond beams, 2,500 psi at 28 days. Grout shall be per structural General Notes.
 - 2. Fine Grout: ASTM C476. Provide for other locations.
- E. Grout Proportions, Mixing:
 - 1. Proportions: ASTM C476, Table 1.
 - 2. Mixing: ASTM C476, Article 5.

2.4 MASONRY REINFORCEMENT

- A. Deformed Bars: for hollow masonry unit cells, lintels, and bond beams: ASTM A615, Grade 60.
- B. Ladder: Standard weight or equal, welded galvanized steel wire ladder design in horizontal joints as shown. Vertical reinforcing bars and metal ties as indicated on drawings.

2.5 REINFORCING POSITIONING TIES

- A. Wire reinforcing positioning ties as manufactured by Lock-Rite Company, Seattle, Washington. Maximum spacing of the positioning ties shall be 48 in. o.c. vertical. Use horizontal bond beam reinforcing positioners at 48 in. o.c.

2.6 CONTROL/EXPANSION JOINT FILLER

- A. Premolded filler formed from PVC, butyl rubber or neoprene, 60-80 shore A hardness. Install in block joint, and provide backer rod and sealant.

2.7 MASONRY CLEANER

- A. Sure-Klean Custom Masonry Cleaner, Prosoco, Inc
- B. 202V Vana-Stop, Diedrich Technologies, Inc.
- C. Or Approved Equal

PART 3 - EXECUTION

3.1 PREPARATION

- A. Related Work: Inspect work in place, correct deficiencies before commencing masonry work.
- B. Work in Place: Clean top surface of loose mortar and foreign material before commencing or resuming work. Drench masonry and concrete with clean water.

3.2 INSTALLATION, GENERAL

- A. Verify that initial absorption, when laid, is less than 30 grams per 30 square inches of bedding surface when tested per ASTM C 67. Lay masonry plumb, true to line and level, running bond coursing. Maintain module accurately. Keep joints uniform. Lay masonry in full mortar beds, shove into place, fill head joints. Broken units not permitted.
- B. Cutting: Use stock specials wherever practicable. Where cutting is necessary, cut units accurately with high speed masonry saw.
- C. Built-In Items: Build in all inserts as work progresses. Coordinate settings of inserts for work specified in other Sections.
- D. Joint Finishing: For Exposed Joints, after initial set, double strike with sled runner tool to smooth uniform concave shape. For Concealed Joints, strike concave shape.
- E. Interrupted Work: When work is interrupted at end of day, or for any other reason, bring face and back up to level and cover top with waterproof, non-staining covering securely held in place.

3.1 ERECTION OF CONCRETE MASONRY UNITS

- A. Use mortar type as specified. Lay units dry, face shell bedding method. For starter courses, pilasters, piers, and jamb blocks bed face shells and webs. Use running bond unless otherwise shown on drawings. Form closures with stock specials, leave no open ends exposed. Anchor to abutting construction with anchors spaces 32 inches on centers in mortar joints. Cut units to fit abutments with allowance for mortar joint. Protect masonry from weather as recommended in environmental requirements by the manufacturer.
- B. Anchors in Horizontal Joints: Set in mortar with cells filled one course above and below with mortar.
- C. Horizontal Joint Reinforcement: Location and spacing as shown on the drawings. Grout bars into horizontal bond beams. Lap splices per structural notes. Use prefabricated corner bars at wall intersections.

- D. Vertical Reinforcement: Location and size of reinforcement as shown on the drawings. Grout bars into vertical cells and pilasters. Rod thoroughly for complete compaction. Grout in 4 foot lifts, completely clean out voids before grouting. Lap splices per structural notes.
- E. Bond Beams and Lintels: Reinforce as shown on the drawings. Lap splices per structural notes. Extend vertical reinforcement into bond beams and lintels. Extend lintels and bond beams 16 inches beyond jambs of openings. Grout lintels and bond beams with concrete. Rod thoroughly for complete compaction.

3.2 CONTROL/EXPANSION JOINTS

- A. Provide continuous control joints with backer rod and sealant at each end of openings in wall or in additional locations where shown on drawings. Place unit in dry joint as detailed. Clean joint free of mortar and leave ready to receive sealant.

3.3 INSTALLATION OF STEEL DOOR JAMBS

- A. Set plumb, level and true. Hold securely in position until installation is complete. Anchor with three standard anchors per jamb, 12 inches into concrete masonry units. Fill with grout between frame and masonry surround.

3.4 FIELD QUALITY CONTROL

- A. Tests: Mortar shall be tested according to ASTM C109, ASTM C780, and ASTM E447. See Section 01 45 00.
- B. Inspection: Reinforced masonry elements require full-time inspection during construction prior to all grout pours.

3.5 DEFECTIVE WORK

- A. Repair defective work as directed. Cut out and repoint defective mortar using mortar matching original.

3.6 PROTECTIONS FOR CLEANING OF MASONRY

- A. Before applying, read "Preparation" and "Safety Information" sections in the Manufacturer's Product Data Sheet for product. Dilute only per manufacturer's recommendations.
- B. Note: Application to surfaces exposed to direct sunlight or high winds may cause rapid drying. When possible, clean when surfaces are shaded from direct sunlight. Wet hot surfaces with fresh water immediately before applying cleaner to remove loose soiling and reduce surface temperature. Do not let cleaner dry on the surface. If drying occurs, lightly wet treated surfaces with fresh water and reapply the cleaner in a gentle scrubbing manner.
- C. Take all necessary precautions to protect existing work and to prevent damage to new work.
- D. Provide protection for any and all surfaces to remain that may be damaged by the work being performed. Protect by covering them with a liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer's recommendations. Do not apply liquid masking agent to painted or porous surfaces.
- E. Dispose of rinse water run-off from cleaning operations by legal means and in manner which prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- F. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles which must remain in operation during the course of concrete restoration work.

- G. Protections can be eliminated subject to Owner's approval, if testing demonstrates no detrimental effect from exposure to cleaning solutions.
- H. Landscape and lawn areas shall be protected with polyethylene tarps in areas adjacent to masonries being cleaned.
- I. Provide for the removal and subsequent reinstallation of surface mounted items where practical. Where not practical, such items shall be protected in place.
- J. Prevent overspray of the cleaning materials caused by wind-drift.

3.7 CLEANER APPLICATION METHODS:

- A. Dilution - Dilute product only as recommended by manufacturer.
- B. General: Apply chemical cleaners to concrete surfaces to comply with chemical manufacturer's recommendations using brush or spray application methods, at Contractor's option, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than that indicated or recommended by manufacturer.

3.8 CLEANING NEW CONCRETE

- A. Caution: Multiple applications may etch sensitive surfaces. Do not let cleaner dry into the surface. If surface begins to dry, reapply cleaner.
- B. Always pre-wet surface with clean water, working from the bottom to the top. On vertical surfaces, keep lower areas wet to avoid streaks.
- C. Apply the pre-diluted cleaner directly to surface using a masonry brush or low-pressure spray. Let cleaner dwell for 2 to 3 minutes.
- D. Reapply cleaner. Scrub or scrape areas of heavy soiling using wood blocks or nonmetallic scrapers.
- E. Working from the top to the bottom, rinse thoroughly with fresh water. If pressure rinsing equipment is not available, brush the surface while rinsing.

END OF SECTION 04 22 10

SECTION 055000
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

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

1.3 SUBMITTALS

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

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

1.4 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

- c. Rowe Products, Inc.: No. 7-C-19.
 - d. Section 016000 – Product Substitutions: Permitted.
2. Touch-Up Primer for Galvanized Surfaces: FS TT-P-641.

2.2 FABRICATION

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

2.3 ROUGH HARDWARE

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

2.4 MISCELLANEOUS FRAMING AND SUPPORTS

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

2.5 MISCELLANEOUS STEEL TRIM

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

2.6 PIPE BOLLARDS

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

2.7 GENERAL

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

2.8 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.

2.9 SHOP PAINTING AND PROTECTIVE COATING

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.3 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

3.4 INSTALLATION - SECURITY GRILLES

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

3.5 INSTALLATION - BOLLARDS

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

3.4 ADJUSTING AND CLEANING

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

END OF SECTION

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

SECTION 062000
FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

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

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE, AND HANDLING

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

1.5 ENVIRONMENTAL REQUIREMENTS

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

1.6 SITE ENVIRONMENTAL PROCEDURES

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

PART 2 - PRODUCTS

2.1 INTERIOR FINISH CARPENTRY

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

2.2 Exterior Finish Carpentry

- A. Exterior Cedar Trim: No. 2 and Better Western Red Cedar, size as indicated. If trim size is not specifically called out, provide size and shape as necessary. Fit carefully at joints and against other members, all joints on bearings. Secure with stainless steel casing nails (exterior). Shop prime all sides of exterior trim.

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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Last revised: 3/29/2017

SECTION 072100
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Batt Insulation in exterior wall [and ceiling] construction.
 - 2. Board Insulation under slab and at foundation perimeter.
 - 3. Vapor retardant.
 - 4. Air infiltration seal.
- 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: Amofoam.
 - b. Owens Corning: Foamular 250.
 - 2. Thickness:
 - a. Under Floor Slab: 2 inches (5.08 cm).
 - b. Foundation Perimeter: 1 inch (2.54 cm).

2.3 VAPOR RETARDANT

- A. ASTM D 4397, 6 mils thick, maximum permeance rating of 0.13 perm.

- B. Vapor Retardant Tape: Pressure-sensitive of type recommended by vapor retardant manufacturer for sealing joints and penetrations in vapor retardant.

2.4 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.

3.3 INSTALLATION - BOARD INSULATION FOUNDATION PERIMETER

- A. Apply adhesive in three continuous beads to board insulation.
- B. Install boards on foundation wall or grade beam perimeter. Place boards by method to maximize contact bedding. Stagger joints. Butt edges and ends tight to adjacent board and to protrusions.
- C. Extend boards over joints, unbonded to foundation 2 inches (5.08 cm) both sides of joint. Backfill carefully to prevent damage to insulation boards.

3.4 INSTALLATION - BOARD INSULATION UNDER CONCRETE SLAB

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Prevent insulation from being displaced or damaged while placing slab.

3.5 INSTALLATION - VAPOR RETARDANT AIR INFILTRATION SEAL

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

END OF SECTION

USPS CSF Specifications issued: 10/1/2020
Last revised: 09/22/2015

SECTION 076200

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preformed metal roof at loading dock door along with Flashings and counterflashings, gutters and fabricated sheet metal items.
 - 2. Sheet metal 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.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- B. Federal Specifications (FS):
 - 1. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - a. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Fabricator: 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. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials which may cause discoloration or staining.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Sheet: ASTM B209, 3003 alloy, H14 temper; 0.025 inch minimum thickness; Class I clear anodized finish. Actual thickness as indicated on contract drawings or as needed to comply with code requirements and to prevent oil canning.
- B. Pre-Finished Aluminum Sheet: ASTM B209, 3003 alloy, H14 temper; 0.025 inch minimum thickness; finish shop pre-coated with PVDF (polyvinylidene fluoride) coating; color as indicated on Drawings.

2.2 ACCESSORIES

- A. Fasteners: Aluminum.
- B. Protective Backing Paint: FS TT-C-494, Bituminous.
- C. Sealant: Specified in Section 079200.

2.3 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet, interlocking with sheet.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2; miter and seam corners.
- E. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Tin edges of copper sheet to be soldered. Solder shop formed metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Weather seal joints.
- G. Fabricate gutters to profile and size indicated on Drawings.
- H. Fabricate downspouts to profile and size indicated on Drawings.
- I. Fabricate accessories in profile and size to suit gutters and downspouts.
 - 1. Anchorage Devices: Type recommended by fabricator.
 - 2. Gutter Supports: Brackets.
 - 3. Downspout Supports: Straps.
- J. Seal metal joints.

2.4 FACTORY FINISHING

- A. PVDF (polyvinylidene fluoride) coating: Multiple coat, thermally cured, fluoropolymer system conforming to AAMA 605.2.
- B. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
 - 2. Verify roofing termination and base flashings are in place, sealed, and secure.
- 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. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- C. Paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil .

3.3 INSTALLATION

- A. Secure flashings in place using concealed fasteners.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

END OF SECTION

USPS CSF Specification Last Revised: 10/1/2022

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 Device 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

USPS CSF Specifications issued: 10/1/2020
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 321313 - Concrete Paving: Sealants used in conjunction with paving.
 - 2. Section 033000 - Cast-In-Place Concrete: Sealants used in conjunction with concrete.
 - 3. Section 042113 - Brick: Sealants used in conjunction with clay masonry.
 - 4. Section 042210 - Concrete Unit Masonry: Sealants used in conjunction with concrete masonry.
 - 5. Section 078400 - Firestopping: Firestopping sealant at fire-rated assemblies.
 - 6. Section 076200 - Sheet Metal Flashing and Trim: Sealants used in conjunction with metal flashings.
 - 7. Section 088000 - Glazing: Sealants used in conjunction with glazing methods.

1.2 REFERENCES

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

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

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

1.7 WARRANTY

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

A. Urethanes:

1. Type 1: Two-Part Urethane: Self-Leveling, ASTM C920, Type M, Grade P, Class 25.
 - a. Chem-Calk CC-550, by Bostik.
 - b. Vulkem 245, by Mameco.
 - c. Vulkem 255, Wide-Joint, by Mameco.
 - d. NR-200 Urexpam, 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. Urexpam 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.

2.5 ACCESSORIES

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION

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

3.4 CURING

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

3.5 CLEANING

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

3.6 SEALANT SCHEDULE

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

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

END OF SECTION

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SECTION 081100

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. 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. Interior Doors: SDI-100, Level II - Heavy-Duty - 1-3/4 inch, Model 1 - Full Flush Design, 18 gage cold-rolled steel.
- B. Interior Frames: 16 gage, cold-rolled steel, mitered and welded, 2 inch profile, for installation in a metal or wood stud security partition.
- C. 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.

2.4 ACCESSORIES

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

2.5 PROTECTIVE COATINGS

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

2.6 FABRICATION

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install frames in accordance with SDI-105.

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

3.3 CONSTRUCTION

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

3.4 FIELD QUALITY CONTROL

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

3.5 ADJUSTING AND CLEANING

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

END OF SECTION

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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

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SECTION 083323

OVERHEAD COILING DOORS

PART 1 – GENERAL

1.1 SUMMARY

- A. Overhead coiling doors.

1.2 SUBMITTALS

- A. Shop Drawings: Required.
- B. Product Data: Required.
- C. Samples: Required
- D. Certificates of Quality Assurance: Required

1.3 QUALITY ASSURANCE

- A. Compliance with local governing codes.
- B. Compliance with ASCE-7 for wind loading requirements.

PART 2 – PRODUCTS

2.1 OVERHEAD COILING DOORS

- A. Approved manufacturers:
 - 1. Overhead Door
 - 2. Cornell
 - 3. Cookson
 - 4. Atlas
- B. Features:
 - 1. Curtain: Constructed of interlocking flat slat of a minimum 18 gauge thick front steel sheet and a min. 24 gauge rear steel sheet, approximately 3 inches high.
 - 2. Guides: Metal side guides, finish to match curtain.
 - 3. Hood: minimum 24-gauge steel sheet, finish to match curtain.
 - 4. Reversing Safety Edge.
 - 5. Counter Balance Assembly: Heat treated helical torsion springs secured within Steel-pipe barrel with a maximum deflection not to exceed .03 inches per foot of width.
 - 6. Operating Mechanism: Motor operated min. 1/2 HP, single phase, 120V. Provide disconnect to permit manual chain hoist operation in the event of power failure or motor burn-out. Provide electrical interlock to prevent motor burn-out in case lock remains engaged.
 - 7. Automatic Operation: Wall-mounted single key activated switch or induction loop.
 - 8. Locking: Security lockout capability.
 - 9. Insulation: Manufacturers standard rigid cellular polystyrene or polyurethane foam type insulation, foamed-in-place to completely fill cores of door.
 - 10. Finish: Shop primed, and field painted.

PART 3 - EXECUTION

3.1. INSTALLATION

- A. Install all components in accordance with manufacturer's instructions.
- B. Upon completion of installation, provide field inspection and testing.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022

SECTION 083500
FOLDING CLOSURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Folding security closures.
 - 2. 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. Provide Products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.
- D. Related Sections:

1.2 SUBMITTALS

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operating and Maintenance Data: Operating and maintenance instructions, parts lists and wiring diagrams.
 - 2. Submit written special warranty with forms completed in United States Postal Service name and registered with manufacturer as specified in this Section.
- B. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Construction, component connections, and details for each door type.
 - 2. Shop Drawings: Indicate dimensions, anchorage methods, hardware locations, and installation details for each door type.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer: Factory authorized 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.

1.5 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 side folding closures and 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 Pre-Approved Vendor. The following vendor contacts must be used:
 - 1. Dynaflair Corporation, Tampa, FL
POC: Gerald Pasternak, (813) 248-8100, (800) 624-3667.
 - 2. Dynamic Closures Corporation, Massena, NY.
POC: Christine Warner, (800) 663-4599.
 - 3. Mobilflex Inc., Niagara Falls, NY
POC: Claire Touzin (800) 216-3539
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not permitted.

2.2 FOLDING CLOSURES

- A. Solid curtain for enclosure of Retail Lobby or Full-Service Counters: Constructed of continuous solid panels of a minimum 16 gage (0.050 inch) (1.25 mm) thick aluminum. The maximum panel width is 8 inches. Panels to match curtain finish. The space between the bottom of the curtain and the floor directly below the track is not to exceed 1/2 inch (1.2 cm).
 - 1. Dynaflair: Elegance with solid insert.
 - 2. Dynamic: Elite Series EL Opaque.
 - 3. Mobilflex: Global.
- B. Track: Curtain shall be supported by trolley assemblies capable of carrying 120 pounds per linear foot. Curves and track shall be heavy extruded aluminum with a minimum of 14-inch (36 cm) radius for each 90 degree curve, and a minimum of 10 inch (25 cm) radius for curves greater than 90 degrees.
- C. Locking:
 - 1. Lead member, trailing member and bi-part member (if any) to be provided with manufacturer's high security cylinder on the exterior side with metal security ring.
 - 2. Lead member to engage a full height striker channel with a single hook latch.
 - 3. Lead bi-part member to engage a full height striker channel member secured with a single hook latch and bottom drop bolt.
 - 4. Lead member/channel connection and bi-part member connection to include a horizontal solid metal pin 1/2 inch (13 mm) in diameter. Pins to be 18" AFF and seat a minimum of 1 inch (2.6 cm) into the strike channel or lead member so they are not visible.
 - 5. Trailing end member to be free floating top and bottom post secured outside the storage pocket with top and bottom drop bolts operated on the exterior side.
 - 6. Intermediate member(s) to be located at all curves and on straight sections at intervals not to exceed 8 feet (2.44 m).
 - 7. Solid Curtains at Full Service Counters: Intermediate members to be equipped with drop bolt at the bottom, operated by manufacturer's high-security mortise cylinder on the exterior side with a metal security ring.

- 8. All applications other than those listed in Item 7 above: Intermediate members to be equipped with a concealed locking device, drop bolt at the bottom, and control lever on interior side.
- 9. Drop bolt to be manufactured with grade 1045 cold roll steel, with the bottom 6 inches (15 cm) of the bolt flame hardened and tempered to 55 Rockwell hardness. Drop bolt to extend not less than 1 inch (2.6 cm) into a dust proof receiver.
- 10. Keying of cylinders:
 - a. Furnish cylinders keyed alike during construction.
 - b. Final keying will use specified cylinders, see section 087100.
- D. Stacking: Allow 2.1 inches (5 cm) of stacking per linear foot of closure width, plus 3 inches (8 cm) for each post section.
- E. Finish: Clear anodized frame with matching clear anodized full height aluminum panels.
- F. Installation Details/Instructions: The Vendor shall produce a package of drawings/details and/or instructions which will be provided by the vendor with each folding closure at the time of delivery. This package shall be of sufficient detail to explain the proper installation and adjustment of folding closures.

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 opening sizes, tolerances, and conditions 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 INSTALLATION

- A. Installation company must specialize in performing the Work of this Section with documented experience and be approved by the folding closure manufacturer.
- B. Install closure unit assembly in accordance with published manufacturer's instructions.
- C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress. Brace and fasten components suspended from structure to be secure and rigid.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

3.3 CONSTRUCTION

- A. Site Tolerances:
 - 1. Maintain dimensional tolerances and alignment with adjacent work.
 - 2. Maximum Variation from Plumb: 1/16 inch (1.6 mm).

3. Maximum Variation from Level: 1/16 inch (1.6 mm).

3.4 ADJUSTING

A. Adjust closure, hardware, and operating assemblies for smooth and quiet operation.

3.5 CLEANING

A. Section 017300 - Execution: Cleaning installed work.

B. Clean closure and components.

C. Remove labels and visible markings.

END OF SECTION

USPS CSF Specifications issued: 10/1/2020
Last revised: 07/24/2020

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Finish Hardware items which are required for swing, sliding and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.
2. Hinges.
3. Locks and latches.
4. Operating trim.
5. Accessories for pairs of doors and exit devices.
6. Closing devices.
7. Door controls.
8. Stops and holders.
9. Miscellaneous hardware.

B. Related Sections:

1. Section 0811000 – Metal Doors and Frames
2. Section 081400 - Wood Doors.
3. Section 016000, Product Requirements.

1.2 REFERENCES

A. American National Standards Institute (ANSI);

1. ANSI A156.3 - National Standard for Exit devices.
2. ANSI A156.4 - National Standard for Door Controls - Closers.
3. ANSI A156.6 - National Standard for Architectural Door Trim.
4. ANSI A156.13 - National Standard for Mortise Locks & Latches.

B. National Fire Protection Association (NFPA):

1. NFPA 80 - Fire Doors and Windows.
2. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
3. NFPA 252 - Fire Tests of Door Assemblies.

C. Underwriters Laboratories (UL):

1. UL 10B - Fire Tests of Door Assemblies.
2. UL 305 - Panic Hardware.

1.3 SUBMITTALS

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

B. Product Data: Submit manufacturers' technical product data for each item of hardware. Include whatever information may be necessary to show compliance with requirements and include instructions for installation and for maintenance of operating parts and finishes.

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

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with the following requirements:
1. ANSI A117.1
 2. NFPA 101.
 3. NFPA 80.
 4. NFPA 252.
 5. UL 10B.
 6. UL 305.
- B. Regulatory Requirements:
1. Conform to applicable code for requirements applicable to fire rated doors and frames.
 2. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., and acceptable to the public authority as suitable for the purpose specified and indicated.
 3. Conform to United States Postal Service "Standards for Facility Accessibility by the Physically Handicapped" Handbook RE-4 for mounting heights and locations of accessories.
- C. Manufacturer: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

- D. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware to similar projects for a period of not less than 2 years, and who employs an experienced architectural hardware consultant (AHC) who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements.
- E. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

36.	Von Duprin, Indianapolis, IN	(317) 613-8302
37.	Wooster Products Incorporated, Wooster, OH	(800) 321-4936
38.	Yale, Charlotte, NC	(800) 438-1951
39.	Zero International (Allegion), Indianapolis, IN	(877) 671-7011

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

2.2 HINGES

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

1. Hager.
2. McKinney.
3. Stanley.
4. Soss.

- B. Material:

1. For interior doors, provide full mortise-type steel hinges with steel pins; non-rising for non-security exposure, flat button with matching plugs.
2. For exterior doors, provide full mortise-type stainless steel hinges with stainless steel pins; non-removable, flat button with matching plugs.
3. Ball-bearing Type: Swaged, inner leaf beveled, square corners.

- C. Hinges/pivots by types:

1. Type H-1: Medium weight door, average frequency, steel.

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

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

a.	Hinge	216		626	Soss
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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	TB2714	4-1/2 x 5 NRP	652	McKinney

2.3 LOCKS, LATCHES, AND BOLTS

- A. Subject to compliance with requirements, provide locks, latches and bolts of one of the following manufacturers and as specified below:

1. Best.
2. Corbin Russwin.

3. Sargent.
4. Schlage.
5. Yale.

B. Materials:

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

C. Keying

1. General:

- a. Incorporate a security system to ensure that keys used during construction do not open doors after United States Postal Service occupancy.
- b. Key side of locks shall be on the public side.
- c. Master and submaster key system shall conform to United States Postal Service criteria. Doors at exterior of facility, from public area to workroom, and Stamped Envelope Storage areas shall not be on the master/submaster keying schedule. Other areas, based on need or local preference, may be excluded from master/submaster keying schedule.

2. Construction Keying:

- a. Furnish exterior door lock sets with keyed alike removable construction core cylinders for use during construction.
- b. Restrict distribution of construction keys. Maintain record of persons who have received keys and deliver copies of record to Contracting Officer upon request.
- c. Provide permanent cores to Postmaster prior to substantial completion. Postmaster shall store them securely until needed. At substantial completion and at Contracting Officer direction, remove construction cores and replace with permanent cores in presence of Postmaster. Provide keys to Postmaster and return construction cores to manufacturer.

3. Permanent Keying:

- a. Master locks and cylinders are to match the United States Postal Service existing keying system if a system exists.
- b. Master to open all doors, except entrance doors to facility, doors from public area to workroom, and Stamped Envelope Storage shall not be on any master key system.

D. Cylinders and Thumbturns by types:

1. Type B-1: Rim Cylinder.

a. Cylinder	1109	626	Yale
b. Cylinder	20-022	626	Schlage
c. Cylinder	3000-200	626	Corbin Russwin
2. Type B-2: Mortise Cylinder.

a. Cylinder	2153 w/ 1161 series cam	626	Yale
b. Cylinder	20-013	626	Schlage
c. Cylinder	1000-A03	626	Corbin Russwin
3. Type B-3: Cylinder Guard

a. Cylinder Guard	MS4043	630	Adams Rite
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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		Corbin Russwin
c.	L9485P-06 w/security collar	626	Schlage
2.	Type L-2 Classroom Lock (ANSI F84)		
a.	AU 5408LN	626	Yale
b.	CL 3555	626	Corbin Russwin
c.	ND70PD	626	Schlage
3.	Type L-3 Entrance Lock (ANSI F20)		
a.	AUR 8847FL w/security collar	626	Yale
b.	ML2067 w/ security collar	626	Corbin Russwin
c.	L9453P-06A w/ security collar	626	Schlage
4.	Type L-4 Storeroom Lock (ANSI F86)		
a.	AU 5405LN	626	Yale
b.	CL3557	626	Corbin Russwin
c.	ND80PD	626	Schlage
5.	Type L-5 Privacy Lock (ANSI F76)		
a.	AU 5402LN	626	Yale
b.	CL3520	626	Corbin Russwin
c.	ND40S	626	Schlage
6.	Type L-6 Closet Deadbolt (ANSI E2151)		
a.	3611B	626	Yale
b.	470	626	Sargent
7.	Type L-7 Passage		
a.	AU 5401LN (F75)	626	Yale
b.	CL3510	626	Corbin Russwin
c.	ND10S	626	Schlage
8.	Type L-8 Entrance cypher lockset		
a.	Simplex 8148 mortise with deadbolt	626	

2.4 PUSH/PULL UNITS

- A. Pulls and Pushes Manufacturers: Subject to compliance with requirements, provide from one of the following manufacturers as specified below.
1. H. B. Ives.
 2. Trimco.
 3. Rockwood.
 4. Baldwin.
 5. Adams Rite
- B. Materials: ANSI A156.6 for 0.050-inch thickness.
- C. Push and Pulls by types:
1. Type P-1: Push 4-inch x 16 inch.
 - a. 1001-3 630 Trimco
 - b. 70C 630 Rockwood
 2. Type P-2 Pull: 4-inch x 16 inch.
 - a. 1010-3 630 Trimco
 - b. 132 x 70C 630 Rockwood
 3. Type P-3 Pull: 2.75-inch x 11.5 inch.
 - a. 3001 fixed pull 629 Adams Rite

2.5 EXIT DEVICES

- A. Exit Devices: Subject to compliance with requirements, provide exit devices of one of the following manufacturers and as specified below.
1. Corbin Russwin.
 2. Yale.
 3. Von Duprin.
 4. Adams Rite.
 5. Jackson Exit Device.
 6. Monarch.
 7. Sargent.
 8. 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

2.6 CLOSERS

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

11. Closers to be installed to allow door swing as shown on drawings.

C. Closers by types:

- | | | | | |
|----|-------------------------|-----|--------|--|
| 1. | Type C-1: | | | |
| a. | 4011 | 689 | LCN | |
| b. | P7500 | 689 | Norton | |
| c. | 4400 | 689 | Yale | |
| 2. | Type C-2: Parallel arm. | | | |
| a. | 4111 | 689 | LCN | |
| b. | P7500 | 689 | Norton | |
| c. | 4400 | 689 | Yale | |

2.7 STOPS, HOLDERS AND BUMPERS

A. Stop and Holder, Floor and Wall Stop, and Bumper Manufacturers: Subject to compliance with requirements, provide from one of the following manufacturers as specified below.

1. H. B. Ives.
2. Quality Hardware Manufacturing Co., Inc.
3. Trimco.
4. Dor-O-Matic.
5. Glenn-Johnson.

B. Materials:

1. Door stop mounting: Methods to suit substrates encountered (plastic anchor, drywall anchor, expansion shield).
2. Provide grey rubber exposed resilient parts.
3. Do not furnish aluminum floor stops.
4. Where a door stop is specified in the Hardware Schedule, provide a wall stop type (S-1). However, if circumstances prevent a wall stop installation (door too far from perpendicular wall, door swing into adjacent glass, etc.) then substitute a type (S-2) or (S-3) floor stop as indicated for use intended.
5. Adjust height of floor stops to suit undercut of adjacent door.

C. D. Stops, Holders and Bumpers by types:

- | | | | | |
|----|--|-----|---------|--|
| 1. | Type S-1: Wall Stop - Install with appropriate anchors for substrate encountered. | | | |
| a. | 1270W | 630 | Trimco | |
| b. | 407 1/2C | 630 | Ives | |
| 2. | Type S-2: Floor Stop - Install with appropriate anchors for substrate encountered. | | | |
| a. | 1201 | 626 | Trimco | |
| b. | FS444 | 626 | Ives | |
| 3. | Type S-3: Floor Stop - Install with appropriate anchors for substrate encountered. | | | |
| a. | W1211 | 630 | Trimco | |
| b. | FS436 | 630 | Ives | |
| c. | 331ES | 630 | Quality | |

2.8 THRESHOLDS

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

1. Pemko.
2. National Guard.
3. Reese.

4. Zero.

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

C. Thresholds by types:

1. Type T-2:
Saddle threshold for floor finish at doors (either VCT to VCT or VCT to tile or sealed concrete.)
 - a. VCT to VCT
 - 154 628 Pemko
 - HD5A 628 Reese
 - 425E 628 National
 - b. VCT to Tile/Concrete
 - 158 628 Pemko
 - S514A 628 Reese
 - 653 628 National
2. Type T-3 (with weather seal):
 - a. S483AV 628 Reese
 - b. 2005AT 628 Pemko
 - c. 896V 628 National

2.9 WEATHERSTRIPPING

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

1. Pemko.
2. Reese.
3. Zero.
4. National Guard.

B. Weatherstripping by types:

1. Type W-1: Door Gaskets.
 - a. 807A Reese

2.10 MISCELLANEOUS HARDWARE

A. Miscellaneous Hardware Manufacturers: Subject to compliance with requirements, provide from the manufacturers specified below.

B. Provide door silencers for all doors unless indicated otherwise.

C. Miscellaneous Hardware by types:

1. Type M-1: Acoustical Perimeter Door Seal
 - a. 105NA 628 National
2. Type M-2: Dead Lock, (ANSI E0191) - w/ No exposed trim on lobby side.
 - a. 3300 Series 630 Yale
3. Type M-3: Security Viewer. Mounted/installed, centered at 5'-0" AFF.
 - a. 1756 630 Hager
4. Type M-4: Astragal
 - a. 184A 628 Reese
5. Type M-5: Silencers
 - a. 1229A Gray Trimco
 - b. SR64 Ives
6. Type M-6: Flushbolts

- | | | | | |
|-----|---|--|-----|----------|
| | a. | 3917 | 626 | Trimco |
| | b. | 555 | 626 | Rockwood |
| 7. | Type M-7: Astragal | | | |
| | a. | 276C | 628 | Reese |
| 8. | Type M-8: Kick Plates | | | |
| | a. | K0050 8 x 34 | 630 | Trimco |
| | b. | KP18 8 x 34 | 630 | Rockwood |
| 9. | Type M-9: Armor Plate; 40" H x 46" W (both sides of door) | | | |
| | | | 630 | |
| 10. | Type M-10: Emergency Exit Alarm w/ Contacts: | | | |
| | a. | SDA103 | | SGI |
| | 1) | Provide concealed door contacts and a separate alarm unit. Alarm will have local 120 db (min) audible alarm and a visual alarm (strobe light) operated on 24VDC fed from a local card reader interface module (where ePACS is provided) or 24VDC from independent power supply and must have a backup battery which will power the alarm for one hour in the event of a loss of power, and to continually charge the battery. Battery operated door or panic bar mounted alarms are not allowed. | | |
| | 2) | Alarm to be located directly above the door 10 ft. above the finished floor. Provide door sign indicating alarm will sound when opened and labeled, "EMERGENCY EXIT ONLY - RE-ENTRY PROHIBITED". | | |
| 11. | Type M-11: Reinforcing Pivot Hinges | | | |
| | a. | 253 | 652 | Hager |
| 12. | Type M-12: Bumper (Install on push side of door at same height as lockset, in line with lever handle of lockset and approximately 2 inches away from the handle.) | | | |
| | a. | 170-19 | 630 | Bommer |
| 13. | Type M-13: Door Bottom Shoe | | | |
| | a. | DES-3C, 1 1/4" x 1 3/4" width | 630 | Hiawatha |

2.11 FABRICATION

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 1. Verify that doors and frames are ready to receive Work and dimensions are as instructed by the manufacturer.
 2. Verify that electric power is available to power operated devices and of the correct characteristics.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

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

3.2 INSTALLATION

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

3.3 ADJUSTING

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct United States Postal Service Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area, the Installer, accompanied by the representative of the latch and lock manufacturer, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware.

Consult with and instruct United States Postal Service personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.4 HARDWARE SCHEDULE

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

SET 1

CSF Small 15-30: Exterior storefront

CSF Small 25-100A Box Lobby exit

Each set to have:

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

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

SET 1 A

CSF Small 15-30: Time Lock Lobby Exterior Entry

Each set to have:

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

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

SET 2

- | | | |
|-------|-------|---------------------------------|
| 1 ea. | | Adams Rite MS1890 |
| 1 ea. | (B-1) | Rim Cylinder, Keyed both sides. |

SET 3

Automatic Storefront Doors

Provide final cylinder cores. Coordinate with Section 084229.

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

SET 4

Workroom to Box Lobby

Each set to have:

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

SET 5

Toilet - single occupancy

Each set to have:

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

SET 6

Toilet - multiple occupancy

Each set to have:

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

SET 7

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

Each set to have:

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

Peep hole at door type G

SET 8

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

Carrier Vestibule Personnel to Exterior

Enclosed Platform: Carrier Vestibule Personnel to Exterior

Building and Grounds Room (single door)

Each set to have:

3 ea.	(H-2)	Hinges
-------	-------	--------

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

SET 9

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

Each set to have:

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

SET 10

Mail and Carrier Vestibule Impact Doors

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

SET 11

SSDB 15-20: Mechanical Room to Mail Vestibule

Office Door to Retail Lobby (public)

Telephone Equipment Room to Workroom

Stamped Envelopes to Workroom

Each set to have:

3 ea. (H-2) Hinges
1 ea. (L-1) Hotel Lock (Similar to F15)
1 ea. Door Stop
1 ea. Closer

SET 12

Storage/Janitor's Closet to Workroom

Storage Room to Workroom

Mechanical Room to Workroom

Each set to have:

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

SET 13

Office to Workroom

Work Area to Office

Janitor's Closet to Workroom

Each set to have:

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

SET 14

Folding Closure Pocket
CSF Small Plans
Each set to have:

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

SET 15

Folding Closure
CSF Small Plans
Each set to have:

2 ea. (B-2) Rim Cylinder

All other hardware furnished by Door Supplier.

SET 16

CSF Small "A" Plans: Wicket door
Each set to have:

Door:

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

Wicket Panel:

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

SET 17

Wicket Door
Each set to have:

Door:

3 ea. (H-2) Hinges
1 ea. (L-1) Hotel Lock (Similar to F15)
1 ea. 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

3 ea.		Spring hinges welded to gate
1 ea.	(L-1)	Hotel Lock

SET 19

CIO to Workroom

Each set to have:

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

SET 20

CIO Covert Entry to Exterior

Each set to have:

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

SET 21

Electrical to Exterior
Recycling to Exterior
Each set to have:

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

SET 22

Admin to Exterior Exit
Each set to have:

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

SET 23

Workroom to Exterior Exit
Each set to have:

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

SET 24

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

6 ea.	(H-2)	Hinges
1 ea.	(L-1)	Hotel Lock (Similar to F15)
1 ea.	(M-6)	Flushbolts
1 ea.	(M-7)	Astragal
2 ea.	(S-1)	Door Stop

SET 29

Lunch room to Workroom

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

END OF SECTION

USPS CSF Specifications issued: 10/01/2018
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SECTION 088000

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
 - 2. ASTM C1036 - Standard Specification for Flat Glass.
 - 3. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
 - 4. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.
 - 5. ASTM E2010-01 - Standard Method for Positive Pressure Fire Tests of Window Assemblies.
 - 6. ASTM F1233 - Standard Test Method for Security Glazing Materials and Systems.
- C. Consumer Product Safety Standards for Architectural Glazing. CPSC 16 CFR, Part 1201.
- D. Flat Glass Marketing Association (FGMA):
 - 1. FGMA - Glazing Manual and Glazing Sealing Systems Manual.
- E. National Fire Protection Association (NFPA)
 - 1. NFPA 257 - Fire Tests of Window Assemblies.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Glass: Structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

- b. Glazing compound: Provide chemical, functional, and environmental characteristics, limitations, special application requirements.
 - 2. Samples:
 - a. Glazing: Submit one sample 12 x 12 inches (300 x 300 mm) in size of each type of glazing, illustrating tinting, and finish of glazing materials. Label each sample indicating kind, quality and manufacturer.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 – Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Submit written special warranty with forms completed in United States Postal Service name and registered with manufacturer as specified in this section.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

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

1.7 WARRANTY

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

3. Include coverage for delamination of laminated glass and replacement of same.
 - a. Warranty Period: 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Pilkington, Toledo, OH (800)221-0444.
 2. Vitro Architectural Glass, Cheswick, PA (855) 887-6457.
 3. Viracon, Owatonna, MN (800) 533-2080.
- B. Subject to compliance with project requirements, manufacturers offering security film products which may be incorporated in the Work include the following:
 1. 3M, St. Paul, MN (800) 480-1704.
- C. Subject to Compliance with project requirements, manufacturers offering wire glass products which may be incorporated with the work includes the following:
 1. Technical Glass Products, Snoqualmie, WA, (800) 426-0279.
- D. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 GLASS MATERIALS

- A. Glass Type 1 - Insulated Glass Units, Low E: Double pane units with inner pane of clear annealed glass and outer pane of tinted annealed glass.
 1. Where required by code, provide Glass Type 2 (tempered).
 2. Glass Thickness, Inner: 1/4 inch (6 mm).
 3. Glass Thickness, Outer: 1/4 inch (6 mm).
 4. Unit Thickness: 1 inch (25 mm) thick units. 1/4 inch (6 mm) thick, clear inner pane. 1/4 inch (6 mm) thick, tinted outer pane. 1/2 inch (12 mm) air space between panes.
- B. Glass Type 2 - Insulated Tempered Glass Units, Low E: Double pane units with inner pane of clear tempered glass and outer pane of tinted tempered glass.
 1. Glass Thickness, Inner: 1/4 inch (6 mm).
 2. Glass Thickness, Outer: 1/4 inch (6 mm).
 3. Unit Thickness: 1 inch (25 mm) thick units. 1/4 inch (6 mm) thick, clear inner pane. 1/4 inch (6 mm) thick, tinted outer pane. 1/2 inch (12 mm) air space between panes.
- C. Glass Type 3 - Clear Tempered Glass: ASTM C 1048, Kind FT (Fully Tempered), Condition A (Uncoated), Type I (Transparent Glass, Flat), Class 1 (Clear), Quality q3 (Glazing Select). Conform to ANSI Z97.1 and CPSC 16CFR Part 1201.
- D. Glass Type 6 - Insulated Glass Units with Security Film, Low E: Double pane units with inner pane of clear annealed glass and outer pane of tinted annealed glass.
 1. Glass Thickness, Inner: 1/4 inch (6 mm).
 2. Glass Thickness, Outer: 1/4 inch (6 mm).
 3. Unit Thickness: 1 inch (25 mm) thick units. 1/4 inch (6 mm) thick, clear inner pane. 1/4 inch (6 mm) thick, tinted outer pane. 1/2 inch (12 mm) air space between panes.

- E. Glass Type 7 - Clear Tempered Glass with Security Film: ASTM C 1048, Kind FT (Fully Tempered), Condition A (Uncoated), Type I (Transparent Glass, Flat), Class 1 (Clear), Quality q3 (Glazing Select). Conform to ANSI Z97.1 and CPSC 16CFR Part 1201. Security film of a minimum 0.007 inch (0.1778 mm) on the inner side of panel.
 - 1. Thickness: 1/4 inch (6 mm), unless indicated otherwise.
- F. Fire Rated Glazing (FRGA): FireLite plus or approved equal. Laminated, fire-rated and impact safety-rated glazing material. Provide in rated assemblies as required by codes and as shown on drawings. Minimum rating shall be 60 minutes. Provide 120 minute rating in two-hour fire walls.

2.3 GLAZING COMPOUNDS

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

2.4 GLAZING ACCESSORIES

- A. Setting Blocks: Resilient blocks of 70 to 90 Shore A durometer hardness; compatible with glazing sealant.
- B. Spacers: Resilient blocks of 40 to 50 Shore A durometer hardness; self adhesive on one side; compatible with glazing sealant.
- C. Filler Rods: Closed cell or jacketed foam rods of polyethylene, butyl, neoprene, polyurethane, or vinyl; compatible with glazing sealant.
- D. Joint Cleaners, Primers, and Sealers: As recommended by glazing sealant manufacturer.
- E. Gaskets: ASTM D2000, SBC 415 to 3BC 620; extruded or molded neoprene or EPDM, black.
- F. Mastic: Non-solvent type adhesive as recommended by mirrored glass manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that openings for glazing are correctly sized and within tolerance.
 - 2. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

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

3.2 PREPARATION

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

3.3 GLAZING

- A. Locate setting blocks at quarter points of sill; set in sealant if heel or toe bead is required.
- B. Install spacers inside and out except where preshimmed tape or glazing gaskets are to be used.
- C. Set each piece in a series to other pieces in pattern draw, bow, or other visually perceptible characteristics.
- D. Provide glazing sealants and gaskets as required for particular glazing application. Coordinate with other Sections for material compatibility.
- E. Gaskets:
 - 1. Provide adequate anchorage, particularly for driven-in wedge gaskets.
 - 2. Miter and weld ends of channel gaskets at corners to provide continuous gaskets.
 - 3. Seal face gaskets at corners with sealant to close opening and prevent withdrawal of gaskets from corners.
- F. Do not leave voids in glazing channels except as specifically indicated or recommended by glass manufacturer. Force sealant into channel to eliminate voids. Tool exposed surfaces to slight wash away from joint. Trim and clean promptly.
- G. Do not allow sealant to close weeps of aluminum framing.
- H. Provide filler rod where sealants are used in the following locations:
 - 1. Head and jamb channels.
 - 2. Colored glass over 75 united inches in size.
 - 3. Clear glass over 125 united inches in size.

3.4 INSTALLATION - BUTT GLAZED METHOD

- A. Temporarily brace tempered glass in position for duration of glazing process. Mask edges of glass at adjoining glass edges and between glass edges and framing members.
- B. Temporarily secure a small diameter non-adhering foamed rod on back side of joint.

- C. Apply silicone sealant to open side of joint in continuous operation; thoroughly fill the joint without displacing the foam rod. Tool the sealant surface smooth to concave profile.
- D. Permit sealant to cure then remove foam backer rod. Apply sealant to opposite side, tool smooth to concave profile.
- E. Remove masking tape.

3.5 CONSTRUCTION

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

3.6 FIELD QUALITY CONTROL

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

3.7 CLEANING

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

3.8 PROTECTION

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

END OF SECTION

USPS CSF Specifications issued: 10/1/2020
Last revised: 6/10/2020

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 jams, 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

USPS CSF Specifications issued: 10/1/2020
Last revised: 7/20/2016

SECTION 092900

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Gypsum board and joint treatment.
 - 2. Gypsum Soffit board.
 - 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 Soffit Board: ASTM C79; moisture resistant type; 5/8 inch thick, maximum available size in place; long edges tapered and ends square cut; water repellent paper faces. Exterior GWB Soffit 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 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 FINISH APPLICATION

- A. Conduct initial maintenance and apply floor finish materials in accordance with manufacturers instructions.
- B. Ensure initial maintenance has been conducted prior to applying floor finish.
- C. Apply two coats of manufacturers floor finish allowing first coat to dry prior to applying second coat. Allow final coat to cure 12 hours before allowing foot traffic.

3.10 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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Last revised: 6/4/2020

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SECTION 096723
RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Epoxy coating with integral slip-resistant abrasive additive on Toilet Room floors.

1.2 REFERENCES

- A. Comply with the following American Society for Testing and Materials (ASTM) standards:
 - 1. E-84: Test Method for Surface Burning Characteristics of Building Materials
 - 2. D-4060: Test Method for Abrasion Resistance of Organic Coatings
 - 3. D-714: Test Method for Evaluating degree of blistering of Paints
 - 4. D-4585: Standard Practice for Testing Water Resistance of Coatings

1.3 SUBMITTALS

- A. Product Data: Required
- B. Samples: Required

1.4 QUALITY ASSURANCE

- A. Applicator to be certified and licensed by the flooring manufacturer.
- B. Field samples to be approved and serve as minimum acceptable standards for finished work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design:
 - 1. Manufacturer: Stonhard, Maple Shade, NJ (800) 257-7953
 - a. Floor Product: Stonclad GS.
- B. Equal Products by one of the following Manufacturers may be substituted:
 - 1. Crossfield Products, Dex-O-Tex, Rancho Dominguez, CA (310) 886-9100
 - 2. General Polymers, Cincinnati, OH (800) 543-7694
 - 3. Florock, Chicago, IL (800) 356-7625
 - 4. Dur-A-Flex, East Hartford, CT (800) 253-3539

2.2 SLIP RESISTANCE

- A. Provide a finished installation that provides a minimum wet SCOF value of 1.0 per ANSI/NFSI B101.3.

- 2.3 COLOR
- A. Medium Gray, equal to Stonhard Pewter.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Apply coating system in strict accordance with manufacturer instructions for material and substrate involved.
- B. Provide ample ventilation during application.

END OF SECTION

USPS CSF Specifications issued: 10/1/2020
Last revised: 07/01/2020

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.

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.

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. Devoe (ICI), Cleveland, OH (888) 681-6353.
 - 3. Glidden (ICI), Cleveland, OH (888) 681-6353.
 - 4. Pittsburgh Paints, Pittsburgh, PA (800) 441-9695.
 - 5. 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

B. Primers and Undercoaters: Manufactured by same manufacturer as finish coat materials.

C. Paint Accessory Materials: Linseed oil, shellac, turpentine and other materials not specifically indicated herein but required to achieve the finishes specified of high quality and approved manufacturer.

2.3 EXTERIOR PAINT SYSTEMS

A. Benjamin Moore:

1. Ferrous Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: M04 Acrylic Metal Primer; MDF 2.0 mils.
 - b. Each Finish Coat: M29 DTM Acrylic Semi-Gloss; MDF 2.0 mils.
2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: M04 Acrylic Metal Primer; MDF 2.0 mils.

- b. Each Finish Coat: M29 DTM Acrylic Semi-Gloss; MDF 2.0 mils.

B. Devoe (ICI):

- 1. Ferrous Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: Mirrolac W/B DTM Primer DP85XX.
 - b. Each Finish Coat: Mirrolac W/B Semi-Gloss Enamel DP83XX.
- 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: Mirrolac W/B DTM Primer, DP85XX.
 - b. Each Finish Coat: Mirrolac W/B Semi-Gloss Enamel DP83XX.

C. Pittsburgh:

- 1. Ferrous Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: 90-709 DTM Interior/Exterior Primer; MDF 3.0 mils.
 - b. Each Finish Coat: 90-474 Acrylic Enamel Satin; MDF 3.0 mils.
- 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: 90-709 DTM Interior/Exterior Primer; MDF 3.0 mils.
 - b. Each Finish Coat: 90-474 Acrylic Enamel Satin; MDF 3.0 mils.

D. Sherwin-Williams:

- 1. Ferrous Metal: Semi-Gloss, Low VOC, Alkyd Primer/Acrylic Latex.
 - a. Primer: Pro-Cryl Universal Water-Based Primer, B66-310, MDF 3.0 mils.
 - b. Each Finish Coat: DTM Acrylic B66 Series; MDF 3.0 mils.
- 2. Galvanized Metal: Semi-Gloss, Water Base, Alkyd Primer/Acrylic Latex.
 - a. Primer: Pro-Cryl Universal Water Based Primer, B66-310, MDF 3.0 mils.
 - b. Each Finish Coat: DTM Acrylic B66 Series; MDF 3.0 mils.

2.4 INTERIOR PAINT SYSTEMS

A. Benjamin Moore:

- 1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: 284 Moorecraft Superhide Interior Latex Primer/Undercoater; MDF 1.5 mils.
 - b. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
- 2. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
- 3. Wood and Wood Doors: Satin, Water Base, Acrylic Latex.
 - a. Primer: 253 Moorecraft Latex Enamel Undercoater and Primer Sealer; 2.0 mils.
 - b. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
- 4. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: M04 Acrylic Metal Primer; MDF 2.0 mils.
 - b. Each Finish Coat: 276 Moorecraft Acrylic Latex; MDF 1.5 mils.
- 5. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Enamel Undercoater: Moorecraft Acrylic Latex Underbody 269.
 - b. Each Finish Coat: 276 Moorecraft Acrylic Latex; MDF 1.5 mils.

B. Devoe (ICI):

- 1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Wonder-Tones Primer DR50801; MDF 1.5 mil.
 - b. Each Finish Coat: Wonder-Tone Eggshell Enamel DR34XX; MDF 1.5 mil.
- 2. Masonry: Eggshell, Water Base, Acrylic Latex.
- 3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Mirrolac W/B Semi-Gloss Enamel DP83XX; MDF 1.5 mil.

4. Wood and Wood Doors: Satin, Water Base, Acrylic Latex.
 - a. Primer: Wonder-Prime DR51701; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
 5. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Mirrolac W/B DTM Primer DP85XX; MDF 1.5 mil.
 - b. Each Finish Coat: Mirrolac W/B Semi-Gloss DP83XX.
 6. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: Wonder-Prime DR51701; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
- C. Glidden (ICI):
1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: ProMaster Interior Latex Primer-Sealer MP-5111; MDF 1.5 mil.
 - b. Each Finish Coat: ProMaster Interior Latex Eggshell MP-6800; MDF 1.5 mil.
 2. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Devflex 4214HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
 3. Wood and Wood Doors: Satin, Water Base, Acrylic Latex.
 - a. Primer: Prime Interior 100% Acrylic Multi-Purpose Latex Stain Killer, PC 1000; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
 4. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Devflex 4020 PF Direct to Metal Primer & Flat Finish; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
 5. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: Prime Interior 100% Acrylic Multi-Purpose Latex Stain Killer, PC 1000; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
- D. Pittsburgh:
1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: 6-2 Speedhide Latex Sealer; MDF 1.0 mils.
 - b. Each Finish Coat: 6-411 Speedhide Eggshell Latex; MDF 1.5 mils.
 2. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
 3. Wood and Wood Doors: Satin, Water Base, Acrylic Latex.
 - a. Primer: 6-855 Interior Water Base Undercoater; MDF 1.5 mils.
 - b. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
 4. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
 5. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: 6-855 Interior Water Base Undercoater; MDF 1.5 mils.
 - b. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
- E. Sherwin Williams:
1. Gypsum Board: Low VOC, Eg-shell, Water Base, Acrylic Latex.
 - a. Primer: Harmony Latex Primer, MDF 1.6 mils.
 - b. Each Finish Coat: Harmony Latex Eg-Shel, MDF 1.6 mils.
 2. Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Pro Industrial DTM Acrylic S-G, B66-1151 Series MDF 3.0 mils.

3. Wood and Wood Doors: 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.
4. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Pro-Cryl Universal Water Based Primer, B66-1310, MDF 3.0 mils.
 - b. Each Finish Coat: Pro Industrial DTM Acrylic S-G, B66-01151 Series; MDF 3.0 mils.
5. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: 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.

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 or 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. Prepaint Gas piping prior to installation. (Touch-up paint after installation.)
 - 1. Color:
 - a. Roof (Yellow): OSHA Standard "Safety Yellow."
 - b. Other Areas: Match adjacent surfaces.
- D. At Workroom locations, paint red background on wall behind fire extinguisher extending 6 inches on both sides of the extinguisher and from floor to ceiling, or to 12 feet above floor, whichever is lower. Color is to be OSHA Standard "Safety Red" and in accordance with ANSI Z53.1.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect painting and coating application for scheduled material, color, sheen, specified thickness (MDF), and coverage.

3.6 CLEANING

- A. As work proceeds and upon completion, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.
- D. Upon completion of work leave premises neat and clean.

3.7 PROTECTION

- A. Protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.

3.8 COLOR SCHEDULE

- A. Any proposal to substitute a color is to include manufacturer's certification that the color matches the specified Munsell notation. 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. Glidden (ICI): #50YY 83/057.
 - 3. Pittsburgh: #512-1, Winter Mood.
 - 4. Sherwin-Williams (S-W): #SW 7636, Origami White.
- C. P-2 Light Gray (Munsell notation: #N8.0)
 - 1. Benjamin Moore: #1612, Pelican Gray.
 - 2. Devoe (ICI): #1H51G, Catkin.
 - 3. Glidden (ICI): #50BG 62/007.
 - 4. 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. Pipe Bollards, if not to receive plastic covers specified in Section 055000.
 - e. 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. Pipe Bollards.
 - f. 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.

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 Metal:
 - a. 2 coats Latex Satin
3. Interior Wood (painted):
 - a. 1 coat Enamel Undercoat
 - b. 2 coats Alkyd Semi-Satin Enamel
4. Wood Doors - Painted.
 - a. One coat Enamel Undercoat.
 - b. Two tinted coats of Latex Semi-Gloss Enamel.
5. Ferrous Metals
 - a. Touch up Prime Coat.
 - b. Two tinted coats of Alkyd Enamel Semi-Gloss.
6. 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: 10/1/2018
Last revised: 08/31/2018

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: 10/1/2020
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
4.	ELECTRICAL HAZARD
5.	TOILETS, MEN
6.	TOILETS, WOMEN
7.	LUNCH ROOM
8.	STORAGE
9.	POSTMASTER OFFICE
10.	EXIT (Tactile Sign)

END OF SECTION

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Last revised: 8/20/2016

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SECTION 101500

BULLETIN BOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. 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 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

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Last revised: 4/12/2011

SECTION 102600

WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. FRP Wall Protection
 - 2. Corner Guards
 - 3. Plastic Laminate Wall Protection
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- C. Related Sections:
 - 1. Section 123216 Manufactured Plastic Laminate Clad Casework.
- D. Regulatory Requirements:
 - 1. Handbook RE-4 Requirements for the Physically Handicapped.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals:
 - 1. Product Data: Indicate materials, construction, configuration, dimensions, and finishes.
 - 2. Assurance / Control Submittals:
 - a. Certificates: Manufacturer's certificate that products meet or exceed specified requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

- A. Subject to compliance with project requirements, manufacturers offering plastic sheeting or fiberglass reinforced plastic (FRP) panels which may be incorporated in the Work include the following:
 - 1. Crane Composites, Channahon, IL (800) 435-0080
 - 2. Glasteel, Moscow, TN (800) 238-5546
 - 3. Kalwall, Bow, NH (800) 526-1609

B. PRODUCT DESCRIPTION

1. Nominal 1/8" thick, white embossed finish, Class A Fire Rated panels.
2. Provide Manufacturer's trim, joining and cap accessories.
3. Install panels in strict accordance with Manufacturer's recommendations.

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

2.2 CORNER GUARDS FOR RETAIL AND OFFICE SPACES

- A. Subject to compliance with requirements, provide corner guards by one of the following manufacturers:
1. Construction Specialties: Acrovyn – SM-20.
 2. Pawling: Pro-Tek Corner Guards surface mounted CG-10 with TC-10.
 3. InPro Corporation: Type 150.
- B. For retail space corner guard colors provide color most closely matching PMS 294 for blue walls and PMS 485 for red walls. For office space and other walls painted P-1, provide white.
- C. Retail and office space corner guards: 4'-0" long snap-on covers of Class 1 fire-rated resilient material, minimum 0.078 inch thick, free-floated over continuous aluminum retainer, 0.063 inch thick, surface mounted and anchored to wall at 20 inches on center maximum; milled end caps color matched to covers.
- D. For non customer retail spaces, subject to compliance with requirements, provide corner guards by one of the following manufacturers:
1. Construction Specialties: Acrovyn CO8 surface mounted stainless steel corner guard.
 2. Pawling: GC-50 surface mounted corner guard.
 3. InPro Corporation: Stainless steel surface mount corner guard.
- E. Non-retail space corner guards: 4'-0" long surface mount screw attached, 3 1/2 inch flanges, 16 gage, No. 304 stainless steel.

2.3 PLASTIC LAMINATE WALL PROTECTION

- A. Refer to Section 123216 Manufactured Plastic-Laminate Clad Casework for approved plastic laminate manufacturers and colors.
- B. Install PL-2 plastic laminate to 3/4" MDF Board as detailed for screen line.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Section 017300 - Execution:
1. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive work.

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

3.2 INSTALLATION

- A. Follow manufacturer's recommended guidelines for cutting, fastening and installing wood polymer lumber. Refer to Report Number A237-06170/MOB, printed 1994.
- B. No color is to be applied to the wood polymer lumber. Use standard color (neutral).
- C. Install FRP panels and corner guards in accordance with manufacturers recommendations.
 - 1. Install corner guards with tops at 5'-0" above finished floor.
- D. Plastic Laminate wall protection: First install MDF panels over drywall to steel studs at 16" o.c.b.w. Install Plastic Laminate to MDF with non-VOC type adhesive as recommended by laminate manufacturer.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements - Field Inspection.

END OF SECTION

USPS CSF Specifications issued: 10/1/2019
Last revised: 07/31/2020

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; verify cost 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 – Paper towel dispenser provided by owners vendor..
- 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-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.
- N. 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. 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.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to NFPA 10 and local jurisdiction for requirements for extinguisher location and mounting.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products that may be incorporated in the work include the following:
 - 1. J.L. Industries, Bloomington, MN (800) 554-6077.
 - 2. Larsen's Manufacturing Company, Minneapolis, MN (800) 527-7367.
 - 3. Potter-Roemer, Incorporated, Cerritos, CA (800) 366-3473.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Extinguisher: Multipurpose dry chemical type, UL 299; UL-rated 4-A:60:B:C. 10 pound nominal capacity in enameled steel container.
- B. Mounting Bracket: Metal designed to prevent accidentally dislodging extinguisher, of size required for type and capacity of extinguisher specified, screw attached to wall. Brite chrome finish.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install extinguisher and bracket or cabinet in accordance with manufacturer's published instructions in locations required by authority having jurisdiction.
- B. Secure rigidly in place.
- C. Locate extinguishers where indicated on Drawings.
- D. Mount brackets so top of extinguisher is maximum 60 inches above finish floor.
- E. At Workroom locations, paint red background on wall behind fire extinguisher extending 6 inches on both sides of the extinguisher and from floor to ceiling, or to 12 feet above floor, whichever is lower. Color is to be "Safety Red" as specified in Section 099100, Painting.

END OF SECTION

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Last revised: 4/12/2011

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

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data on locker types, sizes, and accessories.
 - 2. Product Data: Data on bench construction, dimensions, configuration, and accessories.
 - 3. Shop Drawings: Indicate layout, dimensions, details of fabrication and installation. Include plans, elevations, sections, and attachments to other Work.
 - 4. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Manufacturer's Instructions: Indicate component installation assembly, and installation instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials to project site in manufacturer's original unopened protective packaging.
- C. Identify contents, manufacturer, brand name, thermal values, and applicable standards.
- D. Store materials in area protected from weather and construction operations.
- E. Protect Work from damaged during transportation, storage at Project Site, and throughout tenure of work. Protect adjacent Work and materials from damage during progress of specified Work. Damaged Work shall be repaired or replaced at no additional cost to the United States Postal Service. Furnish receipts of all loose or detachable parts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. HSS Industries, Incorporated, Traverse City, MI (800) 330-9701.
 2. Lyon Metal Products, LLC, Aurora, IL (800) 323-0096.
 3. Medart, Incorporated, Greenwood, MS (800) 647-7155.
 4. Penco Products, Incorporated, Oaks, PA (800) 562-1000.
 5. Republic Storage Systems Company, Canton, OH (800) 477-1255.
- B. Subject to compliance with project requirements, manufacturers offering Locker Room Benches which may be incorporated in the Work include the following:
1. DeBourgh Manufacturing Company, La Junta, CO, (800) 328-8829
 2. Lyon Metal Products, Aurora, IL, (800) 323-0096
 3. [_____].
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Type: Double Tier lockers with sloped tops and "Z" type metal base.
- B. Sheet Steel: Commercial grade, mild annealed, cold rolled and stretcher leveled with the following thickness:
1. Body and shelf: Minimum 24 gauge.
 2. Door Frames: Minimum 16 gauge:
 3. Tops and trim: Minimum 18 gauge.
- C. Hinges: Minimum 2 inches high, 0.050 inch thick steel, 4 or 5 knuckle with spun over pin ends.
- D. Fittings:
1. Recessed locking handles with provisions for Contractor furnished padlocks.
 2. One double and three single prong coat hooks.
 3. Door numbers with numbers as directed.
 4. Rubber bumpers.
- E. Locker Unit Size: 12 inches wide by 15 inches deep by 72 inches high.
- F. Bodies: Formed and flanged.
- G. Door Frames: Formed channel shaped, welded and ground flush.
- H. Doors: One piece with vertical edges channel shaped, top and bottom, flanged at 90 degree angle, hinges welded to door and bolted to frame and ventilation louvers and top and bottom.
- I. Sloped tops: Continuous with closed ends where exposed.
- J. Fasteners and Anchors: As recommended by locker manufacturer.
- K. Finish:
1. Preparation: Clean, degrease and neutralize.
 2. Paint Materials and Application: Powder coat or electrostatically sprayed with heavy coat high quality enamel and baked at 300 degrees Fahrenheit, capable of withstanding hammer test without chipping and flaking.
 3. Finish Color: Gray to match specified interior paint finishes.
- L. Padlocks: Combination lock with master-key operation at back of lock.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication of special components, when possible, to ensure proper fitting of work. However, allow for adjustment and fitting of trim and filler panels whenever taking of field measurements before fabrication might delay Work.

3.3 INSTALLATION

- A. Install metal lockers at locations indicated on Drawings in accordance with manufacturer's published instructions.
- B. Install lockers plumb, level, rigid, and flush.
- C. Space fastenings about 48 inches on center, unless otherwise recommended by manufacturer. Install through back-up reinforcing plates where necessary to avoid metal distortion. Conceal fasteners.
- D. Install trim where indicated, use concealed fasteners to provide flush, hairline joints with adjacent surfaces.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect installation of lockers, attachments, and alignment with adjacent finishes.
- C. Operate locker doors and locking devices.

3.5 ADJUSTING AND CLEANING

- A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices are operating properly.

- B. Touch-up marred finishes. Use only materials and procedures recommended or furnished by locker and bench manufacturer. Replace units which cannot be restored to factory-finished appearance.

END OF SECTION

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SECTION 105526
PARCEL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Parcel lockers.
 - 2. 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.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data on locker types, sizes, and accessories.
 - 2. Shop Drawings: Indicate layout, dimensions, details of fabrication and installation. Include plans, elevations, sections, and attachments to other Work.
 - 3. 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.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operation and Maintenance Data: Include spare parts data, current unit prices, sources of supply, and maintenance 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, and applicable standards.
- D. Store materials in area protected from weather and construction operations.
- E. Protect Work from damage during transportation, storage at Project Site, and throughout tenure of work. Protect adjacent Work and materials from damage during progress of specified Work. Damaged Work shall be repaired or replaced at no additional cost to the United States Postal Service. Furnish receipts of all loose or detachable parts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. HSS Industries, Incorporated, Traverse City, MI (800) 330-9701.
 - 2. Secura Locker, Chatsworth, CA (800) 709-4933.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not Permitted.

2.2 PARCEL LOCKERS

- A. Model:
 - 1. HSS: PL series. PL-1, PL-2, PL-3, PL-DRD, PL-15, PL-SRD.
 - 2. Secura: Model #1262, #1563, #1564, #1565.

2.3 MATERIALS

- A. Sheet Steel: Zinc-coated steel, nickel bearing, free from buckle, scale, and surface imperfections. Steel to be phosphate-treated, baked-on prime paint with baked enamel finish coat.
- B. Finish: Custom finish and color.
 - 1. Coating Type: Polyester/Acrylic.
 - 2. Color of Trim: Black, as delivered.
 - 3. Color of Faceplate: Silver to match finish of P.O. Boxes.
 - 4. Gloss: 35-Ultrahigh.
 - 5. Edge Coverage: Good.
 - 6. Specific Gravity: 1.20 + 1.80.
 - 7. Average Particle Size: 24-40 Microns (per ASTM-D1921).
 - 8. Chip Resistance: Minimum Rating of 5.
- C. Fasteners: Cadmium, zinc, nickel plated steel; exposed both heads, slotless type; self-locking nuts or locker washers for nuts on moving parts.

2.4 MANUFACTURED UNITS

- A. Select model and quantity of parcel lockers as directed by Contracting Officer from the following (based on USPS approved parcel lockers, manufactured by HSS Industries). Post office box rack ladder system provided by postal parcel locker manufacturer.
 - 1. Model PL-1 (1 compartment), size: 22.5 inches wide x 15.5 inches deep x 11.75 inches high.
 - 2. Model PL-2 (2 compartment), size: 22.5 inches wide x 15.5 inches deep x 11.75 inches high.
 - 3. Model PL-3 (1 compartment), size: 22.5 inches wide x 15.5 inches deep x 23.5 inches high.
 - 4. Model PL-DRD (rear doors), size: 22" wide x 60 inches high (Required for all installations).
 - 5. Model PL-15 (1 compartment), size: 14.5 inches wide x 15.5 inches deep x 11.75 inches high.
 - 6. Model PL-SRD (rear door), size: 13.5 inches wide x 60 inches high (Required for all PL-15 installations).
- B. Select model and quantity of parcel lockers as directed by Contracting Officer from the following (based on Secura Postal Pas-thru lockers, manufactured by Secure):
 - 1. Model #1565 (5 compartments), size: 15 inches wide x 18 inches deep x 60 inches high.
 - 2. Model #1564 (4 compartments), size: 15 inches wide x 18 inches deep x 60 inches high.
 - 3. Model #1563 (3 compartments), size: 15 inches wide x 18 inches deep x 60 inches high.

4. Model #1262 (2 compartments), size: 12 inches wide x 18 inches deep x 60 inches high.

2.5 ACCESSORIES

- A. Locking: Fabricate lockers to receive the following locking devices.
 1. Locking Mechanism (Customer Side): Each parcel locker module shall be secured with a U.S. Postal Service furnished 306 lock. (Manufacturers providing an installed lock equal to the 306 lock will be acceptable). Upon opening the compartment with a customer key to remove the contents, the customer key shall remain trapped. Three customer keys shall be provided for each compartment lock. The locks shall be so located to allow for easy replacement if they should be damaged or inoperable. Provide proper holes for USPS supplied and installed "Arrow" lock, above the 306 lock. The Arrow lock enables the Postal Service to unlock the trapped customer key with a master key.
 2. Locking Mechanism (Postal Side): Full length door, minimum 16 GA., locked closed by a 12 gage, plated steel latch/strap that forms a three point latch (top, middle and bottom of door). The latch mechanism and cables shall be covered or enclosed to prevent tampering. The mechanism will be spring loaded to return to the locked position when handle is released or door is slammed shut. The door may be secured by turning the handle and closing the door or slamming the door shut so that the slam lock bolts engage.
- B. Number Plates: Manufacturer's standard stainless steel metal number plates with numerals not less than 3/8 inch (9 mm) high. Number lockers in sequence as directed by Contracting Officer. Attach plates to each locker above keyway with minimum 2 fasteners of same finish as number plate.
- C. Trim: Provide black fillers and/or closure panel trim at jambs and head of recessed lockers, consisting of minimum 18 gage cold-rolled steel, 3 inch (8 cm) and 6 inch (15 cm) wide factory-finish trim where indicated to match lockers. Secure trim to lockers with concealed fastening clips.

2.6 FABRICATION

- A. Construction: Fabricate lockers square, and without warp, with metal faces flat and free of dents or distortion. Make all exposed metal edges safe to touch. Weld frame members together to form rigid, one-piece structure. Weld, bolt, or rivet other joints and connections as standard with manufacturer. Grind exposed welds flush. Do not expose bolts or rivet heads on fronts of locker doors and frames.
- B. Frames: Fabricate of 16 gage channels or 12 gage angles, minimum with continuous stop/strike formed on vertical members.
- C. Interior: Side panels to be flush constructed to inside of frames for easy removal of customer packages. Offset frame-to-side panel or protrusions into the opening are not permitted. From customer side, through compartment - postal floor shall not be visible with postal side door closed and latched. Provisions for attaching lockers together in at least two places front and back.
- D. Body: Fabricate top, bottom and sides of minimum 24 gage steel, with double flanged connections extending full height.
- E. Front Frame and Doors: One piece, minimum 16 gage sheet steel, without louvers, flanged at all edges, constructed to prevent springing when opening or closing. Fabricate to swing minimum 90 degrees.
 1. Reinforcing: Provide extra bracing or reinforcing on inside of doors over 15 inches (38 cm) wide.
 2. Hinges: Heavy-duty, stainless steel, concealed full loop hinges. Weld to inside of frame and secure to door with minimum 2 factory-installed fasteners which are completely concealed and tamperproof when door is closed. Front door shall have self-closing hinges.

- F. Rear Doors: Provide doors without louvers on back of lockers for access by postal employees from space behind public areas. The rear door shall be supported by a continuous hinge on one side. The rear door must be design and fabricated to preclude access from one compartment to another for the purpose of vandalism or unlawful removal of compartment contents and to prevent access to the workroom floor. Opening the rear door shall expose all compartments within a module for easy access and deposit of parcels.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication of special components, when possible, to ensure proper fitting of work. However, allow for adjustment and fitting of trim and filler panels whenever taking of field measurements before fabrication might delay Work.

3.3 INSTALLATION

- A. Install metal lockers at locations indicated on Drawings in accordance with manufacturer's published instructions.
- B. Install lockers plumb, level, rigid, and flush.
- C. Space fastenings about 48 inches (1.2 m) on center, unless otherwise recommended by manufacturer. Install through back-up reinforcing plates where necessary to avoid metal distortion. Conceal fasteners.
- D. Install trim where indicated, use concealed fasteners to provide flush, hairline joints with adjacent surfaces.
- E. Provide door with flush fit at cross sill when in closed position to maximize intercompartment security. Gaps not permitted.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect installation of lockers, attachment, and alignment with adjacent finishes.

- C. Operate locker doors and locking devices.

3.5 ADJUSTING AND CLEANING

- A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices are operating properly.
- B. Touch-up marred finishes. Use only materials and procedures recommended or furnished by locker manufacturer. Replace units which cannot be restored to factory-finished appearance.

END OF SECTION

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Last revised: 9/22/2015

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SECTION 107500

FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. 25' Aluminum ground mounted flagpole.
 - 2. Truck, halyards, and accessories.
 - 3. Concrete flagpole foundation base.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 033000 - Cast-In-Place Concrete: Concrete base.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM B 241 - Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Pole With Flag Flying: Resistant without permanent deformation, 100 miles per hour wind velocity, non-resonant, safety design factor of 1.0.
 - 2. Flag Dimension: 4 foot x 6 foot. Coordinate recommended flag size with manufacturer.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data on pole, accessories, and configurations.
 - 2. Shop Drawings: Detailed dimensions, anchor requirements, imposed loads, and foundation system.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Design flagpole foundation under direct supervision of a Professional Structural Engineer licensed in the State where Project is located, experienced in the design of flagpole supports.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- C. Protect flagpole and accessories on site from damage or moisture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. American Flagpole, Division of Kearney-National Incorporated, Abingdon, VA (800) 368-7171.
 - 2. Concord Industries, Incorporated, Addison, TX (800) 527-3902.
 - 3. Eder Flag Manufacturing Company, Incorporated, Oak Creek, WI (800) 558-6044.
 - 4. Pole-Tech Company, Incorporated, East Setauket, NY (800) 633-6733.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Pole Type: Commercial internal halyard cone tapered aluminum with ground sleeve.
- B. Flagpole: ASTM B 241; 6063-T6 wrought alloy aluminum, cone tapered.
 - 1. Mounting: Ground mounted to concrete foundation and base.
- C. Truck Assembly: Aluminum; revolving; stainless steel ball-bearings, non-fouling.
- D. Halyard: Stainless steel aircraft cable with four chrome plated bronze swivel snaphooks, plastic covered counterweight, and beaded sling.
- E. Hand Crank: Removable type with automatic brake system to permit locking of flag in any position.
- F. Collar: Spun aluminum to match pole.
- G. Foundation Sleeve: 16 gauge steel, galvanized corrugated tube with 3/16 inch thick steel base plate and support plate, 3/4 inch diameter x 18 inch long ground spike, and steel centering wedges.
- H. Concrete: Specified in Section 033000.
- I. Flags: Furnished and installed by United States Postal Service.

2.3 FINISHES

- A. Metal Surfaces in Contact with Concrete: Asphaltic paint.
- B. Aluminum: AA M32-C22-A41 Clear anodized.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.3 INSTALLATION

- A. Install flagpole base assembly, and accessories in accordance with manufacturer's published instructions.
- B. Electrically ground flagpole installation.
- C. Install foundation plate and centering wedges for flagpole base set in concrete base and fasten. Fill foundation tube sleeve with sand and compact.

3.4 CONSTRUCTION

- A. Site Tolerances:
 - 1. Maximum Variation From Plumb: One inch.

3.5 ADJUSTING AND CLEANING

- A. Clean flagpole surfaces immediately prior to installation.
- B. Adjust operating devices for smooth halyard and flag function.

END OF SECTION

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

SECTION 111300
LOADING DOCK EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Dock Bumpers.
- 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. 111304, Scissors Lift.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI MH29.1 - Safety Requirements for Industrial Scissors Lifts.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Bumpers: Indicate unit dimensions, method of anchorage, and details of construction.
 - b. Levelers: Indicate materials and finish, installation details, roughing-in measurements, and operation of unit.
 - 2. Shop Drawings: Indicate required opening dimensions, tolerances of opening dimensions, placement dimensions, and perimeter conditions of construction.

1.4 QUALITY ASSURANCE

- A. Scissor Lifts: Conform to requirements of ANSI MH 29.1.

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. APS Resource; Mequon, WI; (262) 518-1000
 2. Chalfant Sewing Fabricators, Inc.; Cleveland, OH; (800) 365-0389.
 3. Flexon, Incorporated, Pittsburgh, PA; (800) 365-3667.
 4. Frommelt Industries; Dubuque, IA; (800) 553-4834.
 5. Kelley Dock Systems, Milwaukee, WI; (800) 558-6960
 6. W.B. McGuire Company, Incorporated, Hudson, NY; (800) 624-8473.
 7. Nordock USA, Greenville, SC (866) 885-4276
 8. NOVA Technology, Inc., Menomonee Falls, WI; (800) 236-7325.
 9. Rite Hite Corporation, Milwaukee, WI; (800) 456-0600.
 10. Serco Company, Carrollton, TX; (800) 933-4834
 11. SPX Pock Products, Carrollton, TX (972) 466-0707.
 12. Blue Giant Equipment Corp., ON; (800)872-2583.
 13. Four Front Products; TX (972)466-0707.
 14. Pioneer Dock Equipment, Spring Hill, TN; (931)486-2296.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 DOCK BUMPERS

- A. Dock Bumpers at Bollard Locations:
1. Laminated rubber, ozone resistant, with two 3/4 inch (2 cm) tie rods and 3/8 inch (1 cm) steel angle at both ends.
 2. Thickness from wall, vertical height, width, and profile of bumpers indicated on Drawings.
 3. Pre-drilled, countersunk mounting holes.

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 dock bumpers in accordance with manufacturer's instructions.
- B. Set square and level.

END OF SECTION

USPS CSF Specifications issued: 10/1/2020
Last revised: 9/5/2019

SECTION 111304
DOCK LIFT (SCISSORS TYPE)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Surface mounted scissors type dock lift.
 - 2. Structure and operating characteristics.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 055000, Metal Fabrications: for pipe bollards.
 - 2. Section 08360, Sectional Overhead Doors

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI MH29.1 - Safety Requirements for Industrial Scissors Lifts.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Indicate materials and finish, installation details, roughing-in measurements, and operation of unit.
 - 2. Shop Drawings: Indicate required opening dimensions, tolerances of opening dimensions, perimeter conditions of construction, and electrical connections.
 - 3. Assurance/Control Submittals:
 - a. Test Reports: Report from approved Independent Testing Agency indicating compliance of Dock Lift with requirements of ANSI MH29.1.
 - b. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operating and Maintenance Data:
 - a. Manufacturer's operating and maintenance instructions.
 - b. Name, address, and telephone number of nearest authorized service representative.
 - c. Complete parts list.
 - 2. Operation Instruction: Document training by furnishing a sign-in sheet with a description of the training provided, instructors name and organization and those who received training. Refer to 017704 1.3, 1.4 and 1.5 for more specific training requirements.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of ANSI MH29.1.
- B. Qualifications:
 - 1. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. This product must be manufactured by a USPS Direct Vendor and is subject to a USPS price and requirements purchasing agreement. The order must be placed using the vendor's web-based ordering system: <https://www.uspslifts.com> .
 - 1. Advance Lifts Model 6568 (surface mounted).
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not permitted.

2.2 SURFACE MOUNTED SCISSORS TYPE DOCK LIFT

- A. Description:
 - 1. Type: Single-scissors-type hydraulic dock lift designed to be anchored to a concrete apron.
 - 2. Rated Lifting Capacity: ANSI MH29.1, 5,500 pounds.
 - 3. Vertical Travel: Minimum 53 inches.
 - 4. Travel Speed: 13 feet per minute.
 - 5. Lowered Height: 5 inches.
 - 6. Platform Size: 6 feet wide x 8 feet long with extended bridge.
 - 7. Audible travel warning device with adjustable volume control that operates in up and down travel motion.
 - 8. Flashing travel lights that that operates in up and down travel motion.
 - 9. Self contained power unit.
 - 10. Quick disconnect: Twist lock removable controls.
- B. Construction: Fabricate from structural steel shapes rigidly welded and reinforced to withstand deformation during operating and stored phases of service.
- C. Platform: Fabricate from heavy steel plate with beveled toe guards on all four sides complying with requirements of ANSI MH29.1. Provide matching hinged throw-over bridge where indicated, and removable handrails.
 - 1. Platform Surface: Non-skid safety tread deck plate.
- D. Hinged Bridge: Provide hinged bridge bolted to full length heavy-duty piano type hinge welded to toe guard at end of the platform. Hinge to be minimum 1/4 inch thick steel. Provide bridge complete with heavy-duty lifting chains. Chamfer edge of the bridge to prevent obstruction of material handling vehicle wheels.

1. Bridge Material: Non-skid safety tread aluminum for bridges 24 inches long or greater. Bridge material shall be a minimum of 1/4 inch reinforced steel and 3/4 inch minimum thickness for aluminum.
 2. Bridge Size: 60 inches wide x 24 inches long bridge.
- E. Ramp: Provide hinged ramp bolted to full length heavy-duty piano type hinge welded to the toe guard at end of the platform. Hinge to be minimum 1/4 inch long.
 1. Ramp Material: Bridge material shall be a minimum of 1/4 inch reinforced steel and three quarter inch minimum thickness for aluminum.
 2. Ramp Size: 60 inches wide x 30 inches long.
 - E. Handrails: Removable handrails on two sides of platform with single removable link chain across each end. Handrails 42 inches high with midrail and 4 inch high kickplate bottom. If rail sockets are provided with lift, mount flush with platform surface and fit securely in sockets.
 - F. Scissor Mechanism: Fabricate leg members from heavy steel formed tube or plate.
 - G. Cylinders: Equip with minimum two heavy-duty high pressure hydraulic ram type cylinders. Rams shall be either direct displacement plunger or rod and piston type with positive internal stops as standard with the manufacturer. Cylinder rods shall be chrome plated and polished to prevent rusting. Provide low temperature hydraulic oil.
 - H. Bearings: Provide pivot points with permanently lubricated anti-friction bushings or sealed ball bearings for minimum maintenance.
 - I. Operation
 1. Self-contained electric hydraulic power unit for raising and lowering of the lift, controlled from a remotely located push-button station.
 - J. Electrical Requirements: Coordinate wiring requirements and current characteristics with building electrical system.
 1. 230 volts/60 Hz/1 phase.
 - K. Power Unit: Self-contained, power unit mounted on the lift and housed in a weatherproof enclosure. Power unit shall consist of a 2 HP continuous duty motor, high pressure gear pump, valve manifold, oil line filters, oil reservoir and fluid level sight gauge.
 - L. Safety Devices: Provide hinged safety maintenance bars. Provide visible and audible warning when lift is in motion. Provide an automatic safety stop velocity fuse or comparable mechanism.
 - M. Steel surfaces must be clean and pretreated for optimum paint bond. Prime with a rust inhibitor primer and apply a hard enamel finish. Alternative painting processes must be approved by the USPS contracting officer. Painted toe guards shall have a minimum of 2" yellow with black diagonal stripes to comply with ANSI Z53.1. Unless otherwise indicated, paint other surfaces in the manufacturer's standard color.
 - N. Provide warning labels in accordance with ANSI 2535.4.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 INSTALLATION

- A. Install unit in prepared opening in accordance with manufacturer's published instructions, ANSI MH29.1, and as indicated on Drawings.
- B. Set square and level.
- C. Anchor unit securely.
- D. Make electrical connections as specified in Division 26.

3.3 CONSTRUCTION

- A. Interface with Other Work: Coordinate forming of pit for hydraulic dock lifts to ensure that the pit depth is adequate to accommodate the lift in proper relationship to the loading platform. Attach the lift securely to the pit floor in accordance with the manufacturer's directions.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect unit connection to structure and to electrical service.
- C. Perform operational tests of unit in the presence of the Contracting Officer. Demonstrate each function or operation.
- D. Provide three (3) operator manuals, three (3) maintenance/repair manuals and three (3) parts breakdown diagrams.

E. OPERATING INSTRUCTION

1. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance that is required to ensure normal operation.
2. Provide one complete set of equipment operating, installation, and programming manuals that will remain at the installed location.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 8/28/2018

SECTION 111316

STRIP CURTAINS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Strip curtains.
- 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: For each type of product.
 - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Shop Drawings:
 - a. Include plans, elevations, sections, details, and attachments to other work.
 - b. Detail assemblies and indicate dimensions, method of field assembly, components, and location and size of anchors and field connection.
 - 3. Samples: For each exposed product and for each color and texture specified.

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 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of screenline wall opening and contiguous construction by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 STRIP CURTAINS

- A. General: Opening curtains consisting of overlapping strips suspended from top of opening to form a sealed opening curtain. Provide strips of length required to suit opening height and with sufficient unit number to close opening width with overlap indicated.

2.2 MANUFACTURERS

- 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. Chase Doors.
 - 2. Rotary Products Inc.
 - 3. Verilon Vinyl.
- B. Section 016000 – Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.3 MATERIAL

- A. Strip Material: Curved, opaque black, extruded PVC. Matte finish is preferred. Fabricate strips for manufacturer's standard method of attachment to overhead mounting system indicated.
 - 1. Standard Grade
 - 2. Strip Width and Thickness: 8 inches (203 mm) wide and 0.080 inch (2 mm) thick.
 - 3. Overlap: 2 inches.

2.4 MOUNTING

- A. Wall Surface Mounting: Consisting of a steel plate bolted to face of wall; equip plate with permanently attached, threaded, mounting pins and steel-angle or plate retaining strip attached to plate with wing nuts.

2.5 STEEL FINISH: Hot-dip galvanize components to comply with the following:

- A. ASTM A 123/A 123M for iron and steel support mounting.
- B. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware and anchors.

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. Strip Curtains: Attach curtain mounting system to wall with screw anchors or toggle bolts. Mount curtain strips to overlap.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 – Quality Requirements – Field Testing and Inspection.
- B. After completing installation, inspect exposed factory finishes and repair damaged finishes.

END OF SECTION

USPS Master Specifications issued: 10/1/2020
Last revised: 8/24/2018

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

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. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

- F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.
- G. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.
- H. 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

USPS CSF Specifications issued:10/1/2020
Last revised: 3/29/2017

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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.

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"	1
C502	Break Room Base Sink Cabinet – 36"	1
C503	Break Room Wall Cabinet – 36"	1
C504	Break Room Base Cabinet – 24"	
C505	Break Room Wall Cabinet – 24"	1
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

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

SECTION 210000
FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire Protection Basic Materials and Methods:
 - a. Hangers and Supports.
 - b. Pipe and Fittings.
 - c. Piping Specialties.
 - d. Valves.
 - 2. Wet-Pipe Fire Suppression Sprinklers:
 - a. System design, installation, and certification.
 - b. Fire department connections.
 - 3. Dry-Pipe Fire Suppression Sprinklers:
 - a. System design, installation, and certification.
 - b. Fire department connections.
 - 4. Fire Pumps:
 - a. Fire pump package.
 - b. Fire pump engine.
 - c. Electric jockey pump.
 - d. Controllers.
- 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 331100 - Water Utility Distribution Piping: Fire protection water system.
 - 3. Section 283100 - Fire Detection and Alarm: Interconnection of systems.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, and 250.
 - 2. ANSI B 16.3 - Malleable-Iron Threaded Fittings, Class 150 and 300.
 - 3. ANSI B 16.4 - Gray Iron Threaded Fittings.
 - 4. ANSI A 21.10 - Ductile Iron and Gray Iron Fittings, 2 in. through 48 in., for Water and Other Liquids.
 - 5. ANSI A 21.51 - Ductile-Iron Pipe, Centrifugally Cast.
- B. American Society of Mechanical Engineers (ASME):
 - 1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
 - 2. ASME B16.3 - Malleable Iron Threaded Fittings.
 - 3. ASME B16.4 - Gray Iron Threaded Fittings.
 - 4. ASME B16.5 - Pipe Flanges and Flanged Fittings.
 - 5. ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings.
 - 6. ASME B16.25 - Buttwelding Ends.
 - 7. ASME Sec 9 - Welding and Brazing Qualifications.
- C. American Society of Sanitary Engineering (ASSE);

1. ASSE 1047 - Reduced Pressure Detector Assembly Backflow Preventer.
 2. ASSE 1048 - Double Check Detector Assembly Backflow Preventer.
 - 3.
- D. American Society for Testing and Materials (ASTM):
1. ASTM A 53 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 2. ASTM A 47 - Specification for Malleable Iron Castings.
 3. ASTM A 135 - Specification for Electric-Resistance-Welded Steel Pipe.
 4. ASTM A 234 - Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
 5. ASTM A 795 - Specification for Black and Hot-dipped Zinc-coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
- E. Factory Mutual (FM):
1. FM - Approval Guide, 2002 Edition.
 2. FM Data Sheet 2-8N, 2002 Edition.
- F. National Fire Protection Association (NFPA):
1. NFPA 13, 2007 Edition - Installation of Sprinkler Systems.
 2. NFPA 20, 2007 Edition - Standard for the Installation of Stationary Pumps for Fire Protection.
 3. NFPA 24, 2007 Edition – Standard for the Installation of Private Fire Service Mains and Their Appurtenances
 4. NFPA 70, 2008 Edition - National Electrical Code.
 5. NFPA 72, 2007 Edition - National Fire Alarm Code
 6. NFPA 291, 2007 Edition – Recommended Practice for Fire Flow Testing and Marking of Hydrants.
- G. Underwriters Laboratories, Inc.(UL):
1. UL Fire Directory B, Product Directory - Fire Protection Equipment Directory, 2009 Edition.
 2. UL 193 - Alarm Valves for Fire Protection Service.
 3. UL 199 - Automatic Sprinklers for Fire Protection Service.
 4. UL 346 - Water Flow Indicators for Fire Protective Signaling Systems.
 5. UL 405 - Standard for Fire Department Connections.
 6. UL 753 - Alarm Accessories for Automatic Water Supply Control Valves for Fire Protection Service.
 7. UL 668 - Hose Valves for Fire Protection Services.
 8. UL 448 - Pumps for Fire Protection Service.
 9. UL 1247 - Diesel Engines for Driving Centrifugal Fire Pumps.
 10. UL 1468 - Direct-Acting Pressure Reducing and Pressure-Control Valves for Fire Protection Service.
 11. UL 1478 - Fire Pump Relief Valves.

1.3 DEFINITIONS

- A. Authority Having Jurisdiction: See Public Authorities.
- B. Delegated Engineer: A Professional Engineer Registered in the State where the project is located who undertakes final design of the fire protection system.
- C. Owner: Any designated representative of the owner.
- D. Professional of Record: Architect or Engineer of Record indicated on the Contract Documents.
- E. Public Authorities: Local, State or Federal government body having jurisdiction over any portion of the project. This includes, but is not limited to building departments, Fire Departments, Fire Marshals Offices, Water Departments, Insurance Regulatory Boards, Utility Companies or Districts, Cross Connection Control Departments, Transportation Departments, etc.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

1. System to provide coverage for entire building.
 2. Retail Areas, Canopies, Workroom and General Storage areas.
 - a. Density: 0.20 gpm/ft² for most hydraulically remote 1500 ft², with 250 gpm hose stream allowance. If Area is less than 1500 ft², calculate at 0.20 gpm/ft² for entire area with 250 gpm hose stream allowance.
 - b. Sprinkler Temperature Rating: Ordinary. High in combustible concealed spaces or near heat producing equipment.
 - c. Spacing: 130 ft² per sprinkler maximum, 15 feet spacing maximum.
 - d. Occupancy: Mercantile, Ordinary Hazard Group 2 per NFPA 13.
 3. Office Areas and Restrooms
 - a. Density: 0.10 gpm/ft² for most hydraulically remote 1500 ft², with 100 gpm hose stream allowance. If area is less than 1500 ft², calculate at 0.10 gpm/ft² for entire area with 100 gpm hose stream allowance.
 - b. Sprinkler Temperature Rating: Ordinary. High near heat producing equipment.
 - c. Spacing: 225 ft² per sprinkler maximum, 15 feet spacing maximum.
 - d. Occupancy: Light Hazard per NFPA 13.
 4. Combustible Concealed Spaces
 - a. Density: 0.10 gpm/ft² for most hydraulically remote 1500 ft², with 100 gpm hose stream allowance. If area is less than 1500 ft², calculate at 0.10 gpm/ft² for entire area with 100 gpm hose stream allowance.
 - b. Sprinkler Temperature rating: Intermediate. High near heat producing equipment.
 - c. Spacing: 130 ft² per sprinkler maximum, 15 feet spacing maximum.
 - d. Occupancy: Light Hazard per NFPA 13.
 5. The Delegated Engineer shall perform a water flow test to determine the available water supply for fire protection system design. The following parameters shall be followed in conducting the water flow test:
 - a. Conduct flow test in accordance with NFPA 291. Coordinate flow tests validity with Public Authorities and Contracting Officer.
 - b. Contact the Public Authorities before conducting the flow test. Public Authority appointed representative must be present during the flow test.
 - c. Conduct a water flow pressure test as close to the proposed location as practical. The water flow pressure test shall consist of three separate pressure tests conducted at the same location. The first water flow pressure test shall be conducted at zero flow (initial static condition). The second water flow pressure test shall be conducted flowing at or more than 700 gpm (residual condition). The final water flow pressure test (final static condition) shall be conducted immediately following the second at zero flow, to determine if pumps or other pressure/flow modifying devices may have been engaged. Conduct test during peak hour demand conditions. If test cannot be conducted during peak hour, adjust results to peak hour demand.
 6. Safety Factor: 10 percent of static and residual PSI.
 7. Hydraulic calculation areas of application shall be based on actual floor area protected by sprinklers. Use 1.2 multiplied by the square root of the area for design criteria.
 8. Hydraulic calculations for all dry pipe system piping shall be based on a C Value of 100.
 9. Entire hose allowance (gpm) shall be included in hydraulic calculations at the connection to the city water main or a yard hydrant, whichever is closer to the system riser.
- B. Scope of Work: Design, fabrication, and installation of Fire Protection System Including the Following:
1. Complete fire protection system as outlined in these Contract Documents, including all labor, materials, shop drawings and hydraulic needed to furnish and install a complete and functional fire protection system. System shall comply with NFPA 13, Public Authorities, Contracting Officer and Contract Documents.
 2. Visit site to determine conditions and extent of work.
 3. Coordination of work with Contract Documents and all trades, including building design loads.
 4. The work under this section shall yield to all other trades.
 5. Warranty on new materials and labor.

6. Provide all necessary permits, taxes, and fees, including Public Authorities inspection and testing fees necessary to complete the specified work.
7. Provide any required core drilling of walls, and required UL listed, non-combustible firestopping materials at all new sprinkler piping penetrations. Patch as required. New piping penetrations shall be adequately firestopped to maintain the fire resistance rating required.
8. Access panels for service and access to valves in enclosed ceiling and walls.
9. Provide coordination and interface of alarm initiating and supervisory devices with the fire alarm system.
10. The fire protection piping and sprinkler layout shall function in such a manner so as not to interfere with lighting fixtures, air distribution devices, equipment, piping, beams, and ductwork. The work under this section shall yield to all other trades.
11. Furnish, install, and adjust as necessary all waterflow and valve supervisory switches.
12. Fire protection systems complete with supervised control valves, inspector's test and main drain assemblies, vane type waterflow alarm switches, pressure gauge, main drain, auxiliary drains, and local alarm devices.
13. Provide required signs at all new control valves, main drains, auxiliary drains and inspector's test connections, hydraulic placards, etc.
14. System testing.
15. Underground pipe modifications, including all necessary fittings, clamps, thrust blocking, backflow preventers, excavating and backfilling, etc.
16. Fire department connection with check valve and ball drip, including interconnecting supply piping to sprinkler riser.
17. If sprinkler system in any area is subject to freezing, then use non-freeze system (dry or anti-freeze).
18. Drawings must indicate specific method of freeze protection for all areas.

1.5 SUBMITTALS

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

1. Product Data:
 - a. Sprinkler heads, valves, and specialties.
 - b. Performance ratings rough-in details, weights, support requirements, and piping connections.
2. Preliminary Shop Drawings: Prior to detailed submission, submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
3. Shop Drawings: Indicate hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls. Prior to commencement of installation, submit licensed Professional Engineer's sprinkler system drawings (signed and sealed by Delegated Engineer) specified in "Quality Assurance" Article to Designated Reviewers. Include system hydraulic calculations and equipment data. Submittals shall be complete and in bound sets. Sprinkler system drawings, prepared according to NFPA 13 and FM 2-8N and Contract Documents. Submittals shall be made to Designated reviewers. Designated Reviewers are:
 - a. Additional Submittal: Submit shop drawings, product data, and hydraulic calculations to Public Authorities for approval. Submit proof of approval to Contracting Officer.
 - b. Submittals to Contracting Officer:
 - c. Submittals to Professional of Record:
4. Assurance/Control Submittals:
 - a. Design Data:
 - 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) 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 Contracting Officers.
 - 2) Fire protection contractor license issued by State or local authority having jurisdiction.
 - e. Manufacturer's Field Reports: Submit the following reports directly to Contracting Officer 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.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
1. Project Record Documents: Accurately record the following.
 - a. Sprinklers and deviations of piping from Drawings.
 - b. Drain and test locations.
 2. Operation and Maintenance Data:
 - a. Components of system, servicing requirements, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.6 QUALITY ASSURANCE

- A. Qualifications:
1. Manufacturer: Company specializing in manufacturing the Products specified in this Section, whose equipment, specialties, and accessories are listed by product name and manufacturer in UL Fire Protection Equipment Directory and FM Approval Guide and that conform to other requirements indicated.
 2. Installer: Company specializing in performing the Work of this Section with minimum of 3 years documented experience and approved by Public Authorities in the State and Jurisdiction where the project is located. Company qualified to install and alter fire protection piping, equipment, specialties, and accessories, and repair and service equipment. Company familiar with, and in compliance with, requirements of authorities having jurisdiction.
 3. Delegated Engineer: Design fire protection system, develop working plans and shop drawings, and perform shop and site work under direct supervision of a Delegated Engineer experienced in design of this work and licensed in the State where the Project is located.
- B. Regulatory Requirements:
1. Perform Work in accordance with NFPA 13 , 20, 24, 70, 72, and 291.
 2. Equipment and Components: UL listed, and FM approved with appropriate label or marking.
 3. Hydraulic Calculations, Product Data, Shop Drawings: Bear stamp of approval of Public Authorities.
 4. Welding Materials and Procedures: Conform to AWS D10.9.
 5. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
 6. Comply with requirements of Public Authorities for submittals, approvals, materials, hose threads, installation, inspections, and testing.
 7. Comply with requirements of Contracting Officer and Owner's insurance underwriter for submittals, approvals, materials, installation, inspections, and testing.
 8. Provide certificate of compliance from Public Authorities indicating approval of field acceptance tests.
 9. Conform to applicable code for submission of design and calculations, reviewed shop and erection drawings and as required for acquiring permits.
 10. Cooperate with regulatory agency or authority and provide data as requested.
- C. Pre-Installation Meetings:

1. Convene a pre-installation meeting one week prior to commencing Work of this Section.
2. Require attendance of parties directly affecting Work of this Section.
3. Review conditions of operations, procedures, and coordination with related Work.
4. Agenda:
 - a. Tour, inspect, and discuss conditions of building and building structure.
 - b. Review fire sprinkler system design and requirements.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review fire protection system Drawings and data.
 - e. Review and finalize construction schedule related to fire sprinkler system and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - f. Review required inspections, testing, certifying, and material usage accounting procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.
- C. Deliver and store valves in shipping containers, with labeling in place.
- D. Provide temporary protective coating on cast iron and steel valves.
- E. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.8 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to Contracting Officer.
 1. Provide extra sprinklers under provision of NFPA 13.
 2. Provide suitable wrenches for each head type.
 3. Provide metal storage cabinet in location designated. Cabinet to be of sufficient size to store sprinklers, wrenches, and copy of all fire protection submittal documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Ames Company, Incorporated, Woodland, CA (530) 666-2493.
 2. Cla-Val Company, Costa Mesa, CA, (800) 942-6326.
 3. Febco, Fresno, CA, (209) 252-0791.
 4. The Viking Corporation, Hastings, MI (800) 968-9501.
 5. Watts Industries, North Andover, MA (978) 688-1811.
 6. Wilkins Regulator Division, Zurn Industries, Incorporated, Erie, PA (814) 455-0921.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 FIRE PROTECTION PIPING - BELOW GROUND

- A. Cast Iron Pipe: Class 200, with flanged joints, ASA 21.2 or bell and spigot ASA 21.6. Cement-mortar lined, ASA 21.4.
 - 1. Fittings: Cast Iron Flanged, ASA B16.1 Class 125; bell and spigot ASA 21.10; fittings to be cement mortar lined ASA21.4.
- B. Polyvinyl Chloride (PVC) Pipe: ASTM D1784-60T, ASTM D2241-64AT. Commercial Standard CS 256-63. Designed for Maximum working pressure of 160 psi at 73 degrees F.
 - 1. Rubber ring joints: Ring Tite PVC Pipe, by Manville.
 - 2. Substitutions: Under provisions of Section 016000.
- C. Ductile Iron Pipe: Class 50
- D. Indicator Posts:
 - 1. No. A-20805, with tamper switch (double contact), by Mueller.
 - 2. Substitutions: Under provisions of Section 016000.
- E. Gate Valves: AWWA C500-59T.

2.3 FIRE PROTECTION PIPING - ABOVE GROUND

- A. Black Steel Pipe: ANSI/ASTM A53; ASTM A795; ASTM A135; ANSI B36.10M; Schedule 10 or 40 (Schedule 30 for 8 inch pipe and larger).
 - 1. Steel Fittings: ANSI/ASME B16.9, wrought steel, butt welded; ANSI/ASME B16.25, battled ends; ASTM A234, wrought carbon steel and alloy steel; ANSI/ASME B16.5, steel flanges and fittings; ANSI/ASME B16.11, forged steel socket welded and threaded.
 - 2. Cast Iron Fittings: ANSI/ASME B16.1, flanges, and fittings; ANSI/ASME B16.4, screwed fittings.
 - 3. Malleable Iron Fittings: ANSI/ASME B16.3, screwed type. ANSI/ASTM A47.
 - 4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts, and washers; Victaulic FlushSeal gasket required for dry pipe, preaction and double interlock dry systems.
 - 5. Fitting type to match pipe. Galvanized required for dry pipe systems.
- B. Alternate Products: Acceptable alternatives to Schedule 10 and Schedule 40 pipe.
 - 1. "Superflow" Non-threadable Lightwall, by Allied.
 - 2. "Dyna-Flow" Non-threadable Lightwall, by American Tube.
 - 3. Schedule 5 pipe used with Victaulic "Pressfit" system.
 - 4. "Eddylite," by Bullmoose.
 - 5. Flexible sprinkler system assembly by SprinkFLEX, for the final connection between the branch line and the sprinkler head.
- C. Pipe must meet the following conditions:
 - 1. Threads: Shop cut according to applicable ANSI standards.
 - 2. Pipe Fittings: Specifically rated for use with pipe.

2.4 BACKFLOW PREVENTER

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Ames Company, Incorporated, Woodland, CA (530) 666-2493.
 - 2. Cla-Val Company, Costa Mesa, CA, (800) 942-6326.
 - 3. Febco, Fresno, CA, (209) 252-0791.
 - 4. The Viking Corporation, Hastings, MI (800) 968-9501.
 - 5. Watts Industries, North Andover, MA (978) 688-1811.
 - 6. Wilkins Regulator Division, Zurn Industries, Incorporated, Erie, PA (814) 455-0921.

7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. ASSE standard type, size, maximum flow rate, and maximum pressure loss as indicated on Drawings. Bronze, cast-iron, steel, or stainless-steel body, corrosion-resistant interior components, FDA-approved epoxy coating for cast-iron or steel body, 150 psig working pressure.
- C. Reduced-Pressure Backflow Preventer: ASSE 1013, consisting of OS&Y gate valves on inlet and outlet and strainer on inlet with test cocks and pressure-differential relief valve with ASME A 112.1.2 air gap fitting located between two positive-seating check valves.
- D. Double-Check Backflow Prevention Assemblies: ASSE 1015, consisting of shutoff valves on inlet and outlet and strainer on inlet with test cocks and two positive-seating check valves.
- E. Reduced-Pressure Detector Assembly Backflow Preventer: UL 312 and ASSE 1047, consisting of OS&Y gate valves on inlet and outlet, and strainer on inlet, with pressure-differential relief valve with ASME A112.1.2 air-gap fitting between two positive-seating check valves and test cocks, and bypass with displacement-type water meter, valves, and reduced-pressure backflow preventer.
- F. Double-Check Detector Assembly Backflow Preventer: UL 312 and ASSE 1048, consisting of OS&Y gate valves on inlet and outlet and strainer on inlet with two positive-seating check valves and test cocks, and bypass with displacement-type water meter, valves, and double-check backflow preventer.

2.5 GATE VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Grinnell Supply Sales, Company, Grinnell Corporation.
 2. Nibco, Incorporated.
 3. Stockham Valves and Fittings, Incorporated.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Gate Valves (Up to and including 2 inches): Bronze body, bronze trim, rising stem, handwheel, inside screw, single wedge, or disc, solder, or threaded ends.
- C. Gate Valves(Over 2 inches): Iron body, bronze trim, rising stem, handwheel, OS&Y, single wedge, flanged ends.

2.6 GLOBE OR ANGLE VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 2. Nibco, Incorporated, Elkhart, IN (800) 642-5463.
 3. Stockham Valves and Fittings, Incorporated, Cullman, AL (800) 786-2542.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Up to 2 inches: Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable composition disc, solder, or screwed ends, with backseating capacity.
- C. Over 2 inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat, and disc.

2.7 BUTTERFLY VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 - 2. Nibco, Incorporated, Elkhart, IN (800) 642-5463.
 - 3. Stockham Valves and Fittings, Incorporated, Cullman, AL (800) 786-2542.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Cast or ductile iron body; chrome plated ductile iron disc, resilient replaceable EPDM seat; wafer, lug, or grooved ends; extended neck; handwheel and gear drive and integral indicating device; built-in tamper proof switch.

2.8 CHECK VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 - 2. Nibco, Incorporated, Elkhart, IN (800) 642-5463.
 - 3. Stockham Valves and Fittings, Incorporated, Cullman, AL (800) 786-2542.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Up to and including 2 inches: Bronze swing disc, solder, or screwed ends.
- C. Over 2 inches: Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer, flanged, or grooved ends.

2.9 DRAIN VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 - 2. Nibco, Incorporated, Elkhart, IN (800) 642-5463.
 - 3. Stockham Valves and Fittings, Incorporated, Cullman, AL (800) 786-2542.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Bronze compression stop with hose thread, nipple, and cap. Use hose thread, nipple, and cap only where piping to outside or other approved drainage facility is not readily available.
- C. Brass ball valve with cap and chain, 3/4 inch hose thread.
- D. Use hose thread, nipple, and cap.

2.10 ALARM CHECK VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 - 2. Viking Corporation, Hastings, MI (800) 968-9501.
 - 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.11 DRY PIPE VALVES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Grinnell Supply Sales, Company, Grinnell Corporation, Exeter, NH (603) 778-9200.
 2. The Viking Corporation, Hastings, MI (800) 968-9501.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.12 MAINTENANCE AIR COMPRESSOR

- A. If applicable, Subject to compliance with requirements, provide maintenance air compressor of one of the following manufacturers:
1. Reliable Fire Equipment Co, Mt. Vernon, NY (914) 668-3470.
 2. The Viking Corporation, Hastings, MI (800) 968-9501.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. If applicable, provide electric, air cooled, tank mounted, inlet filter silencer, fly wheel, belt guard, automatic start-stop control, tank, air dryer, motor with a thermal overload protection rated for continuous operation at the rated capacity, motor control with adjustable pressure switch set to start compressor at 75 percent of the normal pressure to prevent short cycling. Provide desiccator (air dryer) between compressor and dry pipe single stage oilless compressor, equip with check valve, centrifugal pressure and moisture unloader, and pressure switch. Exact location to be approved by Public Authorities and Contracting Officer.

2.13 SPRINKLERS

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Gem Sprinkler Company, Division of Grinnell Corporation, Exeter, NH (603) 778-9200.
 2. Reliable Automatic Sprinkler Company, Incorporated, Mt. Vernon, NY (914) 668-3470.
 3. The Viking Corporation Hastings, MI (800) 968-9501.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Subject to compliance with requirements, provide automatic sprinklers, with 1/2 inch, 17/32 inch orifice; or 0.64 inch (extra-large) orifice, unless noted otherwise. Sidewall sprinklers are not acceptable, unless noted otherwise.
1. Areas With Exposed Structure Above:
 - a. Standard Sprinklers: Upright sprinkler, bronze.
 - b. Extra Large Orifice Sprinklers: bronze.
 2. Areas With Finished Ceilings, Not Visible To The Public: Pendent sprinkler, chrome, with two-piece chrome escutcheon plate.
 3. Areas With Finished Ceilings 10 Feet Above Finish Floor or Higher, Visible to the Public: Pendent sprinkler, chrome, with two-piece chrome escutcheon plate.
 4. Areas With Finished Ceilings Below 10 Feet Above Finish Floor, Visible to the Public: Pendent sprinkler, chrome, with two-piece 1/2 inch recessed chrome escutcheon plate.

2.14 SLEEVES AND ESCUTCHEONS

- A. Sleeves through structural concrete members and sleeves for walls below grade and floors on grade shall be standard weight galvanized Schedule 40 steel pipe. Sleeves through other than structural components of the building shall be 20 gage galvanized sheet metal with lock seam joints. Sleeve shall

extend two inches past finished surface. USG Thermafiber safing insulation shall be installed between sleeve and pipe.

- B. Pipe escutcheon plates to be installed where exposed piping passes through walls, ceilings, and floors of building shall be minimum 20 gage steel, chrome.

2.15 ACCESSORIES

- A. Hangers and Supports: Provide hangers and supports as required by NFPA 13 and Public Authorities. Provide seismic bracing in accordance with NFPA 13, as required by state and local codes, and Public Authorities.
- B. Flushing Connections: Provide threaded, capped nipple or mechanical groove end cap on ends of cross mains. If nipple provided, diameter shall be same as pipe, but not larger than 2 inches.
- C. Auxiliary Drains:
 - 1. 5 gallons or greater: provide minimum 1 inch globe valve with hose adapter and cap.
 - 2. Less than 5 gallons: provide minimum 1 inch nipple and cap.
 - 3. All auxiliary drain facilities shall be placed to allow easy access.
- D. If piping or components of Inspector's test connection are modified as a result of this Work, then provide as required by Contractor.
- E. If inspector test valve and auxiliary drain valve are piped together then test drain assembly shall be an approved manufactured assembled unit. Subject to compliance with requirements, provide valves of one of the following manufacturers:
 - 1. "Test Master", by Victaulic, Easton, PA (610) 559-3300.
 - 2. Central Sprinkler Corp., Lansdale, PA (800) 523-6512.
 - 3. Globe Fire Sprinkler Corp., Standish, MI (800) 248-0278.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- F. Water Motor Alarm Gong: Provide water-operated alarm gong on exterior of building adjacent to sprinkler system riser. Electric alarm bell (gong) not permitted.
- G. Electric Bell: Provide 10 inch diameter electric bell on exterior of building locate as required by Public Authorities.
- H. Horn and Strobe: Provide horn and strobe on exterior of building locate as required by Public Authorities.
- I. Wet Sprinkler System Water Flow Detectors: Equip sprinkler system risers with double pole vane type flow detector, Model No. VSR-F, by Potter Electric Signal of St. Louis, Missouri, (800) 325-3936. Set adjustable delayed signal at 30 seconds. Connect to alarm system.
 - 1. Substitutions: Under provisions of Section 016000.
- J. Dry Sprinkler System Water Flow Detector: Equip Dry System risers with pressure activated flow detector by Potter Electric Signal of St. Louis, Missouri, (800) 325-3936. Connect to alarm system.
 - 1. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- K. Control Valve Supervisory Switches:
 - 1. Equip post indicator valves with tamper switches, Model No. PCVS, as manufactured by Potter Electric Signal of St. Louis, Missouri. Connect to alarm system.
 - 2. Equip outside screw and yoke valves with tamper switches, Model No. OSYSU-A2 as manufactured by Potter Electric Signal of St. Louis, Missouri. Connect to alarm system.
 - 3. All valves capable of controlling water supply shall have tamper switches. Connect to alarm system.

4. If control valve is located remote from store building, provide 3/4 inch conduit, with pull string, from remote location to nearest electrical room.
 5. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- L. Fire Department Connections: Fire Department connections in accordance with NFPA 13 and Public Authorities. Equip with threads/connections compatible with hoses utilized by the local fire department.
1. Drain: 3/4 inch automatic drip, piped to approved drainage location.
 2. Label: "Auto Sprinkler".
 3. Finish: Red enamel.
 4. Thread/Connection: NST, Storz, verify with Public Authorities.
- M. Wire Cage Sprinkler Guards: Fig. 6160, by Potter-Roemer or acceptable substitute.
1. Provide sprinkler guards on sprinkler pendants that are located below 8 feet above finished floor, except at semi-recessed sprinklers.
- N. Relief Valves: For gridded sprinkler systems, provide a relief valve not less than 1/4 inch size and set to operate at 175 psi or 10 psi in excess of the maximum system pressure, whichever is greater. Location of relief valves to be in accordance with NFPA 13.
- a. Valve: UL 1468, 400 psig (2760 kpa) rated, brass, pressure-regulating type, 90 degree angle pattern, female NPS inlet and male hose outlet. Design in accordance with NFPA 1963 and match local fire department threads.
- O. Fire pump bypass on electric pump fitted with butterfly valves and check valve.

2.16 ELECTRIC MOTOR DRIVER

- A. Motor: Squirrel cage induction type; in open drip proof NEMA MG-1 enclosure.
- B. Power: 480 volt, three phase, 60 Hz.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Coordinate work of this Section with other affected work and construction schedule.

- B. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- C. Remove scale and foreign material, from inside and outside, before assembly.
- D. Prepare piping connections to equipment with flanges or unions.
- E. Install system and equipment in accordance with manufacturer's instructions, and NFPA Standards.

3.3 INSTALLATION - BELOW GROUND PIPING

- A. Install piping and system components in accordance with NFPA 24. Verify that main feed from water supply source to building is as specified.
- B. Support barrel of pipe for entire length on compacted pipe bedding. Excavate for couplings, fittings, and valves.
- C. Lay pipe to lines and grades as required.
- D. Keep interior of pipe free from dirt and other foreign material as installation progresses. Plug open ends when work is stopped. Join lengths with couplings in accordance with pipe manufacturer's instructions. Join to fittings and valves that have rubber ring bells with same groove dimensions and tolerance as pipe.
- E. Provide valves and fittings as necessary.
- F. Install concrete thrust blocks as required. Place concrete between undisturbed soil with fittings anchored. Do not cover coupling flanges or other joints with concrete.

3.4 INSTALLATION - ABOVE GROUND PIPING

- A. Install piping in accordance with NFPA 13. Install sprinkler piping products in accordance with recognized industry practices to ensure that fire protection sprinkler piping complies with requirements and serves intended purposes.
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient. Use eccentric reducers to maintain top of pipe level. Slope piping and arrange systems to drain. Size drain piping as required to drain sprinkler system properly. Provide drain valves at main shut-off valves and low points of piping.
 - 1. Pitch piping as required in dry pipe systems. If applicable:
 - a. Dry pipe Branch lines: Slope 1/2 inch for every 10 feet.
 - b. Dry pipe Mains: Slope 1/4 inch for every 10 feet.
- C. Install piping to conserve building space. Do not interfere with use of building space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. All system components shall be concealed above ceilings where ceilings exist.
- G. Replace sprinklers having paint other than factory finish with new sprinklers. Cleaning and reuse of painted sprinklers is prohibited.
- H. Do not penetrate building structural members. Examine other work indicated on the Contract Documents and conditions at job site. Coordinate routing of work with other construction trades to avoid interference

with other installations. Do not cut building structural members, beams, joists, etc. for routing of sprinkler piping. In the event of conflicts, consult Contracting Officer, and their decision shall govern.

- I. Provide sleeves when penetrating floors and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required. Provide wall plates at all penetrations.
- J. Die cut screw joints with full cut standard taper pipe threads with non-toxic joint compound applied to male threads only. Recoat threads on galvanized pipe with galvanized coating.
- K. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
- L. Route piping and locate sprinklers as required to avoid building structure equipment, plumbing piping, heating and air conditioning piping, ductwork, lighting fixtures, electrical conduits and bus ducts, and similar work.
 - 1. Final location of lighting will have priority over final sprinkler locations.
- M. Provide pipe offsets as required to complete installation. Modify shop prefabricated piping, pipe hangers, and other components as required to fit the job site conditions.
- N. Shop drill and weld weld-o-lets on piping.
- O. Conceal piping in chases, walls, furred spaces, and above ceiling in areas with dropped ceilings.
- P. If piping or components of Inspector's Test Connection are modified as a result of this Work, then:
 - 1. Provide one inspector's test valve for each system at the most remote point of the system along the exterior wall, piped to non-public areas.
 - 2. Install inspector's test valves at five feet (minimum) to seven feet (maximum) above finish floor to facilitate bi-monthly tests.
 - 3. Coordinate test valve locations with Contracting Officer.
 - 4. Test connection shall discharge at location approved by Contracting Officer.
 - 5. Outlet shall have same orifice as sprinklers.
- Q. Piping shall maintain clearance from electrical equipment as required by NEC and Public Authorities. Drains and Inspector's test connection shall not be piped into or through electrical rooms/areas.
- R. Sprinkler piping that passes through unheated spaces in or under structures and are exposed to freezing shall be protected from freezing as indicated or in accordance with applicable methods in NFPA 13.
- S. Provide valves as required to comply with NFPA Standards and requirements of Public Authorities. Provide backflow prevention devices, check valves, and drains where required by Public Authorities.
- T. Make reductions in pipe sizes with one-piece reducing fittings. Bushings are not acceptable. Use flanged fittings at base of risers.
- U. Contractor shall notify Contracting Officer one week prior to any sprinkler system shutdown or work performed.
- V. All system components (i.e., pipe, fittings, supports, and accessories), except sprinklers, not concealed shall be prepared for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Apply masking tape or paper cover to ensure sprinkler do not receive field paint finish. Remove tape or paper after painting.
- W. Locate sprinklers in suspended ceiling tiles along the centerline of the two foot dimension, and at one foot increments from the edge in the four foot dimension direction. Provide piping offsets as necessary to locate sprinklers.
- X. Dry Pendent Sprinklers: Install concealed above ceilings where ceilings are used.

- Y. Anti-freeze Systems (where required): Install "Loop", concealed, above ceilings where ceilings are used, or as required by Public Authorities, and Contracting Officer.
- Z. If applicable, install maintenance air compressor adjacent to dry pipe riser. Connect 1/4 inch compressor outlet with the 1/4 inch pipe through a shutoff valve to the system side of dry pipe valve. Adjust pressure switch to the required setting.
- AA. Locate wet pipe (and dry pipe if required) inspector test valves and associated sight glasses at remote ends of system, in accessible locations. Provide drain pipes as required by Contracting Officer.

3.5 PROTECTION OF WORK

- A. Protect work from danger of freezing, breakage, dirt, foreign materials, etc., and replace work so damaged. Use every precaution to protect work of others.

3.6 IDENTIFICATION

- A. Apply signs to control, drain, test and alarm valves, etc., to identify their purposes and functions. Provide lettering sizes and styles selected by Contracting Officer from NFPA's suggested styles.
- B. Stencil riser/zone numbers on risers.
- C. Provide hydraulic placard for each sprinkler system in accordance with NFPA 13.

3.7 CLEANING AND FLUSHING

- A. Prior to connecting overhead system piping to underground supply system piping, flush underground supply system piping per NFPA 13 and 24.

3.8 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Procedures for field inspection and testing of installation.
- B. Site Tests - Leaks from System:
 - 1. Contractor shall identify to Contracting Officer any leaks or damage that occur within the system as a result of testing. Contractor shall take necessary precautions to limit any potential damage. Corrective action shall be performed at Contractors expense.
- C. Site Tests - Above Ground Fire Protection Piping:
 - 1. Test system pressure piping for leakage as required by and in presence of Public Authorities and Contracting Officer Test to consist of holding the test pressure at the high end for a period of two hours. Test pressure: 200 psi or 50 psi over normal operating pressure, whichever is greater. Conduct test in accordance with NFPA 13. Send completed copy of the material and test certificate to Contracting Officer.
 - 2. All required tests shall be witnessed by Public Authorities and Contracting Officer.
 - 3. Inspection of welds, and/or verification of welder's qualifications may be required by Public Authorities. Contractor shall comply with all requirements of Public Authorities, including but not limited to :
 - a. Provide written documentation of welder's qualifications and certification.
 - b. Stamp imprint of welder's identification adjacent to all welds.
 - c. Provide provisions for, schedule and conduct inspection of all welds . Inspection shall be scheduled at project site, with pipe at grade level, prior to installation.

D. Site Tests - Under Ground Fire Protection Piping:

1. Test pressure piping for leakage in presence of Public Authorities and Contracting Officer. Test to consist of holding the test pressure in each section of line tested for a period of two hours. Test pressure at the high end of each test section shall be 200 psi or 50 psi over normal operating pressure whichever is greater. Conduct test in accordance with NFPA 24.
2. Flush underground mains and lead-in connections thoroughly before connection is made to above ground system piping to remove foreign material. Minimum flow rate shall not be less than the maximum water flow demand rate of the system and not less than necessary to provide a velocity of 10 feet per second. Continue flushing for sufficient time to ensure thorough cleaning. Provide proper disposal of water from flushing operation.
3. All required tests shall be witnessed by Public Authorities and Contracting Officer.
4. Contractor shall identify to Contracting Officer any leaks or damage that occur within the system as a result of testing. Contractor shall take necessary precautions to limit any potential damage. Corrective action shall be performed at Contractors expense

END OF SECTION

SECTION 220500

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Dielectric fittings.
 - 3. Mechanical sleeve seals.
 - 4. Sleeves.
 - 5. Escutcheons.
 - 6. Grout.
 - 7. Equipment installation requirements common to equipment sections.
 - 8. Plumbing identification.
 - 9. Concrete bases.
 - 10. 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, crawlspace, 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 B32, lead-free alloys. Include water-flushable flux according to ASTM B813.
- 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 D2235.
 - 2. CPVC Piping: ASTM F493.
 - 3. PVC Piping: ASTM D2564. Include primer according to ASTM F656.
 - 4. PVC to ABS Piping Transition: ASTM D3138.

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 or NBR 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 or Stainless steel. Include two for each sealing element.
- D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating or 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 A53, 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 D1785, 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.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - 1. Finish: Polished chrome-plated.

2.7 GROUT

- A. Description: ASTM C1107, Grade B, non-shrink, and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, non-staining, 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 square.
 - 2. Metal Tags: Brass, Aluminum, or Stainless Steel with stamped letters; tag size minimum 1-1/2 inches 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 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 wide by 4 mil thick, manufactured for direct burial service.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION

- A. Refer to Division 1 Section "Cutting and Patching" and Division 2 Section "Selective Structure Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - 4. Equipment to Be Removed and 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 7 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 B813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B32.
- 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 F402, for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. ABS Piping: Join according to ASTM D2235 and ASTM D2661 Appendixes.
 - 3. CPVC Piping: Join according to ASTM D2846/D2846M Appendix.
 - 4. PVC Pressure Piping: Join schedule number ASTM D1785, PVC pipe and PVC socket fittings according to ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D2855.
 - 5. PVC Nonpressure Piping: Join according to ASTM D2855.
 - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D3138 Appendix.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D3139.
- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D3212.
- L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D2657.
 - 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 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 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 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 along each run. Reduce intervals to 25 feet 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, 28-day compressive-strength concrete and reinforcement as specified in Section 033000 - Cast-in-Place Concrete.

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 5 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

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.
- B. 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 (INCHES)	THICKNESS (INCHES)
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 (INCHES)	THICKNESS (INCHES)
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

SECTION 221000

PLUMBING PIPING AND PUMPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe and pipe fittings.
 - 2. Valves.
 - 3. Sanitary sewer piping system.
 - 4. Domestic water piping.
 - 5. Backflow preventers.
 - 6. Cleanouts.
 - 7. Trap Primers
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American National Standards Institute, Inc. (ANSI):
 - 1. ANSI B31.9 - Building Service Piping.
 - 2. ANSI B31.2 and ANSI/AGA LC 1a - Fuel Gas Piping.
- B. American Society of Mechanical Engineers (ASME):
 - 1. ASME Sec. 9 - Welding and Brazing Qualifications.
 - 2. ASME B16.1-1989 - Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.
 - 3. ASME B16.3-1992- Malleable Iron Threaded Fittings.
 - 4. ASME B16.4-1992- Cast Iron Threaded Fittings Class 125 and 250.
 - 5. ASME B16.18-1984 - Cast Bronze Solder-Joint Pressure Fittings.
 - 6. ASME B16.22-1995- Wrought Copper and Bronze Solder-Joint Pressure Fittings
 - 7. ASME B16.23-1992- Cast Copper Alloy Solder-Joint Drainage Fittings - DWV.
 - 8. ASME B16.26-1988- Cast Bronze Fittings for Flared Copper Tubes.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A47-99 - Ferritic Malleable Iron Castings.
 - 2. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
 - 3. ASTM A74 -98- Cast Iron Soil Pipe and Fittings.
 - 4. ASTM B32-96 - Solder Metal.
 - 5. ASTM B42-98- Seamless Copper Pipe, Standard Sizes.
 - 6. ASTM B75-99 - Seamless Copper Tube.
 - 7. ASTM B88-99 - Seamless Copper Water Tube.
 - 8. ASTM B251-99 - Wrought Seamless Copper and Copper-Alloy Tube.
 - 9. ASTM C564-95a - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
 - 10. ASTM D2447-99 - Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
- D. American Welding Society (AWS):
 - 1. AWS A5.8-92 - Specification for Filler Metals for Brazing and Braze Welding.
- E. Cast Iron Soil Pipe Institute (CISPI):
 - 1. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.

221000 - 1

2. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 1. Product Data: Data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 1. Project Record Documents: Accurately record the following:
 - a. Actual locations of valves.
 2. Operation and Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Do not install underground piping when bedding is wet or frozen.

PART 2 - PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets, or oakum and lead.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: ASTM C564, neoprene gasket system stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
 - 1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.
 - 2. Shall not be allowed in return air plenums or any other area not allowed by code.

2.2 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: ASTM C564, neoprene gasket system
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
 - 1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.

2.3 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Pipe sizes less than 3 inch 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. Joints: ASTM B32, Solder, Grade 95TA, 100 percent lead free solder.
 - 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 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.

2.4 WATER PIPING, ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ASME B16.18, cast bronze, or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, solder, Grade 95TA. 100 percent lead free solder.

2.5 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches and Under:

1. Copper tube and pipe: 150 psig bronze unions with soldered joints.
- B. Pipe Size Over 2 Inches:
 1. Copper tube and pipe: 150 psig slip-on bronze flanges: 1/16 inch thick performed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.6 GATE VALVES

- A. Manufacturers:
 1. Grinnell Corporation.
 2. Other acceptable manufacturers offering equivalent products.
 - a. Milwaukee Valve Company.
 - b. Nibco Incorporated.
 - c. Red-White Valve Corporation.
- B. Over 2 Inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, single wedge, flanged ends.

2.7 GLOBE VALVES (Balancing Valve)

- A. Manufacturers:
 1. Grinnell Corporation.
 2. Other acceptable manufacturers offering equivalent products.
 - a. Milwaukee Valve Company.
 - b. Nibco Incorporated.
 - c. Red-White Valve Corporation.
- B. Up to and including 2 Inches: Bronze body, bronze trim, rising stem, handwheel, inside screw, renewable composition disc, solder or screwed ends, with back seating capacity (repackable under pressure).
- C. Over 2 Inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.8 BALL VALVES

- A. Manufacturers:
 1. Grinnell Corporation.
 2. Other acceptable manufacturers offering equivalent products.
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - c. Red-White Valve Corporation.
 - d. Nibco
 - e. Apollo
- B. Up to 2 Inches: Bronze two piece body, stainless or chrome plated steel ball, Teflon seats and stuffing box ring, lever handle solder or threaded ends. Note: Three piece full port ball valves are recommended up to 3 inches. Also recommended to add option for extended handle stem for insulated pipes
- C. Over 2 Inches: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, flanged.

2.9 SWING CHECK VALVES

- A. Manufacturers:
 - 1. Grinnell Corp.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a. Hammond Valve.
 - b. Nibco, Incorporated.
 - c. Stockham Valves & Fittings.
- B. Valve should have a provision for regrinding without removal of valve from line.
- C. Up to and including 2 Inches: All bronze, 125 psig swp at 350 degrees F.
- D. Over 2 Inches: Flanged iron body, bronze mounted, 125 psig swp at 450 degrees F

2.10 WATER PRESSURE REDUCING VALVES

- A. Manufacturers:
 - 1. Armstrong Pumps, Inc, N. Tonawanda, NY (716) 693-8813.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a. Bell & Gossett.
 - b. Watts Regulator Company.
 - c. Zurn Industries, Incorporated.
- B. Construction
 - 1. Up to 2 Inches: Bronze body construction with bronze working parts.
 - a. Diaphragm operated with anti-siphon check valve.
 - b. Stainless steel inlet strainer.
 - c. Built-in thermal expansion by pass check valve.
 - 2. Over 2 Inches: Valve shall maintain constant downstream pressure regardless of varying inlet pressure.
 - a. Hydraulically operated, pilot control, diaphragm type globe valve.
 - b. Main valve shall have single removable seat and resilient disc.
 - c. Stem guided at both ends by bearing in valve cover and internal bearing in valve seat.
 - d. Direct acting pilot control, adjustable, spring loaded, normally open diaphragm valve.
 - e. 125 Class - 175 psig max pressure rating with water temp rating up to 180 degree F max.
 - f. Main valve body and cover - Cast iron ASTM A48
 - g. Main valve trim - Bronze ASTM B61
 - h. Pilot Control system - Cast bronze ASTM B62 with 303 stainless steel trim.

2.11 RELIEF VALVES

- A. Manufacturers:
 - 1. Conbraco Industries, Incorporated.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a. IMI Cash Valve, Incorporated.
 - b. Watts Regulator Company.
 - c. Bell & Gossett.
- B. 2 inches and smaller:
 - 1. Heavy bronze body construction, Teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.
 - 2. Fluid shall not discharge into spring chamber.
 - 3. Valve shall have low blow down differential.
 - 4. Valve seat and all working parts to be constructed of non-ferrous material.

- 5. Working Pressure - 125 psig at 250 degrees F.

2.12 STRAINERS

- A. Manufacturers:
 - 1. Armstrong International.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a. Grinnell Corporation.
 - b. Honeywell.
 - c. Bell & Gossett.
- B. Size 2 inch and Under: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

2.13 BACKFLOW PREVENTERS

- A. Manufacturers:
 - 1. Watts, of following types:
 - a. Reduced Pressure Type: Model No. 909.
 - b. Double Detector Check: ; 909 RPDA.
 - c. Verify acceptable model with local codes.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a. Watts
 - b. Wilkins.
 - c. Zurn
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions permitted.
- C. Unit shall operate completely automatic and be fitted with tight closing shutoff valves and test cocks at each end.
- D. All parts must be replaceable without removing unit from line.
- E. Total pressure drop through complete backflow preventer shall not exceed 10 psi at rated flow.
- F. Backflow preventer assembly shall include strainer basket upstream of the backflow preventer.

2.14 CLEANOUTS:

- A. Manufacturers:
 - 1. Josam.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a. Zurn.
 - b. Wade.
 - c. J. R. Smith.
 - d. Ancon.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions permitted.

2.15 TRAP PRIMER:

- A. Manufacturers:

1. Jay R. Smith Figure 2698.
- B. Water saver trap primer with chrome 1-1/4 inch P-trap and wall supply.
- C. Provide supply 1/2 inch type K copper, with no joints, from wall supply to floor drain as per Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install expansion loops in piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Provide access where valves and equipment are not exposed. Coordinate size and location of access doors with Section 083113.
- I. Establish elevations of buried piping outside the building to ensure not less than 12 inches deep nor less than 6 inches below frost line. Maintain minimum cover per local code.

- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer after welding.
- K. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Section 099100.
- L. Excavate in accordance with Sections 312300 for work of this Section.
- M. Backfill in accordance with Sections 312300 for work of this Section.
- N. Install bell and spigot pipe with bell end upstream.
- O. Install valves with stems upright or horizontal, not inverted.
- P. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

3.4 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions on all bypasses. Install valves and unions ahead of all traps & strainers and at all connections to equipment to facilitate replacement and removal. All unions are to be accessible.
- C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- D. Install gate valves for 4 inches and larger pipe or butterfly valves, balls valves for 3 inches and smaller pipe for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install globe or ball valves for throttling, bypass, or manual flow control services.
- F. Provide spring loaded check valves on discharge of water pumps.

3.5 CONSTRUCTION

- A. Site Tolerances:
 - 1. Oil or Waste
 - a. System Component - Main or Branch
 - b. 1 inch fall in 4 feet
 - c. Direction of fall is the direction of flow.
 - 2. Roof Drain & Parking Drain
 - a. System Component - Main or Branch
 - b. 1 inch fall in 8 feet
 - c. Direction of fall is the direction of flow.
 - 3. Domestic Water
 - a. System Component - Main or Branch
 - b. 1 inch fall in 60 feet
 - c. Direction of fall is the direction of flow.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 0.3 mg/L.

3.7 SERVICE CONNECTIONS

- A. Connect to existing Sanitary and Storm Sewer Services and extend to main. Before commencing work check invert elevations required for sewer connections, confirm inverts.
- B. Connect to existing Domestic Water Service and extend to main.
 - 1. Provide reduced pressure double check Backflow Preventer when required by local authority having jurisdiction.
 - 2. Provide Water Meter when required by local authority.
- C. Connect to existing gas meter and regulators. Gas service distribution piping to have initial minimum pressure of approximately 8 inch wc. Coordinate with local utility for available pressure and installation requirements.

END OF SECTION

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

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 B88, 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 B88, 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 2, lead-free alloys. Include water-flushable flux according to ASTM B813.
- 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 F1545.
 - 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 A53/A53M, 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 C1107, 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 B813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B828 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.
 - 3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
 - 4. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish] [cast brass with rough-brass finish.
 - 5. Bare Piping in Equipment Rooms: One piece, cast brass.
 - 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 7 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 B88, 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 B88, 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 B88, 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 B88, 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. Drain valves.
 - 8. Water hammer arresters.
 - 9. 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:
 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.
 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 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.

2.7 WATER HAMMER ARRESTERS

A. Water Hammer Arresters:

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.

2.8 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.
 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

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.
- 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 vent stack.
- 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 D 2661.
- L. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

- 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

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.

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- e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Zurn Plumbing Products Group; Light Commercial Operation.
 - h. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASME A112.36.2M for adjustable housing cleanout.
 - 3. Size: Same as connected branch.
 - 4. Closure: Brass plug with straight threads and gasket OR cast-iron plug.
 - 5. Top Loading Classification: Medium Duty.
 - 6. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
- C. Cast-Iron Wall Cleanouts:
- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASME A112.36.2M. Include wall access.
 - 3. Size: Same as connected drainage piping.
 - 4. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 - 5. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

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.
 - 9. Top Shape: Square.
 - 10. Top Loading Classification: 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.

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 calking 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 work stops.

END OF SECTION

SECTION 223300

ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Commercial electric water heaters.
- 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.
 - a. Product Data: Indicate rated capacity, weight, specialties, accessories, dimensions, required clearances, piping and wiring connections.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service location name, address, and telephone number.

1.3 REFERENCES

- A. NFPA 70 - National Electric Code.

1.4 QUALITY ASSURANCE

- A. Provide water heaters that are UL listed and labeled.
- B. Provide water heaters listed with the California Energy Commission.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Energy Efficiency:
 - 1. Minimum energy efficiency: Comply with ASHRAE 90.1.
 - a. Electric water heaters: Provide instantaneous point-of-use electric water heaters for lavatories and hand sinks located away from the domestic hot water mains; use electric tank type water heaters, unless gas fired type is approved by USPS Contracting Officer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Commercial Electric Water Heaters: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. A.O. Smith Water Products Company, Irving, TX (800) 527-1953.
 - 2. Lochinvar Corporation, Nashville, TN (615) 889-8900.
 - 3. Ruud Water Heater, Montgomery, AL (334) 260-1500.
 - 4. State Industries Incorporated, Ashland City, TN (800) 365-8170.
- B. Instantaneous Point-of-Use Electric Water Heaters: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Chronomite Laboratories, Incorporated, Carson, CA (800) 447-4963.
 - 2. Eemax, Incorporated, Monroe, CT (800) 543-6163.
 - 3. PVI Industries, Incorporated, Fort Worth, TX (800) 433-5654.
- C. Refer to Specification Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 COMMERCIAL ELECTRIC WATER HEATERS

- A. Model, Capacity, and Electrical Requirements: Indicated on Drawings.
- B. Type: Factory-assembled and wired, electric, vertical storage, 150 psi working pressure.
- C. Tank: Glass lined welded steel; 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.
- D. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.
- E. Accessories: Brass water connections and dip tube, drain valve, high-density magnesium anode, and ASME rated temperature and pressure relief valve.

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'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 INSTALLATION

- A. Set and connect units in accordance with manufacturer's published instructions at locations indicated on Drawings.
- B. Install units plumb and level, rigidly connected to adjacent construction.
- C. Maintain manufacturer's recommended clearances. Orient unit for clear access to controls and devices requiring servicing.
- D. Install and connect units in conformance with NFPA 70.
- E. Connect hot and cold water piping to units with shutoff valve, check valve, and union. Extend relief valve to location indicated on Drawings.
- F. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Test and adjust unit operation and adjust controls as specified in Section 230593.

END OF SECTION

SECTION 224000
PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Faucets for lavatories and sinks.
 - 2. Flushometers.
 - 3. Toilet seats.
 - 4. Protective shielding guards.
 - 5. Fixture supports.
 - 6. Disposers.
 - 7. Water closets.
 - 8. Lavatories.
 - 9. Kitchen sinks.
 - 10. Service sinks.
- B. Related Sections include the following:
 - 1. Division 22 Section "Emergency Plumbing Fixtures."
 - 2. Division 22 Section "Drinking Fountains and Water Coolers."

1.2 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. FRP: Fiberglass-reinforced plastic.
- D. PMMA: Polymethyl methacrylate (acrylic) plastic.
- E. PVC: Polyvinyl chloride plastic.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Documentation indicating flow and water consumption requirements.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities and ADA/USPS Handbook RE-4 for plumbing fixtures for people with disabilities.

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- C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- F. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
 - 2. Vitreous-China Fixtures: ASME A112.19.2M.
 - 3. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
- G. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
 - 1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
 - 2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
 - 3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
 - 4. Faucets: ASME A112.18.1.
 - 5. Hose-Connection Vacuum Breakers: ASSE 1011.
 - 6. Hose-Coupling Threads: ASME B1.20.7.
 - 7. NSF Potable-Water Materials: NSF 61.
 - 8. Pipe Threads: ASME B1.20.1.
 - 9. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 - 10. Supply Fittings: ASME A112.18.1.
 - 11. Brass Waste Fittings: ASME A112.18.2.
- H. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
 - 1. Atmospheric Vacuum Breakers: ASSE 1001.
 - 2. Brass and Copper Supplies: ASME A112.18.1.
 - 3. Manual-Operation Flushometers: ASSE 1037.
 - 4. Plastic Tubular Fittings: ASTM F 409.
 - 5. Brass Waste Fittings: ASME A112.18.2.
- I. Comply with the following applicable standards and other requirements specified for miscellaneous components:
 - 1. Disposers: ASSE 1008 and UL 430.
 - 2. Flexible Water Connectors: ASME A112.18.6.
 - 3. Grab Bars: ASTM F 446.
 - 4. Hose-Coupling Threads: ASME B1.20.7.
 - 5. Off-Floor Fixture Supports: ASME A112.6.1M.
 - 6. Pipe Threads: ASME B1.20.1.
 - 7. Plastic Toilet Seats: ANSI Z124.5.
 - 8. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 - PRODUCTS

2.1 LAVATORY FAUCETS

- A. Lavatory Faucets:
 - 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. American Standard Companies, Inc.
 - b. Bradley Corporation.
 - c. Chicago Faucets.

- d. Delta Faucet Company.
 - e. Elkay Manufacturing Co.
 - f. Just Manufacturing Company.
 - g. Kohler Co.
 - h. Royal Brass Mfg. Co.
 - i. Speakman Company.
 - j. T & S Brass and Bronze Works, Inc.
 - k. Zurn Plumbing Products Group; Commercial Brass Operation.
2. Description: Single-handle-control mixing valve. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
- a. Body Material: Commercial, solid brass.
 - b. Finish: Polished chrome plate.
 - c. Maximum Flow Rate: 0.5 gpm.
 - d. Centers: 4 inches or Single hole as required.
 - e. Mounting: Deck, exposed.
 - f. Inlet(s): NPS 3/8 tubing, with NPS 1/2 male adaptor.
 - g. Spout: Rigid type.
 - h. Spout Outlet: Aerator, 0.5 gpm.
 - i. Drain: Grid.

2.2 SINK FAUCETS

A. Sink Faucets:

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. American Standard Companies, Inc.
 - b. Bradley Corporation.
 - c. Broadway Collection.
 - d. Chicago Faucets.
 - e. Delta Faucet Company.
 - f. Elkay Manufacturing Co.
 - g. Just Manufacturing Company.
 - h. Kohler Co.
 - i. Royal Brass Mfg. Co.
 - j. Sayco; a Briggs Plumbing Products, Inc. Company.
 - k. Speakman Company.
 - l. T & S Brass and Bronze Works, Inc.
 - m. Zurn Plumbing Products Group; Commercial Brass Operation.
2. Description: Kitchen faucet without spray. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
 - a. Body Material: Commercial, solid brass.
 - b. Finish: Polished chrome plate.
 - c. Maximum Flow Rate: 1.5 gpm.
 - d. Mixing Valve: Single control.
 - e. Centers: 4 inches or 8 inches, as required.
 - f. Mounting: Deck], exposed.
 - g. Handle(s): Lever.
 - h. Inlet(s): NPS 3/8 tubing with NPS 1/2 male adapter.
 - i. Spout Type: Swing, solid brass.
 - j. Spout Outlet: Aerator].

2.3 FLUSHOMETERS

A. Flushometers:

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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. Coyne & Delany Co.
 - b. Sloan Valve Company.
 - c. Zurn Plumbing Products Group; Commercial Brass Operation.
 - d. TOTO USA, Inc.
2. Description: Flushometer for urinal and water-closet-type fixture. Include brass body with corrosion-resistant internal components, non-hold-open feature, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
 - a. Internal Design: Diaphragm operation.
 - b. Style: Exposed.
 - c. Stops: Integral screwdriver stops.
 - d. Inlet Size: NPS 3/4 for urinals, NPS 1 for water closets.
 - e. Trip Mechanism: Oscillating, lever-handle actuator.
 - f. Consumption: 0.5 gal./flush for urinals, 1.28 gal./flush for water closets.
 - g. Tailpiece Size: NPS 3/4 for urinals, NPS 1-1/4 for water closets length to top of bowl.

2.4 TOILET SEATS

A. Toilet Seats:

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. Bemis Manufacturing Company.
 - b. Centoco Manufacturing Corp.
 - c. Church Seats.
 - d. Olsonite Corp.
2. Description: Toilet seat for water-closet-type fixture.
 - a. Material: Molded, solid plastic with antimicrobial agent.
 - b. Configuration: Open front without cover.
 - c. Size: Elongated.
 - d. Hinge Type: SS, self-sustaining.
 - e. Class: Standard commercial.
 - f. Color: White.

2.5 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

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. Engineered Brass Co.
 - b. Insul-Tect Products Co.; a Subsidiary of MVG Molded Products.
 - c. McGuire Manufacturing Co., Inc.
 - d. Plumberex Specialty Products Inc.
 - e. TCI Products.
 - f. TRUEBRO, Inc.
 - g. Zurn Plumbing Products Group; Tubular Brass Plumbing Products Operation.
2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

2.6 FIXTURE SUPPORTS

- A. 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:

1. Josam Company.
2. MIFAB Manufacturing Inc.
3. Smith, Jay R. Mfg. Co.
4. Tyler Pipe; Wade Div.
5. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
6. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Water-Closet Supports:

1. Description: Combination carrier designed for accessible mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

C. Lavatory Supports:

1. Description: Type lavatory carrier with concealed arms and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
2. Accessible-Fixture Support: Include rectangular steel uprights.

2.7 DISPOSERS

A. Disposers:

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. Franke Consumer Products, Inc.; Kitchen Systems Div.
 - b. General Electric Company.
 - c. In-Sink-Erator; a div. of Emerson Electric Co.
 - d. KitchenAid.
 - e. Maytag Co.
2. Description: Batch-feed, food-waste disposer. Include reset button; wall switch; corrosion-resistant chamber with jam-resistant, cutlery- or stainless-steel grinder or shredder; NPS 1-1/2 outlet; quick-mounting, stainless-steel sink flange; antisplash guard; and combination cover/stopper.
 - a. Type: Batch-feed, stainless steel construction with lifetime lubrication and replaceable hammers and rind kicker.
 - b. Shock absorbing mounting
 - c. Model: Sound-insulated chamber and stainless-steel outer shell.
 - d. Motor: 115-V ac, 1725 rpm, 1 hp with overload protection.

2.8 WATER CLOSETS

A. Water Closets:

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. American Standard Companies, Inc.
 - b. Briggs Plumbing Products, Inc.
 - c. Crane Plumbing, L.L.C./Fiat Products.
 - d. Eljer.
 - e. Gerber Plumbing Fixtures LLC.
 - f. Kohler Co.
 - g. TOTO USA, Inc.
2. Description: Accessible, floor-mounting, floor-outlet, vitreous-china fixture designed for flushometer valve operation.
3. Supply: NPS 1 chrome-plated brass or copper with screwdriver stop.
4. Style: Flushometer valve.
 - a. Bowl Type: Elongated, siphon-jet design. Include bolt caps matching fixture.

- b. Height: Standard or Accessible as indicated on drawings.
 - c. Design Consumption: 1.28 gal./flush.
 - d. Color: White.
- 5. Flushometer: 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 valve. Manufacturer:
 - a. Sloan; #111-1.5FYB.
 - b. Zurn: #Z 6000 WS 1 YB.
- 6. Toilet Seat: Solid white plastic, open front, extended back, brass bolts, bolt caps, without cover. Manufacturer:
 - a. Beneke: #533.
 - b. Church: #5321.112.
 - c. Kohler: #k-4670-C.

2.9 URINALS

A. Urinals:

- 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. American Standard Companies, Inc.
 - b. Briggs Plumbing Products, Inc.
 - c. Crane Plumbing, L.L.C./Fiat Products.
 - d. Eljer.
 - e. Kohler Co.
 - f. TOTO USA, Inc.
- 2. Description: Accessible, wall-mounting, back-outlet, vitreous-china fixture designed for flushometer valve operation.
 - a. Type: Siphon jet.
 - b. Strainer or Trapway: Open trapway with integral trap. Stainless steel strainer
 - c. Design Consumption: 0.5 gal./flush.
 - d. Color: White.
 - e. Supply Spud Size: NPS 3/4.
 - f. Outlet Size: NPS 3.
 - g. Flushometer:
 - h. Fixture Support: Urinal carrier.

2.10 LAVATORIES

A. Lavatories:

- 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. American Standard Companies, Inc.
 - b. Eljer.
 - c. Kohler Co.
 - d. Briggs Plumbing Products, Inc.
 - e. Crane Plumbing, L.L.C./Fiat Products.
 - f. Eljer.
 - g. Gerber Plumbing Fixtures LLC.
 - h. TOTO USA, Inc.
- 2. Description: Accessible, wall fixture.
 - a. Type: With back.
 - b. Size: 20 by 18 inches minimum, rectangular.
 - c. Faucet Hole Punching: Three holes, 4-inch centers.
 - d. Faucet Hole Location: Top.
 - e. Color: White.
 - f. Faucet: Lavatory with grid drain.

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- g. Supplies: NPS 3/8 chrome-plated copper with stops.
- h. Protective Shielding Guard(s): Where designated.
- i. Fixture Support: Lavatory concealed arm carrier.

2.11 KITCHEN SINKS

A. Kitchen Sinks:

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. Dayton Products, Inc.
 - b. Elkay Manufacturing Co.
 - c. Franke Consumer Products, Inc., Kitchen Systems Div.
 - d. Just Manufacturing Company.
 - e. Kohler Co.
 - f. Moen, Inc.
 - g. Revere Sink.
 - h. Sterling Plumbing Group, Inc.
2. Description: One-compartment, counter-mounting, stainless-steel kitchen sink.
 - a. Overall Dimensions: 25 x 22 x 8.
 - b. Metal Thickness: 0.050 inch
 - c. Bowl:
 - 1) Drain: 3-1/2-inch crumb cup.
 - 2) Location: Centered in bowl.
 - d. Sink Faucet:
 - e. Supplies: NPS 1/2 chrome-plated copper with stops.
 - f. Drain Piping: NPS 1-1/2 chrome-plated, cast-brass P-trap; 0.045-inch- thick tubular brass waste to wall; continuous waste; and wall escutcheon(s).
 - g. Disposer: As designated.

2.12 SERVICE SINKS

A. Service Sinks:

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. American Standard Companies, Inc.
 - b. Commercial Enameling Company.
 - c. Eljer.
 - d. Kohler Co.
 - e. Crane Plumbing, L.L.C./Fiat Products.
 - f. Eljer.
 - g. Kohler Co.
2. Description: Trap-standard- and wall-mounting, enameled, cast-iron fixture with roll-rim with back and stainless steel rim guard on front and sides.
 - a. Size: 22 by 18 inches.
 - b. Color: White.
 - c. Faucet: Service sink faucet with vacuum breaker, adjustable wall brace, pail hook, integral stops, 3/4-inch hose thread on spout.
 - d. Drain: Grid with NPS 3 outlet.
 - e. Trap Standard: NPS 3 enameled, cast iron with cleanout and floor flange.
 - f. Fixture Support: Service Sink wall support.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-mounting fixtures with tubular waste piping attached to supports.
- F. Install fixtures level and plumb according to roughing-in drawings.
- G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
- H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- I. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- J. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- K. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
- L. Install toilet seats on water closets.
- M. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- N. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- O. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- P. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
 - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- Q. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.
- R. Install escutcheons at piping wall and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."
- S. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
- E. Install fresh batteries in sensor-operated mechanisms.

3.4 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 230500

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic mechanical methods.
 - 2. Supports and anchors.
 - 3. Motors.
 - 4. Mechanical identification.
 - 5. Vibration isolation.
 - 6. 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. Section 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
- B. Plumbing Piping - DWV:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or carbon steel, adjustable swivel, split ring.
 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 7. Vertical Support: Steel riser clamp.
 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or carbon steel, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
 5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
 6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
 8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.

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10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

D. See Hanger and Support schedule at end of this Section.

2.2 MOTORS

- A. Electric motors shall be new NEMA Standard, sized and designed to operate at full load and full speed continuously 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, exhaust fans, pumps, etc.
- D. High 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 MINIMUM FULL LOAD EFF.
3.....	1750.....	86.5
5.....	1750.....	86.5

- E. Motor sound power levels shall not be greater than recommended in NEMA MG 1-12.49.
- F. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned or balanced.
- G. Motor Characteristics:
 1. 120V/1/60 Hz: Capacitor start, open drip-proof type, ball bearing, rated 40 C. continuous rise.
 2. 460/3/60 Hz: NEMA B, normal starting torque, single speed, squirrel-cage type, open drip-proof, rated 40 C continuous rise, with ball bearings rated for B-10 life of 100,000 hours and fitted with grease fittings and relief ports. Provide motors with aluminum end brackets with steel inserts in bearing cavities.
- H. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 1. GE
 2. Other acceptable manufacturers offering equivalent products.
 - a. Lincoln
 - b. Reliance
 - c. Louis Alis
- 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.
- 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.
- 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.

2.3 MECHANICAL IDENTIFICATION

- A. Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.
- B. Tags
 1. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches square.
 2. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches with grommet and self-locking nylon ties.
 3. 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.
 4. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.4 VIBRATION ISOLATION

- A. Type 1: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
- B. Type 2: Open spring mount with stiff springs (horizontal stiffness equal to vertical stiffness).
- C. Type 3: Open spring mount with stiff springs, heavy mounting frame, and limit stop.
- D. Type 4: Closed spring mount with stiff springs and limit stop.
- E. Type 5: Closed spring hanger with acoustic washer.
- F. Type 6: Closed spring hanger with one inch thick acoustic isolator.
- G. Type 7: Elastomer mount with threaded insert and hold down holes.
- H. Type 8: Neoprene jacketed pre-compressed molded glass fiber.

- I. Type 9: Rubber waffle pads, 30 durometer, minimum 1/2 inch thick, maximum loading 40 psi. Use neoprene in oily or exterior locations.
- J. Type 10: 1/2 inch thick rubber waffle pads bonded each side of 1/4 inch thick steel plate.

2.5 SLEEVES AND SEALS

- A. Sleeves for Pipes Through Non-Fire Rated Floors: 18 gage galvanized steel.
- B. Sleeves for Pipes Through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage 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 space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- F. 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 ensure 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 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 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 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.

3.7 INSTALLATION - VIBRATION ISOLATION

- A. Install vibration isolators for motor driven equipment.
- B. Set steel bases for one inch clearance between housekeeping pad and base. Set concrete inertia bases for 2-inch clearance. Adjust equipment level.
- C. Provide spring isolators on piping connected to isolated equipment as follows: Up to 4 inches diameter, first three points of support; 5 to 8 inches diameter, first four points of support; 10 inch diameter and over, first six points of support. Static deflection of first point shall be twice deflection of isolated equipment.

3.8 PIPE HANGER AND SUPPORT SCHEDULE

PIPE SIZE (Inches)	MAX. HANGER SPACING (Feet)	HANGER ROD DIAMETER (Inches)
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2
4 to 6	10	5/8
8 to 12	14	7/8
PVC (All Sizes).....	6.....	3/8

END OF SECTION

SECTION 230548

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Inertia bases.
 - 2. Vibration isolation.

1.2 REFERENCES

- A. General:
 - 1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
 - 2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
 - 3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.
 - 4. Refer to Division 23 Section "Common Results for HVAC" for codes and standards, vibration and noise, and other general requirements.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Provide specific information for items described under the products section of this Specification, including specifications, descriptive drawings, catalog cuts, and descriptive literature, including make, model, dimensions, weight and interface description with other work, and indicating full compliance with specifications as outlined.
 - 2. An itemized list showing items to be isolated, the isolator type, model number, isolator loading and deflection, and reference to specific drawing showing frame construction where applicable.
- B. Shop Drawings:
 - 1. Indicate inertia bases and vibration isolator locations, with static and dynamic load on each.
 - 2. Drawings showing intended locations.
 - 3. Drawings showing equipment frame construction for each machine, including dimensions, structural member sizes, and support point locations.
 - 4. Drawings showing methods for suspension, of support, and guides.
 - 5. Drawings showing methods for isolation of piping, at penetrations of walls, slabs, etc.
- C. Maintenance and Operations Data: Submit manufacturer's certificate that isolators are installed and adjusted to meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Maintain ASHRAE criteria for average noise criteria curves for equipment at full-load condition

PART 2 - PRODUCTS

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2.1 GENERAL REQUIREMENTS

- A. Vibration isolation components (isolators, snubbers, rails, and inertia bases) to be hot-dip galvanized. Welded steel channel perimeter frame with welded-in reinforcing bars, pre-located welded-in anchor bolts or pre-located bolt holes suitable for the number and size required, and height saving brackets where required. Inertia bases shall be 1.5 times of the weight of the equipment. Snubbers shall be provided. Delete inertia base requirement if the equipment is provided with motor rating of less than 15 hp and is provided with steel frame base.

2.2 VIBRATION ISOLATORS

- A. General:
1. Metal parts of vibration-isolation units shall be as follows:
 - a. Housing: Hot-dipped galvanized outdoors, and inside air handlers and painted indoors. Galvanizing shall meet ASTM Salt Spray test Standards and Federal Test Standard no. 14.
 - b. Hardware (washers, nuts, bolts, etc.): Galvanized outdoors, and inside air handlers, and cadmium plated indoors.
 - c. Springs: Neoprene coated outdoors, inside air handlers, and painted indoors.
 2. Isolator types are scheduled to establish minimum standards. At the Subcontractor's option, accessories can be an integral part of isolators supplied to provide initial lift of equipment to operating height, hold piping at fixed elevation during installation and initial system filling operations, and similar installation advantages. Accessories shall not degrade the vibration isolation system.
 3. Static deflection of isolators are indicated in Vibration Isolation Schedule. Static deflections stated are the minimum acceptable deflection for the mounts under actual load.
 4. The use of nested springs or of multiple parallel springs within a single mount is not permitted.
- B. Hanger Spring:
1. Vibration-isolation hangers shall consist of a free-standing laterally stable steel spring set into a neoprene cup, contained within a steel housing. The neoprene cup shall be manufactured with a grommet (or other element) to prevent the hanger rod from contacting the hanger housing. A steel washer shall be provided in the neoprene cup to evenly distribute load onto the neoprene.
 2. The plate or washer at the top of the spring shall be welded to the spring. The hanger rod shall be securely fastened to this plate or washer using lock nuts. The hanger rod shall have a diameter not less than 5/8 inch. This design represents a modification to the unit types given below. The modification is intended to limit the side-to-side motion of the hanger rod relative to the hanger casing.
 3. Spring diameter and hanger housing lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the housing. Spring elements shall have minimum additional travel to solid equal to 50 percent of the actual deflection.
 4. Upper hanger rod attachment shall be made through a neoprene rubber-in-shear element designed to avoid direct contact between the hanger rod and the isolator frame.
 5. Springs shall be color coded for ease of identification and removable, for field connection.

2.3 EQUIPMENT BASES

- A. Base Steel Frame:
1. Steel base frames shall consist of structural steel sections sized, spaced, connected, and cross-connected to form a rigid base which will not twist, deform, or deflect in any manner which will negatively affect the operation of the supported equipment of the vibration-isolation mounts. Frames shall be adequately sized to support basic equipment units and mounts plus associated pipe elbow supports, duct elbow supports, electrical control elements, or other components closely related and requiring resilient support in order to prevent vibration transfer to the building structure. The depth of steel frame bases shall be at least 1/10 the longest dimension of the base with a minimum depth of 6 inches, but not more than 12 inches. Frame bases shall include side

mounting brackets for attachment to vibration isolators. Mounting brackets shall be located on the sides of the base that are parallel to the axis of rotation of the supported equipment.

2.4 SNUBBERS

- A. Snubbers to limit the vertical and horizontal motion of the isolated equipment shall be fabricated from steel. A neoprene pad, 1/4-inch minimum thickness, shall be affixed at the point of contact. There will be no contact between snubbers and the inertia base or equipment support frame during normal operation. Minimum of one snubber per side, four total, shall be required on each base. Seismic snubbers shall have a minimum of 1.0G ratings and anchorages.
- B. Snubbers shall not be finally installed until vibration isolators are in place and adjusted with actual operating loads.

2.5 PIPING ISOLATORS

- A. Specialty Products Co. Acousto-Plumb isolators, or equal, for pipe 3/4-inch and smaller, and Trisolator for pipes 1 inch and larger, or equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Subcontractor is to obtain written and/or oral instructions from the vibration isolation manufacturer as to the proper installation and adjustment of vibration isolation devices.
- B. The Subcontractor is to correct, at no additional cost, installations which are deemed defective in workmanship or materials.
- C. The Subcontractor is responsible for proper operation of systems, minor sub-systems, and services provided under this Section. The Subcontractor is to coordinate startup procedures, calibration, and system check-out with Subcontractors involved. Any system operational problems shall be diagnosed. Correctional procedures shall be initiated by the various Subcontractors as required to bring the system into compliance with the design, and the problem shall then be rechecked to verify that the system operates normally. Any remaining difficulties shall be brought to the attention of the USPS.
- D. Do not install equipment, ductwork, piping and conduit which makes rigid contact with the structure unless it is allowed by this specification.
- E. The Subcontractor is to bring to the USPS's attention prior to installation conflicts which will result in unavoidable contact between the building structure and the isolated equipment, piping, etc., described herein, due to inadequate space, etc. Corrective work necessitated by conflicts after installation is at the expense of the Subcontractor.
- F. The Subcontractor is to bring to the USPS's attention prior to installation discrepancies between the requirements of this Specification and field conditions, changes required due to specific equipment selection, etc. Corrective work necessitated by discrepancies after installation is at the expense of the responsible Subcontractor.
- G. Resilient Wall, Ceiling, and Floor Penetrations: Provide resilient wall and ceiling penetrations for piping, conduit, ductwork, etc.

- H. Support vibration isolated ducts, pipes, and equipment directly from structural steel, not the concrete deck.

3.2 ISOLATOR INSTALLATION

- A. The installation or use of vibration isolators must not cause change of position of equipment, conduit, piping or ducting, which would result in stresses in connections or misalignment of shafts or bearings. To meet this objective, maintain equipment and attached systems in a rigid position during installation. The load shall not be transferred to the isolator until the installation is complete and under full operational load. Plumbing, piping, and ducting at mechanical equipment connections is to be fully supported by specified hangers. Mechanical equipment and vibration mounts shall not carry plumbing, piping, or ducting loads. Utilize flexible metal, liquid-tight conduit for electrical connections.
- B. Isolation/Absorption Products: The completed installation must be free of vibration and noise. Systems, equipment, or parts which vibrate or generate vibration unduly, or which generate or emit undue noise while in operation shall: 1) be adjusted, repaired or replaced as appropriate to obtain acceptable levels of vibration or noise; or 2) be supported on, or fitted with, suppression or absorption devices or other means, which effectively prevent the transmission of vibration or noise beyond the offending item.
- C. Equipment Isolator Installation:
 - 1. The minimum operating clearance between the underside of the frame or inertia base and the pad or floor is 1 inch.
 - 2. Place the frame in position and support temporarily by shims prior to the installation of the machine or isolators.
 - 3. After the entire system installation is completed and under full operational load, adjust the isolators so that the load is transferred from the shims to the isolators, and that the shims are barely free. Remove the shims.
 - 4. Seismic snubbers shall not be finally installed until vibration isolators are in-place and adjusted with actual operating loads.
- D. Isolator Hangers:
 - 1. The isolators shall be installed with the isolator hanger box as close as possible to the structure.
 - 2. The isolators shall be suspended from massive beams, never from slab diaphragms between beams.
 - 3. Orientation of isolator assembly including support and load rods shall be within five degrees of vertical.

3.3 EQUIPMENT ISOLATION

- A. Install isolators for fans, chillers, compressors, pumps and other such equipment as shown on Vibration Isolation Schedule or as otherwise required.
- B. Approve completed vibration isolation system for isolated equipment.

3.4 PIPING ISOLATION

- A. Where specifically indicated only, use specified pipe isolation system.

3.5 VIBRATION ISOLATION SCHEDULE

Equipment	Base Type and Weight¹	Isolator Type	Minimum Static Deflec- tor (inches)
Water Heaters: WH-XXX	NA	NA	NA
In-Line Pumps: GP-XXX	NA	NA	NA
Hung Fans in Utility Building	NA	HS	1
Pipes with water pressure (ICW, IHW, DIWS, DIWR, TRWS, TRWR, HHWS, HHWR) in rooms XXX (list rooms).	NA	Acousto-Plumb (or equal) and insulate pipes at each partition penetration with one inch thick insulation	NA

11X = 1 time the weight of the equipment supported.
 2X = 2 times the weight of the equipment supported.
 NA = Not applicable

END OF SECTION

SECTION 230593

TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Balancing, airflow and water flow within distribution systems, including submains, branches and terminals, to indicated quantities according to specified tolerances.
- B. Adjusting total HVAC systems to provide indicated quantities.
- C. Measuring electrical performance of HVAC equipment.
- D. Setting quantitative performance of HVAC equipment.
- E. Verifying that automatic control devices are functioning properly.
- F. Measuring sound and vibration.
- G. Reporting results of the activities and procedures.

1.2 SUBMITTALS

- A. Certification: Required
- B. Testing and Balancing Reports: Required

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Company specializing in testing, adjusting, and balancing of the types of systems & equipment specified with minimum 5 years documented experience.
 - 2. Company or agent certified by AABC or NEBB.
 - 3. Testing and Balancing Company shall be submitted for approval prior to commencement of work.
- B. Reference Standards:
 - 1. AABC
 - 2. AMCA
 - 3. ASHRAE
 - 4. CTI
 - 5. NEBB
 - 6. SMACNA

1.4 INSTRUMENTS

- A. All instruments used by this agency shall be accurately calibrated and maintained in good working order. Calibration records must be with the instruments.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing work.
- B. Verify that all required balancing dampers, valves and fittings are provided before commencing work.

3.2 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for fans.
- B. Air Outlets and Inlets: Adjust outlets and inlets in the specific space to within plus or minus 10 percent of design.
- C. Pump Flow: Adjust to 110% of design flow rate.
- D. Hydronic Components: Adjust to within plus 5 percent of design.
- E. All rotating equipment such as fans, compressors and pumps shall be balanced and aligned so that vibration severity measured at bearing caps shall not exceed 0.09 inch/second in rms velocity for frequency range from 1 Hz. To 100 Hz.

3.3 GENERAL TESTING AND BALANCING PROCEDURES

- A. Test and balance each system according to the procedures contained in reference standards.

3.4 REPORTS

- A. Provide 4 certified copies of all test data.

END OF SECTION

SECTION 233100

HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal ductwork.
 - 2. Nonmetal ductwork.
 - 3. Air turning devices.
 - 4. Duct access doors.
 - 5. Duct test holes.
 - 6. Flexible duct connections.
 - 7. Volume control dampers.
 - 8. Duct cleaning.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 230500 - Common Work Results for HVAC:
 - 2. Section 230713 - Duct Insulation.
 - 3. Section 233713 - Diffusers Registers and Grilles:
 - 4. Section 230593 - Testing, Adjusting, and Balancing for HVAC:

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 36 - Structural Steel.
 - 2. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
 - 3. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 4. ASTM A 480 - General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - 5. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process.
 - 6. ASTM A 568 Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
- B. American Welding Society (AWS):
 - 1. AWS D9.1 - Welding of Sheet Metal.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
 - 2. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
 - 3. NFPA 91 - Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying.
 - 4. NFPA 96 - Installing of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.
- D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. SMACNA - HVAC Air Duct Leakage Test Manual.
 - 2. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

- E. Underwriters Laboratories, Inc. (UL):
 - 1. UL 181 - Factory-Made Air Ducts and Connectors.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Duct materials, duct liner, duct connectors, and flexible duct.
 - b. Factory or shop manufactured assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Actual locations of ducts and duct fittings.
 - b. Record changes in fitting location and type.
 - c. Show additional fittings used.
 - d. Actual locations of access doors, test holes, and fire dampers.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements: Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96 standards.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Protect dampers from damage to operating linkages and blades.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 - 1. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
 - 2. Maintain temperatures during and after installation of duct sealants.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Indoor Air Quality: Install insulation so that unfaced fiberglass and mineral fiber insulation are not in the interior of the ductwork.

PART 2 - PRODUCTS

- A. Galvanized Steel Ducts: ASTM A653 having zinc coating in conformance with ASTM A90.
- B. Steel Ducts: ASTM A569 and A568.
- C. Flexible Ducts:
 - 1. Manufacturers:
 - a. Anco Products Inc.
 - b. Hart & Cooley.
 - c. Tuttle & Bailey.
 - 2. UL Labeled, black polymer film supported by helically wound spring steel wire.
 - 3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
 - 4. Maximum Velocity: 4000 fpm.
 - 5. Temperature Range: -20 degrees F to 175 degrees.
- D. Insulated Flexible Ducts:
 - 1. Manufacturers:
 - a. Anco Products Inc.
 - b. Hart & Cooley.
 - c. Tuttle & Bailey
 - 2. Black polymer film supported by helically wound spring steel wire; fiberglass insulation; aluminized vapor barrier film.
 - 3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
 - 4. Maximum Velocity: 4000 fpm.
 - 5. Temperature Range: -20 degrees F to 175 degrees F.
- E. Stainless Steel Ducts: ASTM A 167, Type 304.
- F. Fasteners: Rivets, bolts, or sheet metal screws.
- G. Sealant:
 - 1. Manufacturers:
 - a. Duro Dyne Corporation, Farmingdale, NY (800) 899-3876.
 - b. H.B. Fuller Co, St. Paul, MN (888) 423-8553.
 - c. Hardcast, Inc, Wylie, TX (800) 527-7092.
 - 2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.
- H. Hanger Rod: ASTM A36; steel threaded both ends, threaded one end, or continuously threaded.

2.2 AIR TURNING DEVICES/EXTRACTORS

- A. Manufacturers:
 - 1. Semco, Inc, Columbia, MO (888) 473-6264.
 - 2. Metal-Fab, Inc, Wichita, KS (800) 835-2830.
 - 3. United McGill Corp, Groveport, OH (614) 836-9981.
- B. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

2.3 DUCT ACCESS DOORS

- A. Manufacturers:
 - 1. Ductmate Industries, Inc, East Monongahela, PA (800) 245-3188.
 - 2. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
 - 3. Semco Inc, Columbia, MO (888) 473-6264.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.
 - 1. Less Than 12 Inches Square: Secure with sash locks.
 - 2. Up to 18 Inches Square: Provide two hinges and two sash locks.
 - 3. Up to 24 x 48 Inches: Three hinges and two compression latches with outside and inside handles.
 - 4. Larger Sizes: Provide an additional hinge.
- D. Access doors with sheet metal screw fasteners are not acceptable.

2.4 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.5 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers:
 - 1. Ductmate Industries, Inc, East Monongahela, PA (800) 245-3188.
 - 2. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
 - 3. Semco Inc, Columbia, MO (888) 473-6264.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Connector: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30oz per sq yd.
 - 2. Net Fabric Width: Approximately 3 inches wide.
 - 3. Metal: 3 inches wide, 24 gage thick galvanized steel.

2.6 VOLUME CONTROL DAMPERS.

- A. Manufacturers:
 - 1. Louvers and Dampers, Inc, Florence, KY (606) 647-2299.
 - 2. Prefco Products, Inc, Buckingham, PA (800) 437-6653.
 - 3. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Splitter Dampers:

1. Material: Same gage as duct to 24 inches size in either direction, or two gages heavier for sizes over 24 inches.
 2. Blade: Fabricate of double thickness sheet metal to streamline shape, secured with continuous hinge or rod.
 3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.
- D. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- E. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- F. End Bearings: Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- G. Quadrants:
1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 3. Where rod lengths exceed 30 inches provide regulator at both ends.

2.7 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide turning vanes.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION - DUCTWORK

- A. Install in accordance with manufacturer's instructions.

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- B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Duct Sizes are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- D. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- G. Use double nuts and lock washers on threaded rod supports.
- H. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp and tape.
- I. Connect flexible ducts to metal ducts with draw bands plus tape.
- J. Provide residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out. Use stainless steel for ductwork exposed to view and stainless steel or carbon steel for ducts where concealed.
- K. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- L. Install so that unfaced fiberglass and mineral fiber insulation are not in the interior of the ductwork.

3.3 INSTALLATION - DUCTWORK ACCESSORIES

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ductwork in accordance with NFPA 96. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. Demonstrate re-setting of fire dampers to Owner.
- G. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.

- H. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- I. Use splitter dampers only where indicated.
- J. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

3.4 CLEANING

- A. Clean work under provisions of 017300.
- B. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION

SECTION 233300

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manual volume dampers.
 - 2. Control dampers.
 - 3. Flange connectors.
 - 4. Turning vanes.
 - 5. Duct-mounted access doors.
 - 6. Flexible connectors.
 - 7. Flexible ducts.
 - 8. 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. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and finish for exposed ducts.
- D. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.
 - b. American Warming and Ventilating; a division of Mestek, Inc.
 - c. Flexmaster U.S.A., Inc.
 - d. McGill AirFlow LLC.
 - e. METALAIRE, Inc.
 - f. Nailor Industries Inc.
 - g. Ruskin Company.
 - h. Vent Products Company, Inc.
 2. Standard leakage rating, with linkage outside airstream.
 3. Suitable for horizontal or vertical applications.
 4. Frames:
 - a. Hat-shaped, galvanized-steel channels, 0.064-inch minimum thickness.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch thick.
 6. Blade Axles: Stainless steel.
 7. Bearings:
 - a. Molded synthetic.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 8. Tie Bars and Brackets: Galvanized steel.
- B. Standard, Aluminum, Manual Volume Dampers:
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.
 - b. American Warming and Ventilating; a division of Mestek, Inc.
 - c. Flexmaster U.S.A., Inc.
 - d. McGill AirFlow LLC.
 - e. METALAIRE, Inc.
 - f. Nailor Industries Inc.
 - g. Ruskin Company.

- h. Trox USA Inc.
 - i. Vent Products Company, Inc.
 - 2. Standard leakage rating.
 - 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.

2.3 CONTROL DAMPERS

- 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. Arrow United Industries; a division of Mestek, Inc.
 - 3. Flexmaster U.S.A., Inc.
 - 4. Greenheck Fan Corporation.
 - 5. Lloyd Industries, Inc.
 - 6. McGill AirFlow LLC.
 - 7. METALAIR, Inc.
 - 8. Nailor Industries Inc.
 - 9. Ruskin Company.
 - 10. Vent Products Company, Inc.
 - 11. Young Regulator Company.
- B. Frames:
- 1. Hat or U shaped.
 - 2. Galvanized-steel channels, 0.064 inch thick.
 - 3. Mitered and welded corners.
- C. Blades:
- 1. Multiple blade with maximum blade width of 8 inches.
 - 2. Parallel- and opposed-blade design.
 - 3. Galvanized steel.
 - 4. 0.064 inch thick.

- 5. Blade Edging: Closed-cell neoprene edging.
- D. Blade Axles: 1/2-inch- diameter; stainless steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
 - 1. Operating Temperature Range: From minus 40 to plus 200 deg F.
- E. Bearings:
 - 1. Molded synthetic.
 - 2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 3. Thrust bearings at each end of every blade.

2.4 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ductmate Industries, Inc.
 - 2. Nexus PDQ; Division of Shilco Holdings Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Material: Galvanized steel.
- C. Gage and Shape: Match connecting ductwork.

2.5 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of 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.
- 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.

- 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.
- 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.
- 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.
- 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 in sizes 3 through 18 inches, to suit duct size.
 2. Non-Clamp Connectors: 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 fire and smoke dampers according to UL listing.
- H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors; and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
- I. Install access doors with swing against duct static pressure.
- J. 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.
- K. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- L. Install flexible connectors to connect ducts to equipment.
- M. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- N. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- O. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Operate fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation.

END OF SECTION

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SECTION 233416

CENTRIFUGAL HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ceiling 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 230500 – Common Work results for HVAC: Basic mechanical methods.
 - 2. Section 233100 – HVAC Ducts and Casings: Connections to ductwork and backdraft dampers.
 - 3. 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 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 and wall mounted switch.

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 structure.
- C. Extend ducts to roof exhausters into structure. Counterflash duct to roof opening.
- D. 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.
- E. Provide sheaves required for final air balance.
- F. Install backdraft dampers on inlet to roof exhausters.
- G. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.
- H. 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. Rectangular and square ceiling diffusers.
 - 2. Perforated diffusers.
 - 3. Adjustable bar registers and grilles.
 - 4. Fixed face registers and grilles.
 - 5. Roof vents.
- B. Related Sections:
 - 1. Section 089000 - Vents for fixed and adjustable wall vents, whether or not they are connected to ducts.
 - 2. Section 233300 - Air Duct Accessories volume-control dampers not integral to diffusers, registers, and grilles.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

- A. Rectangular and Square Ceiling Diffusers:
 - 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. Carnes.
 - b. Hart & Cooley Inc.
 - c. Krueger.
 - d. METALAIRE, Inc.
 - e. Nailor Industries Inc.
 - f. Price Industries.
 - g. Titus.
 - h. Tuttle & Bailey.
 - 2. Devices shall be specifically designed for variable-air-volume flows, where required.
 - 3. Material: Steel or Aluminum, as specified. Aluminum shall be used in humid climates.
 - 4. Finish: Baked enamel, white or anodized aluminum, per requirements.
 - 5. Face Size: 24 by 24 inches (600 by 600 mm) for lay-in ceilings or as otherwise required.
 - 6. Mounting: Surface or T-bar, as required.
 - 7. Pattern: Fixed or adjustable, as required.
 - 8. Dampers: Radial opposed blade.

9. Insulation: Back plate covered with glass fiber insulation with an aluminum foil vapor barrier to prevent harmful effects of condensation.

2.2 REGISTERS AND GRILLES

A. Fixed Face Grille or Register:

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. Carnes.
 - b. Hart & Cooley Inc.
 - c. Krueger.
 - d. METALAIRE, Inc.
 - e. Nailor Industries Inc.
 - f. Price Industries.
 - g. Titus.
 - h. Tuttle & Bailey.
2. Devices shall be specifically designed for variable-air-volume flows, where required.
3. Material: Steel or Aluminum, as specified. Aluminum shall be used in humid climates.
4. Finish: Baked enamel, white or anodized aluminum, per requirements.
5. Face Size: 24 by 24 inches (600 by 600 mm) for lay-in ceilings or as otherwise required.
6. Mounting: Surface or T-bar, as required.
7. Pattern: Fixed or adjustable, as required.
8. Dampers: Radial opposed blade.
9. Insulation: Back plate covered with glass fiber insulation with an aluminum foil vapor barrier to prevent harmful effects of condensation.

2.3 ROOF VENT:

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. PennBarry.
 - b. Greenheck.
 - c. Carnes.
 - d. Cook "TRE" series.
2. Devices shall be specifically designed for mounting on factory fabricated roof curb.
3. Roof Curb: Shall be constructed of minimum 18 gauge galvanized steel or 0.064-inch thick aluminum, of all-welded construction, with top wooden nailer held in place by metal wrap-around, and internally insulated with minimum 1/2-inch thick rigid fiberglass. Size of curb shall match roof vent. Provide curb type as required to match roof type (i.e., with built-in cant and step height to allow for roof insulation; sloped base; etc.).
4. Material: Galvanized steel or aluminum.
5. Finish: Baked enamel, white or anodized aluminum, per requirements.
6. Face Size: Throat size as indicated on the plans (or size to match the connecting duct sizes indicated).
7. Dampers: Motorized.

2.4 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
- D. Weather Exposure: All outlets and inlets exposed to the weather shall be adequately flashed and installed in a manner to assure complete weatherproofness. Sealing and caulking of all outlets and inlets exposed to the weather shall conform to Division 07.

3.2 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 238246
ELECTRIC HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Electric Heaters.

1.3 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit product information on all items.

1.4 GENERAL REQUIREMENTS

- A. Listing: All heaters shall be listed by an independent testing laboratory for the application indicated.
- B. Installation Verification: Prior to ordering units confirm finishes at heater location and type of installation and associated trim required; i.e. fully recessed, semi recessed, surface mount, etc.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Duct Heaters: Indeeco, Berko, Markel, Q-Mark, Warren.

2.2 DUCT ELECTRIC HEATERS

- A. Type: Open coil type electric duct heaters; of size and capacity as shown on the drawings.
- B. Listing: Heaters shall be UL listed for zero clearance to combustibles, and shall be built to meet all requirements of the National Electric Code and NFPA.
- C. Construction: Heating coils shall be made of 80% nickel and 20% chromium coiled resistance wire. Coils shall be supported in an aluminized steel frame and insulated by floating ceramic bushings. Heaters shall be of the configuration to suit the application as shown on the drawings.

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- D. Overtemperature Protection: All heaters shall be equipped with primary and secondary overtemperature safety devices. The primary safety device shall be a disc or liquid filled bulb type with automatic reset; the secondary device shall be a disc type with manual reset, wired in series with each heater stage, set to trip at a higher temperature than the primary safety device.
- E. Overcurrent Protection: Fuses shall be provided for overcurrent protection; fuse capacities shall be rated for at least 125% of the circuit amperage.
- F. Proof of Air Flow: Where project's control system is the DDC type, and heater is controlled by the DDC, proof of airflow is to be provided via the DDC system; no proof of airflow devices are required to be furnished integral with the heater. For non-DDC control systems or where the DDC control system is not providing heater control, provide heater with differential air pressure device and sensing tube (or sail flow switch), interlocked with the heater to prevent heater operation in case of insufficient airflow across the coil. Differential air pressure device (or sail flow switch) shall have sufficient sensitivity to suit velocity and duct pressures of the application. Configure and arrange differential air pressure device (or sail flow switch) for proper operation as the application requires. Air differential air pressure device shall have a pitot tube on high pressure side installed to sense duct total air pressure; except where heater is used on the suction side of a fan, the air differential air pressure device shall be connected to the low pressure side and be configured sensor to measure static pressure only. Where sensitive enough differential air pressure devices (or sail flow switches) are not available, provide heater with 24 volt relay for interlocking to a fan proof device (i.e. motor starter auxiliary contacts, fan start relay, or equivalent).
- G. Terminal Box: All heater controls shall be mounted in a side mounted terminal box, unless a separate remote mounted terminal box is shown on the drawings. Terminal box shall be insulated from the heater casing.
- H. Disconnect: Heaters shall be provided with a built-in power disconnect switch, having a terminal door interlock.
- I. Controls: Heaters shall be furnished with 24 volt transformer and shall be for use with 24 volt controls unless indicated otherwise. Transformer shall have secondary fusing, and transformers which are not class 2 shall have primary fusing. Mercury control contactors shall be used for controlling heater stages unless indicated otherwise. Where SCR control has been indicated the heater shall be furnished with a solid state proportional power controller allowing modulation of heater capacity from 0 to 100% of full capacity. The SCR control shall energize the heater only for the number of AC cycles necessary to produce the amount of heat required. For heaters with loads greater than 90 amps SCR control combined with a step controller in a vernier configuration (still providing full proportional control) is acceptable. (Backup or safety contactors - where used - shall be magnetic type).
- J. Electrical: Heaters shall be for use with electricity of the voltage and phase indicated, and provide the output and number of control stages indicated. Three phase heaters shall have equal balanced three phase circuits. Heater element circuits shall be subdivided so that no circuit load exceeds 48 amperes. All internal wiring shall be suitable for 220 degrees.
- K. Pressure Plate/Baffle: Provide plate to allow for uniform flow across heater; fabricate of galvanized steel; pressure drop shall not exceed 0.20" wc.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install in accordance with manufacturer's written instructions, code, applicable standards and best construction practices.
- B. Coordination: Coordinate heater power and control requirements with other trades; confirm location of any required heater contactors, relays, thermostats, and similar devices. Provide any required wiring for proof of fan operation between fan devices and heater; wiring shall comply with the HVAC control portion of the specifications and Division 26.
- C. Location and Trim Verification: Install equipment at locations indicated in accordance with the Contract Documents. Review and confirm installation locations, that proper clearances are provided, unit controls are accessible, and installation has been coordinated with other trades.
- D. Complete Connections: Connect and install all items shipped loose with units; provide and connect all contactors, relays, wiring, interconnections and accessories as required for proper unit operation.
- E. Cleaning: Units shall be thoroughly cleaned (internally and externally) of all debris prior to operation. Units shall be clean and in new condition prior to Owner acceptance.
- F. Owner Instruction: Instruct Owner on equipment operation and maintenance.

3.2 START-UP

- A. Pre Start-Up Inspection: Inspect equipment and connecting systems to confirm equipment and connecting systems to confirm equipment has been installed properly and is ready for start-up. As a minimum, check for: proper voltage and phases, correct electrical connections, complete control connections, all unit safety devices properly set and connected, coils clear of obstructions, and other items as listed by the manufacturer are properly provided/connected and operating to ensure safe and proper start-up. If items are discovered that prevent start-up to be completed, notify the installing Contractor and Engineer of issues. Coordinate and re-schedule start-up after items are corrected.
- B. Start-Up: Perform start-up in accordance with manufacturers written start-up procedures. Observe proper operation of all unit components.
- C. Adjustments: Adjust and set unit components to allow for proper operation. Observe unit to detect any unusual vibration, leakage, loose wiring, or other situations that could affect unit operation.

3.3 COMMISSIONING

- A. General: The Products referenced in this section are to be commissioned. The Contractor has specific responsibilities for scheduling, coordination, testing, and documentation of the commissioning. The Contractor shall provide a documented and signed record to verify that all equipment and systems installed under this contract have been inspected and functionally tested to verify full compliance with the contract specifications.

END OF SECTION

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SECTION 000010

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SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic Electrical Methods.
 - 2. Grounding and Bonding.
 - 3. Hangers and Supports.
 - 4. Electrical Identification.
 - 5. Motor Starters, Controls, and Connections to Mechanical Equipment.
 - 6. Electrical System Testing and Inspection.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 019113 - General Commissioning Requirements.
 - 2. Section 078400 - Firestopping.
 - 3. Section 220500 - Common Work Results for Plumbing.
 - 4. Section 230500 - Common Work Results for HVAC.
 - 5. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
 - 6. Section 260533 - Raceway and Boxes for Electrical Systems.
 - 7. Section 260623 - Lighting Control Devices.
 - 8. Section 260800 - Commissioning of Electrical Systems.
 - 9. Section 262416 - Panelboards.
 - 10. Section 262726 - Wiring Devices.
 - 11. Section 262816 - Enclosed Switches and Circuit Breakers.
 - 12. Section 264128 - Surge Protective Devices (SPD's).
 - 13. Section 265100 - Interior Lighting (LED-Solid State).
 - 14. Section 265600 - Exterior Lighting.
 - 15. Section 270500 - Common Work Results for Communications.
 - 16. Section 271300 - Communications Backbone Cabling.
 - 17. Section 271500 - Horizontal Cabling.
 - 18. Section 272133 - Wireless Access Points.
 - 19. Section 275116 - IP Integrated, Public Address Zone Paging System.
 - 20. Section 281600 - Intrusion Detection System.
 - 21. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.

1.2 REFERENCES

- A. National Electrical Contractors Association (NECA):
 - 1. NECA SI - Standard of Installation.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA KS 1 - Enclosed Switches.
- C. National Electrical Testing Association (NETA):
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Grounding electrodes and connections.
 - b. Starter electrical characteristics and connection requirements.
 - 2. Assurance/Control Submittals:
 - a. Electrical System Test Reports: Submit report including the following directly to USPS Project Manager from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.
 - 1) Summary of project.
 - 2) Description of equipment tested.
 - 3) Description of test.
 - 4) Test results.
 - 5) Conclusions and recommendations.
 - 6) Appendix, including appropriate test forms.
 - 7) List of test equipment used and calibration date.
 - 8) Signature of responsible Testing Laboratory Officer.
 - b. Certificates: Manufacturer's certificate that each Product specified meet or exceed specified requirements.
 - c. Qualification Documentation: Submit documentation of experience indication compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following.
 - a. Locations of components and grounding electrodes.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing Work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements:
 - 1. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for the purpose specified and indicated.
 - 2. Work herein shall conform to all applicable laws, ordinances and regulations in accordance with the latest applicable requirements of:
 - a. National Electrical Manufacturer's Associates.
 - b. Standards of National Fire Protection Association (NFPA 72, 90A and 101).
 - c. Underwriter's Laboratories.
 - d. Occupational Safety and Health Agency Standards.
 - e. Illuminating Engineering Society Handbook.
 - f. The International Existing Building Code.
 - g. The International Electrical Code.
 - h. ASHRAE Standard 90.1.
 - i. The International Energy Conservation Code.

1.5 BASIC ELECTRICAL METHODS

- A. Drawings are schematic and diagrammatic. Use judgment and care to install electrical Work to function properly and fit within building construction and finishes. Electrical conductors, conduit, components, not

shown or specified, which are required for any device or system to produce a complete and operative system are required to be furnished and installed.

- B. Exact location of outlets are determined from dimension on Drawings, manufacturer's shop drawings, or as may be determined at Project Site. Do not scale Drawings for exact location of any item. Verify item mounting heights as required by project conditions prior to rough-in.
- C. Route conduits and wiring associated with new equipment and systems above ceilings, in existing chases, and concealed within building structure.
- D. Surface mounted raceways or conduit permitted only at locations indicated on Drawings.
- E. Circuit grouping, conduit or cable runs and home runs are indicated with number of conductors shown in each raceway to clarify operation and function of various systems. Provide proper number of conductors and conduits or cables to provide operative system as indicated on Contract Documents. Do not regroup any feeder circuits, branch circuits, home runs, and zone alarms at any point, from that shown on Contract Documents. Each conduit run shall contain no more than (6) current carrying conductors.
- F. Branch and home run circuits are indicated as 2, 3, or 4 wire circuits unless otherwise noted. Do not connect two ungrounded conductors to same circuit breaker/fused switch in any panel. Circuit runs consist of a maximum of five conductors; 3 phase conductors, 1 neutral conductor, and 1 equipment ground conductor, unless otherwise noted. Do not splice branch circuit conductors in any panels, safety switches, or circuit breakers in separate enclosures.
- G. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutrals.
- H. Proposed equipment, switches or devices, shown mounted on and/or adjacent to equipment, which if installed, would impair proper operation of existing or new equipment, shall be removed and relocated by Contractor as required so equipment will function properly. Notify USPS Project Manager immediately if any such condition exists.
- I. Seal and make permanently watertight penetrations by electrical raceways or equipment through ceilings, walls or floors.
 - 1. Seal penetrations in non-fire rated ceilings, walls or floors material specified in Section 079200 - Joint Sealants.
 - 2. Seal penetrations in fire rated walls with material specified in Section 078400 - Firestopping.
- J. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A, and NFPA 70.
- K. Install equipment and materials to provide required maintenance and code working clearance for servicing and maintenance. Coordinate final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow required space for removal of parts that require replacement or servicing.
- L. Remove existing equipment, lighting fixtures, switches, and receptacles as required to facilitate proposed installation and as specified in Section 024119 - Selective Structure Demolition. Remove existing wiring and conduit serving items to be removed. Conduit in inaccessible areas shall be cut off below finished surfaces and existing surface patched to match existing. Provide blank plates on existing flush mounted outlet boxes that will be abandoned. Remove all abandoned conductors from raceways.

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING

- A. Grounding System Resistance: Five ohm.
- B. Rod Electrodes:
 - 1. Material: Copper.
 - 2. Diameter: 3/4 inch.
 - 3. Length: 10 feet.
- C. Mechanical Connectors: Bronze.
- D. Electrode Conductor:
 - 1. Material: Bare stranded copper.

2.2 HANGERS AND SUPPORTS

- A. Product Requirements: Furnish and install approved materials, sizes, and types of anchors, fasteners, and supports to carry loads of equipment and conduit, including weight of wire in conduit plus 300 pounds.
- B. Materials and Finishes: Corrosion resistive.
- C. Anchors and Fasteners:
 - 1. Steel Structural Elements: Beam clamps and welded fasteners.
 - 2. Concrete Surfaces: Self-drilling anchors and expansion anchors.
 - 3. Hollow Masonry, Plaster, and Gypsum Board Partitions: Toggle bolts and hollow wall fasteners.
 - 4. Solid Masonry Walls: Expansion anchors.
 - 5. Sheet Metal: Sheet metal screws.
 - 6. Wood: Wood screws.

2.3 ELECTRICAL IDENTIFICATION

- A. Nameplates:
 - 1. Engraved three-layer laminated phenolic plastic, white letters on black background.
 - 2. Locations:
 - a. Each electrical distribution and control equipment enclosure.
 - b. Communication cabinets.
 - c. Terminal Cabinets.
 - d. Individual motor starter.
 - e. Separately enclosed circuit breakers.
 - f. Panelboards.
 - g. Pull boxes.
 - h. Lighting contactor/control panel enclosure.
 - i. Relays.
 - j. Switches and disconnects.
 - 3. Letter Size:
 - a. Use 1/8 inch letters for identifying individual equipment and loads.
 - b. Use 1/4 inch letters for identifying grouped equipment and loads.
- B. Wire and Cable Markers:
 - 1. Description: Cloth tape or tubing type wire markers.
 - 2. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.

3. Identification:
 - a. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings.
 - b. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on Drawings.
 - c. Communications Cable: Per section 270500.
- C. Conduit Markers:
 1. Underground conduit routings shall be marked utilizing magnetic marker tape set atop of the entire conduit run.
 - a. Underground-Type Plastic Line Marker: Manufacturer's standard detectable permanent, bright colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide by 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried cable. Locate tape 12 inches above top of conduit.
- D. Arc Flash warning Signs: Furnish signs in accordance with NEC Article 110.16, warning of potential arc flash hazard and requiring suitable Personal protective equipment. Locate and install signs per INSTALLATION Section of this specification.

2.4 MOTOR STARTERS, CONTROLS, AND CONNECTIONS TO MECHANICAL EQUIPMENT

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Allen-Bradley Company, Milwaukee, WI (414) 382-2000.
 2. Cutler-Hammer Eaton Corp, Milwaukee, WI (800) 833-3927.
 3. Square D Company, Palatine, IL (847) 397-2600.
 4. General Electric Company, Plainville, CT (860) 747-7111.
 5. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
 6. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Motor Starters:
 1. Provide manual, single phase, 120/277V, toggle type, motor rated switches with thermal overload element (sized at 115 percent of full load current) for fractional horsepower motors not requiring automatic control interfaces.
 2. Provide across-the-line, AC magnetic motor starters in applications where controls other than manual on and off are involved. Motor starters shall be UL labeled. Provide starters with the following features:
 - a. Rating for the voltage and current imposed.
 - b. Enclosure for the application usage: NEMA 1 for dry, indoors, NEMA 3R for outdoors, etc.
 - c. Control circuit voltage and amperage to match coil voltage and ratings of control apparatus.
 - d. Control transformers with primary and secondary fusing for control circuits, as required.
 - e. Overload elements for every conductor leg above ground. Elements are to be "thermal alloy" type, resettable and properly sized to motor nameplate rating. Elements located near boilers, heat strips, duct heaters or other heat sources or where heating by conduction or radiation can occur, shall be ambient temperature compensated types.
 - f. Adjustable phase loss/phase reversal protection (0-15 seconds), factory set at 7 seconds and a minimum of two field convertible auxiliary contacts.
 - g. Cover-mounted control switch is to be a "start-stop" or "hand-off-auto" type with "running" and "auto" pilot lights, as required by the control sequence. A suitable reset device for manually resetting overcurrent trip shall be provided.
 3. Magnetic starters for motors 10 hp or less shall be connected to automatically return the motor to service after a power interruption. Starters for motors over 10 hp shall be equipped with time delay relays so that after a power resumption and after a preset delay of 0-30 seconds, the motor shall automatically be returned to service.
 4. Combination magnetic motor starter/fused disconnect unit shall be utilized wherever possible.
- C. Furnish and Install the Following:

1. Conduit, wiring and electrical connections to motors, safety switches, starters, relays, electrical interlock circuits, valves, unit heaters, fan coil units, air handling units, and other similar equipment, required for complete and ready for operation. Coordinate with and review other sections of the specifications describing electrical equipment in order to fully understand the wiring requirements.
 2. Starters as indicated on Drawings except factory provided starters such as those physically mounted on the unit or any piece of equipment where starter is furnished as an integral part of the equipment.
 3. Electrical line voltage control components and installation as specified in Division 26 Sections.
 4. Furnish and install low voltage (below 50 volts) control wiring as indicated on Drawings using metallic conduit and No. 12 type THHN wire, minimum.
- D. Refer to Drawings for quantity and size of motor starters.
- E. Individual motor starters and those starters factory provided integral with the equipment shall be furnished in accordance with paragraph 2.4 B.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION - GROUNDING AND BONDING

- A. Provide bonding and grounding in conformance with NFPA 70.
- B. Equipment Grounding Conductor: Provide separate, insulated conductor within all lighting and power raceways. Terminate each end on suitable lug, bus, or bushing.
- C. Testing and Inspection:
 1. Inspect and test in accordance with NETA ATS, where applicable.
 2. Perform inspections and tests listed in NETA ATS, Section 7.13.
 3. Test ground resistance of system with ground resistance tester. The resistance of the grounding system shall not exceed 5 ohms. Where tests show resistance-to-ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms, or less, but driving additional ground rods; then retest to demonstrate compliance. Install rods at least 8 feet apart.
 4. Method for testing individual ground rods and overall grounding system shall be accomplished by the three point method per military handbook 419. Test probes shall be placed minimum of 30 feet and 60 feet from rod being tested. Furnish written report of all test results for all ground rods.

3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Install products in accordance with manufacturer's published instructions.

- B. Furnish and install anchors, fasteners, and supports in accordance with NECA SI.
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Do not use spring steel clips and clamps.
- E. Do not use powder-actuated anchors.
- F. Obtain permission from structural engineer before drilling or cutting structural members.
- G. Fabricate supports from structural steel angle or structural steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- I. In wet and damp locations use structural steel channel supports to stand cabinets and panelboards one inch off wall.
- J. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

3.4 INSTALLATION - ELECTRICAL IDENTIFICATION

- A. Install nameplate parallel to equipment lines.
- B. Secure nameplate to equipment front using stainless steel screws. Use minimum two screws at each end of nameplate.
- C. Secure nameplate to outside surface of door on panelboards.
- D. Install Arc Flash Warning Signs on switchboards, panelboards, control panels, meter socket enclosures, and motor control centers likely to require examination, adjustment, servicing, or maintenance while energized. Locate sign so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

3.5 INSTALLATION – MOTOR STARTERS, CONTROLS, AND CONNECTIONS TO MECHANICAL EQUIPMENT

- A. Verify and check equipment manufacturer's nameplate and installation instructions to obtain exact location of outlets for equipment before installation.
- B. Wire and connect line voltage controls in accordance with approved wiring diagrams. Provide line voltage interlock and control wiring as indicated on Drawings using conduit and No. 12 type THHN wire.

3.6 FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Section 260800 - Commissioning of Electrical Systems: Requirements related to Division 26 Commissioning.
- C. Conduct testing to Determine that Electrical Equipment and Systems:
 1. Are in conformance with Contract Documents and applicable reference standards.
 2. Is properly installed without damage due either to installation or shipment.
 3. Operate correctly, meet design intent, and are performing at optimum level, in safe manner.

- D. Provide a complete written record of operational values to be used as a baseline for future operational testing.
- E. Instrumentation:
 - 1. Provide calibration program that assures applicable test instrumentation is maintained within rated accuracy and directly traceable to National Bureau of Standards.
 - 2. Calibrate instruments in accordance with following frequency schedule:
 - a. Field Instruments:
 - 1) Analog - 6 months maximum.
 - 2) Digital - 12 months maximum.
 - b. Leased Specialty Equipment: 12 months. (Where accuracy is guaranteed by lessor.)
 - 3. Dated Calibration Labels: Visible on test equipment.
 - 4. Keep records current; show date and result of instruments calibrated or tested.
 - 5. Maintain current instrument calibration instruction and procedure for each test instrument.
 - 6. Calibrating Standard: Higher accuracy than that of instrument being calibrated.
- F. Regulatory Requirements:
 - 1. Safety Practices: Include, but not limited to, the following requirements:
 - a. Occupational Safety and Health Act of 1970 - OSHA.
 - b. Accident Prevention Manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
 - c. Applicable State and Local Safety Operating Procedures.
 - d. NETA Safety/Accident Prevention Program.
 - e. United States Postal Service Safety Practices.
 - f. NFPA 70E - Electrical Safety Requirements for Employee Workplace.
 - g. American National Standards for Personnel Protection, ANSI Z244.1.
 - 2. Perform tests with apparatus de-energized except where otherwise specifically required herein.
 - 3. Testing Laboratory: Provide a designated safety representative present at Project Site and supervise safety operations.
 - 4. Power Circuits: Conductors shorted to ground by a hot line grounded device approved for the purpose.
 - 5. Do not proceed until safety representative has determined that it is safe to do so.
 - 6. Testing Laboratory: Provide sufficient protective barriers and warning signs to conduct specified tests safely.
- G. Tests and inspections include, but are not limited to the following:
 - 1. Proper operation of lights and equipment.
 - 2. Continuity of raceway system.
 - 3. Insulation leakage and impedances.
 - 4. Ground system resistance.
 - 5. Elimination of reverse rotation and single-phasing of motors.
 - 6. Sub-system tests indicated in other Sections.
 - 7. Proper operation of communications systems specified in Section 270500.
 - 8. Proper operation of intrusion detection systems specified in Section 281600.
 - 9. Proper operation of video surveillance system specified in Section 282305.
 - 10. Proper operation of fire alarm system specified in Section 283100.
- H. Load balance all electrical phases, at device, panels, and switchboards.
- I. Perform electrical system testing and inspection as specified in each related Section and as specified in this Section.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/5/2018

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Building Wire and Cable.
 - 2. Branch-Circuit Cable.
 - 3. Wiring Connectors and Connections.
 - 4. Drop Cords.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver in accordance with NEMA WC 26.

PART 2 - PRODUCTS

2.1 BUILDING WIRE AND CABLE

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Alcan Cable, Atlanta, GA (770) 392-2376.
 - 2. Anixter, Inc., Skokie, IL (800) ANIXTER.
 - 3. General Cable, Highland Heights, KY (800) 526-4391.
 - 4. General Electric, Plainville, CT (860) 747-7111.

5. Okonite, Ramsey, NJ (201) 825-0300.
 6. Southwire Company, Carrollton, GA (800) 444-1700.
 7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: Single conductor insulated wire.
- C. Conductor: Copper, except conductors #1/0 AWG and larger may be compact stranded aluminum if equipped with compression lugs and installed per manufacturer's recommendations and the National Electrical Code.
- D. Insulation Voltage Rating: 600 Volts.
- E. Insulation: NFPA 70, Type THHN/THWN or Type XHHW-2
- F. Multiconductor Cable: Metal clad cable, Type MC with ground wire.
1. Type "MC" cable shall be permitted for use in exposed or accessible ceiling spaces only. Type "MC" cable shall not be utilized above inaccessible hard ceilings or in damp locations. Cable shall be supported and secured where such support does not exceed 3 ft. intervals and shall be properly color coded to identify phase, neutral, ground and switch legs.

2.2 WIRING CONNECTORS

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Buchanan Construction Products, Hackettstown, NJ (800) 610-5201.
 2. Thomas and Betts, Memphis, TN (800) 695-1901.
 3. 3M, St. Paul, MN (800) 364-3577.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Compression Connectors; Conductor sizes #12 through #6 AWG:
1. Buchanan: 2006S or 2011S.
 2. Thomas and Betts: Approved.
 3. 3M: Approved.

2.3 DROP CORDS

- A. Description: Continuous length of cable with 20 Amp, 120 Volt, locking blade type connector body at one end as indicated on Drawings. Secure cable at both ends with wire type stainless steel cable grips to prevent transmission of tension directly to conductors or terminal screws.
- B. Junction Box: Furnished and installed flush with ceiling anchored to building structure for fastening of uppercord grip.
- C. Cable: Type SO 600 volt flexible cord with three #12 stranded wires.
- D. Connector Body: Single 20 Amp, 120 volt, grounding receptacle of twistlock type at one end and straight blade type at other end that grips on cable insulation and is manufactured for use with wire cable grips. Furnish and install drop cords in length required for a receptacle height of 6 feet 8 inches above finished floor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Wiring Methods:
 - 1. Concealed Dry Interior Locations: Use building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
 - 2. Exposed Dry Interior Locations: Use building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
 - 3. Above Accessible Ceilings: Use building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
 - 4. Wet or Damp Interior/Exterior Locations: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in raceway.
- B. Install products in accordance with manufacturers published instructions and NECA SI.
- C. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- D. Use stranded conductors for control circuits and final connections to all vibration equipment.
- E. Use conductor not smaller than 12 AWG for power and lighting circuits.
- F. Use conductor not smaller than 14 AWG for control circuits.
- G. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- H. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
- I. Pull all conductors into raceway at same time.
- J. Use approved wire pulling lubricant for all building wire.
- K. Protect exposed cable from damage.
- L. Neatly train and lace wiring inside boxes, equipment, and panelboards in accordance with NECA Standards.
- M. Clean conductor surfaces before installing lugs and connectors.
- N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- O. For splices and taps, use only compression connectors for copper conductors, 6 AWG and larger or aluminum conductors 1/0 and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- P. Use solderless pressure compression connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

- Q. Use conductors rated 90 degrees C, inside a ballast compartment or within 6 inches of any ballast.
- R. Conductor Sizes #8 and Larger: Class B stranding.
- S. Install Drop Cords to building structure at locations indicated on Drawings as indicated on Drawings.
- T. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutral conductors.

3.4 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Identify wire and cable using Thomas and Betts type WM vinyl markers.
 - 2. Identify each conductor with its circuit number or other designation indicated on Drawings in all junction, pull, terminal boxes and cabinets. Identify neutrals with common circuit numbers in all junction, pull and terminal boxes, panels and cabinets.

3.5 WIRING COLOR CODE

- A. Comply with the following color code for each voltage system.
- B. 208Y/120 Volt System:
 - 1. Phase A - Black.
 - 2. Phase A Switch Leg - Black with "S" tag.
 - 3. Phase B - Red.
 - 4. Phase B Switch Leg - Red with "S" tag.
 - 5. Phase C - Blue.
 - 6. Phase C - Switch Leg - Blue with "S" tag.
 - 7. Travelers - Yellow.
 - 8. Neutral - White.
 - 9. Equipment Ground - Green.
- C. Use same color for same phase throughout. Use same colors for switch legs. Travelers shall be yellow. Phase rotation shall be same in all panels. Identify large cables with colored tape.
- D. Provide identification tags on each conductor entering panel, switch, junction box and pull box to identify conductor.

3.6 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Cables, 600 Volt or less and size no. 3 or larger, shall be meggered using an industry-approved "megger with a minimum of 500 Volt internal generating voltage. All inspection, cleaning and testing procedures shall be in compliance with the recommendations and standards outlined in the "maintenance testing specifications for electrical power distribution equipment and systems", latest edition, published by International Electrical Testing Association (NETA). Insulation resistance test values shall be no less than 250 megaohms. A typewritten report of all readings shall be prepared and submitted.

END OF SECTION

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SECTION 260533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal Conduit.
 - 2. Flexible Metal Conduit.
 - 3. Liquidtight Metal Conduit.
 - 4. Electrical Metallic Tubing.
 - 5. Fittings and Conduit Bodies.
 - 6. Wall and Ceiling Outlet Boxes.
 - 7. Pull and Junction Boxes.
 - 8. Cable Trays.
 - 9. Floor Boxes with Covers (other uses).
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 230500 - Common Work Results for HVAC.
 - 2. Section 260500 - Common Work Results for Electrical.
 - 3. Section 262726 - Wiring Devices.
 - 4. Section 270500 - Common Work Results for Communication.
 - 5. Section 281600 - Intrusion Detection System.
 - 6. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.
 - 7. Section 283100 - Fire Detection and Alarm.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 123 - Specification for Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.
- B. American National Standards Institute (ANSI):
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
 - 2. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
 - 3. ANSI C80.5 - Rigid Aluminum Conduit.
- C. National Electrical Contractors Association (NECA):
 - 1. NECA "Standard of Installation."
- D. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 2. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - 3. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
 - 4. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
 - 5. NEMA VE 1 - Metallic Cable Tray Systems.
- E. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Conduit Size: NFPA 70, unless indicated otherwise on Drawings.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Provide products listed and classified by Underwriters Laboratories, Incorporated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Accept conduit on site. Contractor inspect for damage prior to acceptance.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Where conduit is required by standards, codes, or required elsewhere, minimum size shall be as follows:
 - 1. 1/2 inch for power and branch circuit wiring, unless indicated otherwise. All homerun conduits shall be 3/4 inch, minimum.
 - 2. 3/4 inch for communications cable, unless indicated otherwise.
 - 3. 3/4 inch for low voltage, control, intercom, security and communications unless indicated otherwise.

2.2 METAL CONDUIT

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Allied Tube & Conduit, Harvey, IL (800) 882-5543.
 - 2. Wheatland Tube Co., Collinswood, NJ (800) 257-8182.
 - 3. Republic Wire & Cable, Rocky Mount, NC (800) 533-8198.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Rigid Galvanized Steel Conduit (GRC): ANSI C80.1, UL6.
- C. Intermediate Metal Conduit (IMC): UL1242.
- D. Fittings and Conduit Bodies: NEMA FB1 Material to match conduit.

2.3 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Millford, CT (203) 882-4800.
 - 2. 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: Racor, Inc., South Bend, IN (219) 234-7151.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Steel City.
 - b. O-Z/Gedney.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Conduits 1/2 inch thru 1 inch enter junction boxes, pull boxes, panels, cabinets, and gutters, provide the following:
 - 1. Rigid Conduit: Racor 1222, 1223, 1224.
 - 2. Flexible Metal Conduit: Racor 3302, 3303, 3304, 3305, 3306, 3308.
 - 3. Liquidtight Flexible Metal Conduit: Racor 3511, 3512, 3513, 3541, 3542, 3543.
- C. Conduits 1-1/4 inch and larger entering junction boxes, pull boxes, panels, cabinets, and gutters, provide Insulated throat type bushings; Racor 1225, 1226, 1228, 1230, 1232, 1234, 1236.
- D. Provide threaded joint connectors and malleable iron no thread compression box connectors on rigid conduit. Do not provide fittings requiring set screws or indenter type applications including BM connectors.
- E. Provide only steel set-screw couplings and connectors on EMT conduit.

2.8 CONDUIT STRAPS AND HANGERS

- A. Strap Manufacturer: Racor, Inc., South Bend, IN (219) 234-7151
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Steel City.
 - b. Unistrut.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Hanger Manufacturer: Steel City/Thomas & Betts, Memphis, TN (800) 888-0211.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Unistrut.
 - b. Racor.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Straps: Two hole push on stamped steel straps on surface areas such as concrete, masonry, wide flange beams, columns, and wood.
 - 1. Rigid Conduit: Racor 2232, 2233, 2234, 2235, 2336, 2238.
 - 2. Electrical Metallic Tubing: Racor 2092, 2093, 2094.
- D. Hangers: Lay-in pipe hanger.
 - 1. Conduits 1-1/4 Inch and Larger: Steel-City C-149.
- E. Trapeze Hangers for Conduits Grouped Together: Hangers consisting of all thread rods sized as required and Kingdorff channel.
 - 1. Steel City B-909, 1/2 inch x 1-7/8 inch (12 gauge) with single bolt channel pipe straps.
 - 2. Steel City C-105, C-105-AL, or C-106, (no wire permitted for anchoring conduit).

2.9 SEAL-OFF AND EXPANSION FITTINGS

- A. Seal-Off Fitting Manufacturer: Crouse-Hinds, Syracuse, NY (315) 477-5531.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Killark.
 - b. Appleton.
 - c. O-Z/Gedney.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Expansion Fitting Manufacturer: OZ/Gedney, Farmington, CT (860) 677-5541.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Crouse-Hinds.
 - b. Killark.
 - c. Appleton.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Provide seal-off fittings where required by governing authority, code, or as indicated on Drawings.
 - 1. Vertical Runs: Crouse-Hinds Type EYS.
 - 2. Horizontal and Vertical Runs: Crouse-Hinds Type EZS.
 - 3. Elbows: Crouse-Hinds Type EYS.
 - 4. Sealing Compound: "Chico X" fiber and "Chico A".
- D. Provide expansion fittings in conduits where indicated on Drawings or where required to pass through expansion joints embedded in concrete.
 - 1. O-Z/Gedney Type AX.

2.10 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 - 2. Receptacle and Device Boxes - 4 inch square x 2-1/8 inch deep with raised, single gang, plaster ring unless indicated otherwise.
 - 3. Switch Boxes: 2 inch x 4 inch x 2-1/8 inch deep, unless indicated otherwise.
 - 4. Communication Boxes: 4 inch square x 3 inch deep with raised gang plaster ring unless indicated otherwise.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- C. Wall Plates for Finished Areas: Specified in Section 262726.

2.11 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

2.12 CABLE TRAY

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Chalfant Cable Trays, Cleveland, OH (216) 521-7922.

2. Cable Management Solutions, Incorporated, Deer Park, NY (800) 308-6788.
 3. GS Metals Corporation, Pinckneyville, IL (800) 851-9341.
 4. Southwire Co., Carrollton, GA (800) 444-1700.
 5. Mono-Systems, Inc., Rye Brook, N.Y. (914) 934-2075.
 6. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide factory shop drawing submittals for each type of cable tray.
1. Show fabrication and installation details of cable tray, including plans, elevations and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths and fittings.
 2. Seismic-Restraint Details: Signed and sealed by a qualified Professional Engineer, licensed in the state where Project is located, who is responsible for their preparation.
 - a. Design Calculations: Calculate requirements for selecting seismic restraints.
 - b. Detail fabrication, including anchorages and attachments to structure and to supported cable trays.
- C. Description: NEMA VE 1, ladder tray, wire mesh tray or solid bottom tray as indicated on drawings.
- D. Material: Steel or aluminum.
- E. NEMA Load/Span Class: 20C
- F. Finish: ASTM A 525, pre-galvanized or clear aluminum.
- G. Inside Width and Depth: Indicated on Drawings. Inside Radius of Fittings: 24 inches (minimum).
- H. Provide with compartment dividers as indicated on drawings. Same materials and finish as tray.
- I. Straight Section Rung Spacing: 9 inches on center (ladder tray only).
- J. Provide approved manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps. Obtain cable tray components from a single manufacturer.
- K. Engraved Nameplates: 1/2 inch high black letters on yellow laminated plastic nameplate, engraved with the following wording:
 WARNING! DO NOT USE CABLE TRAY AS WALKWAY, LADDER, OR SUPPORT. USE ONLY AS MECHANICAL SUPPORT FOR CABLES AND TUBING!

2.13 FLOOR BOXES

- A. Type: Modular, flush-type dual-service units suitable for wiring method used. Provide dual-service units within carpeted areas only.
- B. Compartmentation: Barrier separates power and signal compartments.
- C. Housing Material: Die-cast aluminum, satin-finished.
- D. Power Receptacle: NEMA WD 6, Configuration 5-20R, ivory finish, unless otherwise indicated.
- E. Signal Outlet: Blank cover with brushed cable opening, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION - RACEWAYS

- A. Install in accordance with the following schedule, unless indicated otherwise on Drawings: Plastic flexible PVC conduit shall not be permitted. Flexible metal conduit shall be permitted for electrical power and security wiring only and not permitted for fire alarm cables. Intermediate grade rigid conduit permitted where indicated below.
 - 1. Above suspended ceilings: Galvanized or sheradized thick wall rigid steel (GRC), or intermediate grade rigid steel (IMC), or electrical metallic tubing (EMT).
 - 2. Metal stud walls: Galvanized or sheradized thick wall rigid steel (GRC), intermediate grade rigid steel (IMC), or electrical metallic tubing (EMT).
 - 3. Exposed interior areas: Galvanized or sheradized thick wall rigid steel (GRC), intermediate grade rigid steel (IMC), electrical metallic tubing (EMT).
 - 4. Exposed exterior areas: Galvanized or sheradized thick wall rigid steel (GRC).
 - 5. Underground or below slab areas: Rigid polyvinyl chloride conduit (PVC-Sched. 40).
- B. Install conduit in accordance with NECA "Standard of Installation."
- C. Install nonmetallic conduit in accordance with manufacturer's instructions. Nonmetallic conduit shall only be used under slabs or direct buried in earth. Conduit penetrations through slab including elbows shall be galvanized rigid conduit.
- D. Conduit routing indicated on Drawings are approximate locations unless dimensioned. Route parallel and perpendicular to building construction for complete wiring system regardless whether exposed or concealed.
- E. Arrange supports to prevent misalignment during wiring installation.
- F. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- G. Group related conduits; support using conduit rack. Construct rack using approved steel channel and provide space on each rack for 25 percent additional conduits.
- H. Fasten conduit supports to building structure and surfaces under provisions of this section.
- I. Do not support conduit with wire or perforated pipe straps in any type structure. Remove wire used for temporary supports. Steel tie wire may be used to anchor conduit down to reinforcing rods in concrete encasement only.
- J. Do not attach conduit or boxes to ceiling support wires. Boxes shall be independently supported.

- K. Arrange conduit to maintain headroom and present neat appearance. Maintain required clearance between conduit and piping.
- L. Route all conduit, whether exposed or concealed, parallel and perpendicular to walls, ceilings, building structures, etc.
- M. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- N. Cut EMT conduit square using saw or pipe cutter; de-burr cut ends and ream. Bring conduit to shoulder of fittings; fasten securely.
- O. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- P. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes. Use Myers hub connectors on all conduit entering top or sides of all junction boxes, pull boxes, wiring gutters, exposed to weather.
- Q. The number of conduit bends per box shall comply with NFPA 70, Article 360. Conduit bends for "SCS" installation shall not exceed two 90 degree bends or exceed a total of 180 degrees of bend between pull boxes or conduit ends. Pull boxes shall be sized per NEC codes per conduit installed. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or use factory elbows for bends in metal conduit larger than 2 inch size.
- R. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- S. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- T. Provide suitable nylon pull string or #14 AWG steel wire in each conduit excluding sleeves and nipples.
- U. Ground and bond conduit per NFPA 70.
- V. Coat all metallic conduit with "General Electric" RTV silicone sealer where conduit is installed in exterior areas or in contact with concrete or earth.
- W. Conduits shall be sized as indicated on Drawings. Where sizes are not indicated, conduit shall be sized per NFPA 70.
- X. Cap all upturned conduits during construction rough-in to prevent moisture or debris from entering. Pull through each and every conduit a dry swab of sufficient size to remove any and all moisture.
- Y. Maximum length of flexible metal conduit (Greenfield), or flexible liquidtight shall be 5 feet.
- Z. Assure ground continuity on all branch circuitry conduits with two locknuts, one inside and one outside of all boxes, cabinets and gutters for rigid conduit. One locknut inside of all boxes, cabinets, and gutters for EMT.
- AA. Provide conduit supports as follows:
 - 1. Galvanized rigid thick wall conduit (GRC), intermediate grade rigid conduit (IMC) and electrical metallic conduit (EMT) within three feet of all outlet boxes, junction boxes, cabinets, gutters, or fittings. Horizontally anchored at 10 foot maximum intervals. Other spacings indicated on Drawings.
 - 2. Flexible metal conduit (Greenfield) and liquid-tight flexible metal conduit (sealtite), within 12 inches of all outlet boxes, junction boxes, cabinets, gutters, or fittings and bends or turns. Horizontally anchored at 4-1/2 foot intervals. 1/2 inch minimum size permitted.

3.3 INSTALLATION - BOXES

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with NFPA 70.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated or as required for specific project requirements. Orient boxes to accommodate wiring devices as specified in Section 262726.
- D. Electrical boxes are indicated on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose with no additional cost to contract. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- E. Maintain headroom and present neat mechanical appearance.
- F. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. Install pull boxes in freezer and dock area above bottom chord of structural joist. Pullboxes sized in excess of 12 inches shall be equipped with hinged and hasped covers.
- G. Install outlet and junction boxes within inaccessible ceiling areas, no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- H. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
- I. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- J. Locate flush mounted box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening. Use approved raised gang covers in masonry and stud walls.
- K. Flush mounted boxes shall not be mounted back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
- L. Secure flush mounted box to interior wall and partition studs. Accurately position to allow for surface finish thickness. Use approved stamped steel bridges to fasten box between studs.
- M. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- N. Use approved adjustable steel channel fasteners spanning joist for hung ceiling outlet box.
- O. Provide factory sectioned multi-gang boxes where more than one adjacent device is to be mounted. Sectional boxes shall not be permitted.

3.4 INSTALLATION - CABLE TRAYS

- A. Install trays level and plumb in accordance with manufacturer's published instructions.
- B. Install metallic cable tray in accordance with NEMA VE 2.
- C. Support cable trays as follows:
 - 1. Use anchors and fasteners as specified in Section 260500.
 - 2. Provide supports at each connection point and at the end of each run.
 - 3. Design supports including attachment to structure to carry the greater of calculated load multiplied by a factor of four or the calculated load plus 200 lb.
- D. Locate cable tray with sufficient space to permit access for installing cables.

- E. Make changes in directions and elevations using standard fittings. Use expansion connectors where required.
- F. Ground and bond cable tray under provisions of Section 260500.
- G. Provide continuity between tray components.
- H. Use anti-oxidant compound to prepare aluminum contact surfaces before assembly.
- I. Provide #2 AWG bare copper equipment grounding conductor through entire length of tray; bond to each section.
- J. Connections to tray may be made using mechanical connectors.
- K. Install warning signs at 50 feet on center along cable tray, located to be visible.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspect conduit installation, types, sizes, fittings and attachment to structure.
- C. Inspect box installation, locations, connection to conduit, and attachment to structure.
- D. Inspect cable tray installation, locations, connection to conduit, and attachment to structure.

3.6 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused box openings.

3.7 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish like new.

END OF SECTION

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SECTION 260623

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Lighting Control System for Workroom.
 - 2. Lighting Control System for Box Lobby.
 - 3. Control of Interior/Exterior Lighting.
 - 4. Control of Administrative Area Lighting.
 - 5. Occupancy Sensors.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- C. Related Sections:
 - 1. Section 019113 - General Commissioning Requirements.
 - 2. Section 260500 - Common Work Results for Electrical.
 - 3. Section 260800 - Commissioning of Electrical Systems.

1.2 REFERENCES

- A. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.
 - 2. NFPA 101 - Life Safety Code.
- C. Codes and Standards:
 - 1. International Building Code / National Electrical Code.
 - 2. Occupational Safety and Health Agency Standards.
 - 3. Illuminating Engineering Society Handbook.
 - 4. ASHRAE Standard 90.1.
 - 5. The International Energy Conservation Code.
- D. U.L. Standards:
 - 1. UL 916 Energy Management Equipment.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 - 1. Product Data: Data for each component of the lighting control system indicating electrical characteristics and connection requirements.
 - a. Lighting Control Components.
 - b. Digital Interval Timer.
 - c. Digital Time Switch.
 - d. Exterior Photo Sensor.
 - e. Occupancy Sensors.

2. Shop Drawings: Indicate electrical characteristics and connection requirements, including layout of completed assemblies, interconnecting cabling, dimensions, and power requirements.
3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products and components meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 1. Project Record Documents: Accurately record the actual locations of Products.
 2. Operating Instruction: Document training by furnishing a sign-in sheet with a description on the training provided, instructors name and organization and those who received training. Refer to 017704 1.3, 1.4 and 1.5 for more specific training.

1.4 SYSTEM DESCRIPTION

- A. Each space enclosed by walls or floor-to-ceiling height partitions must be equipped with at least one automatic control device to independently control the general lighting within the space. This control device must automatically de-energize the space lighting within 30 minutes of all occupants leaving the space. Interior lighting for all spaces must utilize automatic occupancy sensors to turn off lighting in all spaces without occupant intervention.
- B. The workroom and enclosed platform lighting systems shall be provided to achieve the required light levels for the lighting groups as shown on the drawings.
- C. The functional characteristic of each luminaire within the workroom and enclosed platform shall be as follows:
 1. Lamp and ballast combinations within individual luminaires, groups of luminaires or at every other luminaire must be controlled as zones to achieve the required illumination levels under different lighting conditions. Control solutions such as turning off every other luminaire or row of luminaires are acceptable. Fluorescent dimming systems, due to their high cost, are not an acceptable control strategy.
 2. All luminaires must be automatically controlled by ceiling or luminaire mounted occupancy sensors. The occupancy sensors selected must be appropriate for the ceiling height or luminaire mounting height within the workroom or platform. Ceiling mounted sensors shall be located to overlap their coverages and provide a seamless transition from one sensor zone to the next.
 3. The occupancy sensors shall be dual-technology type and must turn the ambient lighting groups "off" within 20 minutes of the last detected presence in the workroom.
- D. Limit lighting in the workroom area to an average maintained level of 25 footcandles and use bi-level AC switching. Average maintained high output level illumination is limited to 25 footcandles, low output level illumination to 12.5 footcandles.
 1. "High output level illumination" condition. This condition must provide 25 fc for normal workroom activities and must be both automatically and countdown timer controlled using countdown timers fed downstream of the occupancy sensors. The high output level illumination groups must only be energized upon detection of presence by the occupancy sensor(s) and activation of the countdown timer(s). When the override countdown timer is activated, high level lighting illumination must come on for a period of no more than four (4) hours. This must be the primary lighting system provided for the workroom.
 2. "Low output level illumination" condition. This condition must provide 12.5 fc for the workroom area when less visual activity is needed and must be automatically controlled using occupancy sensors.
- E. The lighting within exterior, open platform and carrier canopies must be provided with bi-level control (0%, 50% to 100%). The lower output illumination level of 12.5 footcandles shall be automatically controlled by photo-sensor(s) and the higher output level of 25 footcandles must be both automatically

and countdown timer controlled utilizing photo-cells with countdown timers fed downstream of the photo-sensor(s).

- F. Exterior lighting shall be energized by photo-sensor(s) and de-energized by time control functions.
 - 1. The control of the exterior and building mounted signs shall operate similar to the exterior lighting control scheme, but shall utilize independent time schedules.
- G. Box Lobby Control System Performance Requirements:
 - 1. 24 hour Box Lobby lighting shall be automatically controlled utilizing occupancy sensors.
 - 2. All other Box Lobby spaces shall have manual on/off controls wired downstream of the area occupancy sensors.
- H. Daylighting automatic controls shall be provided for the rooms and spaces indicated on the drawings and provided as specified herein.

1.5 QUALITY ASSURANCE

- A. Single Source: Provide occupancy sensors, photocells, time switches, digital override timer switches, and other lighting control components from a single lighting control system supplier.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70 and NFPA 101.
 - 2. Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.
 - 3. Comply with NEC, NEMA and FCC Emission requirements for Class A applications.
 - 4. UL Approvals: Lighting control components are to be UL listed under UL 916 Energy Management Equipment.
- D. Testing:
 - 1. Component Pretesting: All component and assemblies are to be pretested and burned-in prior to installation.
 - 2. System Checkout: A factory trained technician shall test each component in the system after installation to verify proper operation. Submit check-out memo from factory representative.
 - 3. Functional testing of the lighting control system shall be provided by an independent commissioning authority in accordance with ASHRAE 90.1. Refer to Section 260800 - Commissioning of Electrical Systems.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, Handle, Store, and Protect Products.
- B. Store products in clean, dry area; maintain temperature to NEMA ICS 1 requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering products which may be incorporated in the Work include the following:
1. Cooper Controls, Peachtree City, GA (800) 553-3879.
 2. Encelium Technologies, Inc., Philadelphia, PA (267) 286-0336.
 3. General Electric Company, Plainville, CT (800) 626-2000.
 4. Hubbell Building Automation, Inc, Austin, TX (888) 698-3242.
 5. Intermatic, Inc., Spring Grove, IL (815) 675-7000.
 6. Leviton, Little Neck, NY (800) 824-3005.
 7. Lighting Control & Design, Glendale, CA (800) 345-4448.
 8. Lutron Electronics, Co. Coopersburg, PA (800) 523-9466.
 9. Novitas, Culver City, CA (310) 568-9600.
 10. Sensor Switch, Wallingford, CT (800) 727-7583.
 11. Tork, Mount Vernon, NY (914) 664-3542.
 12. WattStopper, Santa Clara, CA (800) 879-8585.
- B. Section 016000 - Product Requirements: Product options and substitutions. Unless otherwise noted, substitutions are permitted.

2.2 LOW VOLTAGE-DIGITAL TIMER SWITCH

- A. Provide flush mounted, low voltage, digital, countdown timer switch with the following features:
1. The timer switch shall be programmable to turn loads "off" after a preset time interval of (4) hours maximum. Switch shall be equipped with manual "on/off" pushbutton.
 2. Time switch shall be five terminal, completely self-contained control system that replaces a standard toggle switch and shall operate at 24 VAC/VDC/VAC half wave rectified.
 3. Time scroll features shall allow manual overriding of the preset time-out period. Selecting time scroll UP shall allow time-out period to scroll up throughout the timer possibilities to the maximum. Time scroll DN (down) shall allow time-out period to scroll down to minimum.
 4. Optional flash and beep warnings shall notify occupants when the interval countdown reaches one minute. Switch shall have a Liquid Crystal Display that shows the timer's countdown.
 5. Timer switch shall have manual feature for timer reset where pressing the ON/OFF switch for more than 2 seconds resets the timer to the programmed time-out period.
 6. Timer switch shall mount behind a decorator style face plate. The calibration switch for setting time-out, time scroll and warnings shall be concealed to prevent tampering of adjustments and hardware.
 7. Sensor shall have no minimum load requirement and shall be capable of switching all solid-state LED and electronic fluorescent ballast loads at the rating of the power pack.
 8. Switch shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1 percent. Sensors shall have standard five (5) year warranty and shall be UL and CUL listed.
 9. Provide universal voltage, power pack for 24 VDC operating voltage to the timer switch.
 10. Basis of Design: WattStopper TS-400-24.

2.3 DIGITAL TIME SWITCH

- A. Provide 365/7 day, digital time switch with astronomical clock, holiday scheduling and automatic daylight savings time adjustment. Time switch shall have the following features:
1. Provide maximum (2) hour manual override switch and capacitor carry-over (minimum 100 hours).

2. Switch shall be compatible with all solid-state LED and electronic fluorescent ballast loads rated 20 Amps at 120 or 277 VAC, DPST.
3. Provide indoor/outdoor plastic enclosure.
4. Basis of Design:
 - a. Tork/NSI #DG100A Series.
 - b. Intermatic #ET2000 Series.

2.4 EXTERIOR PHOTOCONTROL SENSOR

- A. Provide weatherproof line voltage photo-sensor for measuring exterior light levels: ON @ 1 to 5 fc / OFF @ 3 to 15 fc. The photo-sensor shall be mounted facing north as indicated on the plans. The photo-sensor shall be rated as follows: 1800 Watts @ 120VAC; 4150 Watts @ 277 VAC.
 1. Basis of Design:
 - a. Intermatic # K4141C (120/277 VAC).
 - b. Tork/NSI #2001 (1800 Watts @ 120 VAC).
 - c. Tork/NSI #2002 (4620 Watts @ 277 VAC).

2.5 ANALOG, DUAL TECHNOLOGY, SINGLE RELAY, WALL BOX OCCUPANCY SENSOR

- A. Provide flush mounted, single relay, wall box type occupancy sensor with the following features:
 1. The Occupancy Sensor Switch shall be a designer-style, multiple-detection technology, universal voltage occupancy sensing wall switch.
 2. Sensor shall be designed to accept and control universal voltage (120VAC to 277VAC, 60Hz.) and rated to control up to 800-watt lighting loads @ 120VAC and 1200 Watts @ 277VAC.
 3. Sensor shall be a two-wire switch capable of handling the following loads:
 - a. Quartz Halogen
 - b. Solid-State LED
 - c. Electronic Low-Voltage
 - d. Magnetic Low-Voltage
 - e. Fluorescent Non-Dimming Ballasts
 4. Sensor shall have a viewing area of not less than one hundred seventy (170°) degrees at an axial distance of forty feet (40'), fifty feet (50') at 0 degrees, and shall have a total coverage area of not less than four-thousand square feet (4,000 Sq. Ft.) with an unobstructed view.
 5. Sensor shall utilize non-intrusive, passive dual detection technologies consisting of:
 - a. Passive Infrared (PIR) to read and detect occupants' body heat and movement, and;
 - b. Enhanced microphonics to hear and detect occupancy throughout the entire space.
 6. Under no circumstances shall the unit emit energy of any type into the space that can potentially interfere with electrical, electronic, or medical devices (i.e. hearing aids), etc.
 7. Each unit shall provide manual on/automatic off operation and accept on/off commands from an unlimited number of multi-location 3-way Remotes.
 8. Remote stations shall provide multi-location On / Off control of the switch using conventional 3-way wiring.
 9. The unit shall, when manually turned off by the user, continue to monitor the space, but will not turn on the lights. User shall be able to, at anytime, override this feature by manually turning on the lights.
 10. The unit's operational/parameter programming shall be accomplished with the unit installed and operational without the need to remove the unit from its installed location.
 11. Each unit shall provide a LED indicator to provide indication when the sensor detects movement.
 12. Device shall mount in a single gang wall box and be gangable with other designer-style electrical devices and faceplates.
 13. The Sensor shall be UL Listed to U.S. and Canadian standards for 120VAC to 277VAC capacity.
 14. Basis of Design:
 - a. Sensor Switch #WSD PDT Series.
 - b. WattStopper #PW-100 Series.

2.6 ANALOG DUAL TECHNOLOGY, DUAL RELAY, WALL BOX OCCUPANCY SENSOR

- A. Provide flush mounted, dual relay, wall box type occupancy sensor with the following features:
1. The occupancy sensor switch shall be a designer style, multiple detection technology, universal voltage, occupancy sensing wall switch.
 2. Sensor shall be capable of detecting presence in the control area by detecting Doppler shifts in transmitted ultrasound and passive infrared heat changes. Sensor shall utilize Dual Sensing Verification Principal for coordination between ultrasonic and PIR technologies. Each sensing technology shall have a LED indicator that remains active at all times in order to verify detection within the area to be controlled.
 3. Sensor shall feature a trigger mode where the end-user can choose which technology will activate the sensor. Selection of technologies for initial, maintain and re-trigger shall be done with DIP switches. Sensor shall have its trigger mode factory preset to allow for quick installation. In this default setting, both technologies must occur in order to initially activate lighting systems. Detection by either technology shall maintain lighting on, and detection by either technology shall turn lights back on after lights were turned off for 5 seconds or less in automatic mode and 30 seconds or less in manual mode.
 4. Sensor shall have 4 occupancy logic options for customized control to meet application needs.
 5. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing which automatically adjusts the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.
 6. The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources.
 7. Sensor shall utilize SmartSet™ technology to optimize automatic time delay to fit occupancy usage patterns. The use of SmartSet shall be selectable with a DIP switch.
 8. Sensor shall utilize Zero Crossing circuitry on both relays to reduce stress on relays and increase sensor life.
 9. Sensor shall utilize two relays capable of simultaneously controlling independent lighting loads or circuits. The secondary relay shall be isolated, allowing for two-circuit control.
 10. Sensor shall have no minimum load requirement and shall be capable of switching from 0 to 800 Watt solid-state LED; 0 to 800 Watt fluorescent or 1/6 hp at 120 VAC, 60 Hz; and 0 to 1200 Watt fluorescent at 277 VAC, 60 Hz.
 11. Sensor shall feature a walk-thru mode, where lights turn off 3 minutes after the area is initially occupied, if no motion is detected after the first 30 seconds, set by a DIP switch.
 12. Sensor shall cover up to 1,000 s.f. for walking motion with a field view of 180 degrees and shall have automatic-ON or manual-ON operation for both relays adjustable for each relay.
 13. The sensor shall act as a "service switch" to allow operation in the unlikely event of a failure and shall be able to control incandescent, magnetic low voltage, electronic low voltage, "LED" solid state, and fluorescent lighting loads
 14. Sensors shall have a built-in light level featuring simple, one-step daylighting setup that works from 8 to 180 footcandles.
 15. Wall switch sensor shall be a completely self contained control unit that replaces a standard toggle switch.
 16. To ensure quality and reliability, sensor shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1%. Sensor shall have standard 5-year warranty and shall be UL and CUL listed.
 17. Basis of Design: WattStopper #DW-200.

2.7 CEILING MOUNTED OCCUPANCY SENSOR

- A. Provide low voltage, ceiling mounted, 360 degree, dual technology occupancy sensor with the following features.
1. The sensor shall be capable of detecting presence in the control area by detecting doppler shifts in transmitted ultrasound.

2. Sensor shall have a retrigger feature in which detection shall retrigger the lighting system on within 5 seconds of being switched off.
3. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing that automatically adjusts the detection threshold dynamically to compensate for changing levels of activity and airflow throughout controlled space.
4. To avoid false ON activations and to provide immunity to RFI and EMI, Detection Signature Analysis shall be used to examine the frequency, duration, and amplitude of a signal, to respond only to those signals caused by human motion.
5. Sensors shall utilize SmartSet™ technology to optimize time delay and sensitivity settings to fit occupant usage patterns. The use of SmartSet shall be selectable with a DIP switch. Sensors shall have a time delay that is adjusted automatically (with the SmartSet setting) or shall have a fixed time delay of 5 to 30 minutes.
6. Sensors shall feature a walk-through mode, where lights turn off 3 minutes after the area is initially occupied if no motion is detected after the first 30 seconds.
7. Sensor shall have an LED indicator that remains active at all times in order to verify detection within the area to be controlled. The LED can be disabled for applications that require less sensor visibility.
8. Sensor shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1%. Sensors shall have standard 5 year warranty and shall be UL and CUL listed.
9. Basis of Design: WattStopper #WT-2200.
10. Provide universal voltage, power pack for 24 VDC operating voltage to the occupancy sensors. Power pack shall enable manual on, hold on, hold off and load shed for bi-level switching applications. Basis of Design: WattStopper BZ-150.

2.8 ANALOG DAYLIGHTING CONTROLLER

- A. Provide low voltage, ceiling mounted, daylighting photo-controller to control the space lighting when sufficient daylighting is present. Controllers shall have the following features:
 1. The light level controller shall be capable of detecting changes in lighting levels and shall utilize an internal photocell that measures light in a 100 degree angle cutting the unwanted light from bright sources outside of this cone.
 2. The light level controller shall be capable of controlling any type of lighting through use of power packs. Light level controller shall operate from a 24 volts DC power supply with a current draw of 22 milliamps.
 3. The light level controller shall be capable of turning lighting on and off for a single zone with an extended range of 1 to 1400 fc. The controller shall have an adjustable deadband feature with 25%, 50%, 75% or 100% in relation to the setpoints and shall have an adjustable time delay range of 3, 10, 15 or 30 minutes.
 4. The controller shall provide a connection for an optional low voltage, normally open momentary contact wall switch override or occupancy sensor interface.
 5. The controllers shall be a microprocessor type with LED status indicator. Light level controller shall have full 5-year warranty.
 6. Basis of Design: WattStopper #LS-102

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. The Lighting Control System shall be installed and wired completely as shown on the plans by the contractor, who shall make all necessary wiring connections to external devices and equipment.

3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Perform operational testing on lighting control system to verify proper operation and field wiring connections.
- C. System Start Up and Commissioning:
 - 1. Manufacturer shall provide a factory authorized technician to confirm proper installation and operation of all lighting control system components.
 - 2. Lighting control devices shall be tested to ensure they are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions.
 - a. Provide functional performance testing as required by Section 260800 - Commissioning of Electrical Systems.
- D. System Training:
 - 1. Manufacturer shall provide factory authorized technician to train owner personnel in the operation, programming and maintenance of the lighting control system including all occupancy sensors and daylighting controls.
- E. System Programming:
 - 1. Manufacturer shall provide system programming including:
 - a. Wiring documentation.
 - b. Switch operation.
 - c. Operating schedules.

END OF SECTION

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SECTION 260800

COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Systems and equipment testing and start-up.
- B. Validation of proper and thorough installation of Division 26 systems and equipment.
- C. Functional performance testing of electrical systems.
- D. Documentation of tests, procedures, and installations.
- E. Coordination of Training Events.
- F. Generic Start-Up Procedures for electrical systems and equipment.

1.2 SCOPE

- A. The following electrical equipment and/or systems shall be commissioned if in compliance with the guidelines provided in Specification 019113, or with Contracting Officer approval:
 - 1. Lighting and Lighting Control System – Per ASHRAE 90.1, Table 9.4.3.
 - 2. Security / Physical Access Control CCTV System.

1.3 GENERAL DESCRIPTION

- A. Commissioning (Cx) is the process of ensuring that all building systems are installed and perform interactively according to the design intent; that systems are efficient and cost effective and meet the USPS's operational needs; that the installation is adequately documented; and that the Operators are adequately trained. It serves as a tool to minimize post-occupancy operational problems. It establishes testing and communication protocols in an effort to advance the building systems from installation to full dynamic operation and optimization.
- B. The USPS shall arrange to retain an independent Commissioning Authority (CxA) to provide Commissioning Services.
- C. Commissioning Authority (CxA) shall work with the Contractor and Engineer to direct and oversee the Cx process and perform functional performance testing.
- D. This Section outlines the Cx procedures specific to the Contractor's electrical responsibilities. Requirements common to all work are described in Specification section 019113.

1.4 RELATED WORK AND DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.
- B. Commissioning Plan: The Cx Plan shall be available for reference as it outlines responsibilities outside of the Construction Contract. It provides the Contractor and the USPS an understanding of the planned commissioning activities for that project.

- C. Section 013300 - Submittal Procedures: Stipulates additional copies of submittals to be submitted and refers to other sections for additional submittal requirements related to Cx.
- D. Section 017704 - Closeout Procedures and Training: Defines the milestones in completion incorporating the Cx process.
- E. Section 019113 - General Commissioning Requirements: Specifies the general facility commissioning procedures common across all Divisions and the Contractor's responsibilities for the commissioning process.
- F. Individual Specification Sections: Individual sections stipulate installation, start-up, warranty, O&M documentation, and training requirements for the system or device specified in the Section.
- G. Section 250804 - Building Automation System Commissioning: Details the commissioning procedures specific to the BAS.

1.5 REFERENCE STANDARDS

- A. AABC Commissioning Group (ACG)
- B. NEBB – Procedures for Building Systems Commissioning
- C. National Electric Code (NEC)
- D. American Society for Testing and Materials (ASTM)
- E. Electronics Industry Association/Telecommunications Industry Association (EIA/TIA)
- F. Illuminating Engineering Society (IES)
- G. Institute of Electrical and Electronics Engineers (IEEE)
- H. International Electrical Testing Association (NETA)
- I. National Electrical Manufacturers Associates (NEMA)
- J. National Fire Protection Association (NFPA)
- K. Underwriters Laboratory, Inc. (UL)

1.6 DOCUMENTATION

- A. As required in Specification 019113 and the following as they apply to the commissioning of equipment:
 - 1. Factory Test Reports: Contractor shall provide any factory testing documentation or certified test reports required by the specifications. These shall be provided prior to Acceptance Phase. Factory Test Reports should be provided in pdf electronic format. These include but are not limited to:
 - a. Field Testing Agency Reports: Provide all documentation of work done by independent testing agencies required by the contract documents. These shall be provided prior to Acceptance Phase. Field Testing Agency Reports should be provided in pdf electronic format.

1.7 COORDINATION MANAGEMENT PROTOCOLS

- A. Coordination responsibilities and management protocols relative to Cx are initially defined in Section 019113 and the Commissioning Plan, but shall be refined and documented in the Construction Phase

Cx Kick-Off meeting. Contractor shall have input in the protocols and all Parties will commit to scheduling obligations. The CxA will record and distribute.

1.8 CONTRACTOR RESPONSIBILITIES

- A. Refer to Section 019113: Detailed Contractor responsibilities common to all Divisions are specified in Section 019113. The following are additional responsibilities or notable responsibilities specific to the electrical systems.
- B. Construction Phase:
 - 1. Coordinate the work of the Electrical Testing Agency and the Cx requirements, as required.
 - 2. Provide skilled technicians qualified to perform the work required.
 - 3. Provide factory-trained and authorized technicians where required by the Contract Documents.
 - 4. Prepare and submit required draft Start-Up Procedures and submit along with the manufacturer's application, installation and start-up information.
 - 5. Provide assistance to the CxA in preparation of the specific Functional Performance Test (FPT) procedures. Contractors, subcontractors and vendors shall review FPT procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
 - 6. Thoroughly complete and inspect installation of systems and equipment as detailed throughout Contract Documents, as required by reference or industry standards, and as specifically indicated elsewhere in this Section.
 - 7. Record Start-up Procedures on start-up procedure forms and certify that the systems and equipment have been started and or tested in accordance with the requirements specified above. Each task or item shall be indicated with the Party actually performing the task or procedure.
- C. Acceptance Phase:
 - 1. Assist CxA in functional performance testing. Assistance will generally include the following:
 - a. Manipulate systems and equipment to facilitate testing (as dictated in Section 019110 and the Cx Plan; in some cases this will entail only an initial sample).
- D. Warranty Phase:
 - 1. Maintain record documentation of any configurations, set ups, parameters etc, that change throughout the period.
 - a. Provide representative for off season testing as required by CxA.
 - b. Respond to Warranty issues as required by Division 1 and the General Conditions.

1.9 START-UP PROCEDURES AND DOCUMENTATION

- A. Refer to Section 019113 and as detailed in PART 3 - EXECUTION below.

1.10 INDEPENDENT ELECTRICAL TESTING AGENCY

- A. The Independent Electrical Testing Agency shall be provided under the construction specifications and therefore included with the bid. Many of the aspects of the start-up and functional performance testing indicated herein will be accomplished under the respective section and witnessed by the CxA at the indicated sample rate. CxA will include applicable test results in the functional performance testing record.

1.11 FUNCTIONAL PERFORMANCE TESTING

- A. For applicable systems and equipment, Contractor shall participate in the initial samples of Functional Performance Testing as stipulated in Section 019113 and the Commissioning Plan.

1.12 FPT ACCEPTANCE CRITERIA

- A. Acceptance criteria for tests are indicated in the specification Sections applicable to the systems being tested. Generally, unless indicated otherwise, the criteria for acceptance will be that specified with the individual system, equipment, component, or device, which in general conform to NFPA 70B and International Electrical Testing Association (NETA) testing specifications NETA ATS-2003.

1.13 TRAINING

- A. Contractors, subcontractor, vendors, and other applicable Parties shall prepare and conduct training sessions on the installed systems and equipment they are responsible for per the requirements of Section 019113 and the individual Specifications.

1.14 O&M MANUAL CONTENT - PREPARATION AND LOGISTICS

- A. Refer to Section 019113 and the individual Specifications.

PART 2 - PRODUCTS

2.1 INSTRUMENTATION

- A. All testing equipment used by any Party shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply: All equipment shall be calibrated according to the manufacturer's recommended intervals. Calibration tags shall be affixed or certificates readily available.
- B. Testing Instrumentation: Contractor shall provide all instrumentation necessary for tests for which they are responsible. CxA will provide standard instrumentation for measuring medium and low voltage electrical voltage, current, power factor, power, and THD. CxA will provide receptacle testers for normal and GFI receptacle tests. Contractor shall provide all other instrumentation required to accomplish the specified testing.
- C. Contractor shall provide infrared scanning equipment when required by the contract documents. Infrared scanning equipment shall be an AGA (or approved equal) thermovision set capable of viewing an entire bus or equipment assembly at one time and have a sensitivity of 0.2°C with a liquid nitrogen reference.
- D. Contractor shall provide Amprobe DM-III Multitest F power quality recorder/data logger or approved equal.

PART 3 - EXECUTION

3.1 START-UP PROCEDURES

- A. This Section outlines 'generic' or minimally acceptable Start-Up Procedures. These items shall provide a minimum or guideline for required Contractor development of Start-Up Procedures. Contractor shall synthesize these minimum requirements along with their own internal quality control practices, those of the manufacturer, and any applicable codes and standards to develop specific and itemized Start-Up Procedures specific to the equipment and systems installed on this project.

- B. Refer to NETA which is referenced in several Division 26 sections which outline electrical related testing required.
- C. The following start up verifications/procedures are common to all systems:
 - 1. Checkout shall proceed from devices to the components to the systems.
 - 2. Verify labeling is affixed per spec and visible.
 - 3. Verify prerequisite procedures are done.
 - 4. Inspect for damage and ensure none is present.
 - 5. Verify system is applied per the manufacturer's recommendations.
 - 6. Verify system has been started up per the manufacturer's recommendations.
 - 7. Verify that access is provided for inspection, operation and repair.
 - 8. Verify that access is provided for replacement of the equipment.
 - 9. Verify the record drawings, submittal data and O&M documentation accurately reflect the installed systems.
 - 10. Verify all gages and test reports are provided as required by contract documents and manufacturer's recommendations.
 - 11. Verify all recorded nameplate data is accurate.
 - 12. Installation is done to ensure safe operation and maintenance.
 - 13. Verify specified replacement material/attic stock has been provided as required by the Construction Documents.
 - 14. Verify all rotating parts are properly lubricated.
 - 15. Verify all monitoring and ensure all alarms are active and set per USPS requirements.

3.2 LIGHTING AND LIGHTING CONTROLS

- A. General: Refer to the quality control requirements listed in section 019113 - General Commissioning Requirements for additional checks and tests. These shall be included in the tests used for this project.
- B. Functional Testing. Lighting control devices and control systems shall be tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. When occupant sensors, time switches, programmable schedule controls, or photo sensors are installed, at a minimum, the following procedures shall be performed:
 - 1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance, lights turn off only after space is vacated and do not turn on unless space is occupied.
 - 2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
 - 3. Confirm that photosensor controls reduce electric light levels based on the amount of usable daylight in the space as specified.
 - 4. Check the lighting systems and ensure that the all luminaries and lamps are operational and fixtures are clean.
 - 5. Measure lighting levels after lamps have been 'burned in' for at least 100 hours. Check lighting levels to ensure compliance with the design requirements for the respective zones, if applicable.
 - 6. Check operational and override switches to ensure the proper operation of timing circuits.
 - 7. Check lighting schedules to ensure they are programmed per the documentation and in accordance with the required lighting zones, if applicable.
 - 8. Measure the connected loads in current and watts on each controlled circuit.
 - 9. Check full load current on all breakers serving controlled lighting to ensure that the breaker is properly sized.
 - 10. Verify the correct operation of all control devices (contactors, relays, time clocks, control interface relays, etc.).
 - 11. Check full load current on all control device contacts serving controlled lighting to ensure that the contact rating is properly sized.

END OF SECTION

USPS CSF Specification issued: 10/1/2018
Last revised: 9/4/2018

SECTION 262416

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Panelboards.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA AB 1 - Molded Case Circuit Breakers.
 - 2. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
 - 3. NEMA KS 1 - Enclosed Switches.
 - 4. NEMA PB 1 - Panelboards.
 - 5. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- C. Underwriters Laboratories (UL):
 - 1. UL 486 - Molded Case Circuit Breakers.
 - 2. UL 67 - Heat Rise Test for Panelboards.
 - 3. UL 50 - Steel Gauge Requirements for Cabinets and Enclosures.
 - 4. UL 1449 3rd Edition - Standard for Transient Voltage Surge Suppressors.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 - 1. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
 - 2. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
 - 3. Shall include UL 1449 Listing documentation verifying the following:
 - a. Short Circuit Current Rating (SCCR)
 - b. Voltage Protection Ratings (VPRs) for all modes
 - c. Maximum Continuous Operating Voltage Rating (MCOV)
 - d. I-nominal rating (I-n)
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
 - 1. Project Record Documents: Record actual locations of Products; indicate actual branch circuit arrangement.

2. Operation and Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.
3. Submit data showing compliance with UL 1449.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Qualifications:
 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

PART 2 - PRODUCTS

2.1 GENERAL CLASSIFICATION

- A. Manufacturers: General Electric Company (G.E.) Catalog numbers are used to identify type of equipment specified. Equivalent products by the following manufacturers are acceptable: Alternate substitutions not permitted.
 1. Siemens
 2. Square-D
 3. Eaton/Cutler Hammer
 - a. Branch Circuit Panels:
 - 1) 120/208V: G.E. Type AQ
 - b. Distribution Panels:
 - 1) Circuit breaker: G.E. Type CS or A

2.2 PANELBOARDS

- A. Cabinet: Construct cabinet with code gauge galvanized steel. Provide minimum 20 inch wide cabinets, and extra wiring space where incoming feed-through or parallel lines are required.
- B. Doors: Provide single door construction, made of cold-rolled steel. Door shall have concealed hinges, flush catch, and lock. (Tie bar handles not acceptable). Secure top and bottom of door to cabinet by slotted steel bolts. Release shall be by one-half turn with a screwdriver. All panels shall be keyed alike.
- C. Panels located adjacent to each other shall have identically sized enclosures and trims.
- D. Finish: Finish exposed parts with one coat of primer and one coat of light gray enamel suitable for overpainting in field if desired.
- E. Phase, neutral and ground bus bars shall be tin plated copper.
- F. Provide all hardware for future breakers, identified on drawings as SPACES, or for the full length of usable bus, whichever is longer.
- G. Provide ground bus with full complement of terminals in addition to insulated neutral bus.
- H. Circuit Breakers:
 1. Provide multi-pole units with common trip elements. Handle ties are not acceptable.
 2. Provide key-operated circuit breakers in the panelboards used for the Fire Alarm. Security and CCTV Systems. Circuit breakers shall be similar to square D type QO_K.
 3. 120/208V branch circuit panelboards: Molded cast bolt-on type designed for 120/208V, three phase, four wire service with minimum 10,000 amperes rms short circuit rating.

4. 277/480V branch circuit panelboards: Molded cast bolt-on type designed for 277/480V, three phase, four wire service with minimum 14,000 amperes rms short circuit rating.
 - I. Main circuit breakers shall be individually mounted. The panelboard interior assembly shall be dead front with panelboard front removed. Main lugs or main breakers shall have barriers on five sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the main shall have barriers.
 - J. Provide all panelboards with lockout/tagout devices; Circuit-Safe type as manufactured by Stranco, Inc. or approved equal.
 - K. Nameplates: Provide screwed-on (no adhesives) engraved bakelite nameplate identification on outside of each panel showing panel designation, voltage and phase in minimum 1/4 inch high letters.
 - L. Circuit directories: Provide a metal-framed typewritten circuit directory on inside of inner door, with plastic protector.
 - M. Provide 2-3/4 inches and 1-1 inch spare empty conduits routed above into accessible ceiling space from all flush mounted panelboards.
 - N. Panels serving electronic equipment and/or other harmonic producing loads shall be equipped with double neutral bus bars.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 CLEARANCES

- A. Minimum code required clearances around panelboards must be maintained.

3.3 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1.
- B. Install panelboards plumb. Provide supports in accordance with Section 260500.
- C. Provide filler plates for unused spaces in panelboards.

3.4 MOUNTING HEIGHT

- A. Typically mount panel boards top at 6 ft. – 0 in. above finished floor but no more than 6 ft. – 6 in. above finished floor to top of circuit breaker handle.

3.5 MOUNTING HARDWARE

- A. Provide all necessary blocking, channels and other hardware for securing panelboards to wall, column, or other parts of building structure.

3.6 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Inspect and test panelboard installation and torque connections.
- C. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.
- D. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION

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Last revised: 5/10/2011

SECTION 262726

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wall Switches.
 - 2. Receptacles.
 - 3. Device Plates and Box Covers.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Device -- Dimensional Requirements.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Inc, Milford, CT (203) 882-4800.
 - 2. Leviton Manufacturing, Company, Inc., Little Neck, NY (800) 824-3005.
 - 3. Pass & Seymour, Syracuse, NY (800) 776-4035.

4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide 20 Amp, 120/277V, specification grade, flush, single pole toggle switches with side and back wired screw terminals. All switches shall be equipped with grounding screws.
- C. Single Pole Switch:
 1. Leviton Cat. No. 1221-2.
 2. P&S Cat. No. PS20AC1I.
 3. Hubbell Cat. No. HBL1221.
- D. Double Pole Switch:
 1. Leviton Cat. No. 1222-2.
 2. P&S Cat. No. PS20AC2.
 3. Hubbell, Cat. No. HBL1222.
- E. Three-way Switch:
 1. Leviton, Cat. No. 1223-2.
 2. P&S Cat. No. PS20AC-3.
 3. Hubbell Cat. No. HBL1223.
- F. Color: Switches located within the Retail Area to be mounted in "blue" or "red" painted walls shall be black. All other switches shall be white unless indicated otherwise.

2.2 RECEPTACLES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 1. Leviton Manufacturing, Company, Inc., Little Neck, NY (800) 824-3005.
 2. Pass & Seymour, Syracuse, NY (800) 776-4035.
 3. Hubbell, Inc, Milford, CT (203) 882-4800.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide duplex, specification grade, 20 Amp, 120 Volt, 2 pole, 3 wire receptacles with grounding screw.
- C. Duplex Convenience Receptacle:
 1. Leviton Cat. No. 5362.
 2. P&S Cat. No. 5362.
 3. Hubbell Cat. No. HBL5352.
- D. GFCI Receptacle (Side Wired Feed-Thru):
 1. Leviton Cat. No. 6599.
 2. P&S Cat. No. 2091-SHG.
 3. Hubbell Cat. No. HBLGF5362.
- E. Color: Receptacles located within the Retail Area to be mounted in "blue" or "red" painted walls shall be black. All other receptacles shall be white unless indicated otherwise.

2.3 WALL PLATES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 1. P&S Sierra.
 2. Hubbell.
 3. Leviton.

- 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Cover Plate: Cover plates to be installed within the Retail Areas on "blue" or "red" painted walls shall be black smooth thermoplastic. All other cover plates shall be white smooth thermoplastic unless otherwise noted.
 - 1. Sierra TP8-W.
- C. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device.
 - 1. Sierra 4510 cast aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that outlet boxes are installed at proper height.
 - 2. Verify that wall openings are neatly cut and will be completely covered by wall plates.
 - 3. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- F. Connect wiring devices by wrapping conductor 2/3 of screw diameter in clockwise direction around screw terminal. Tighten screw to 12 pound-inches. Do not use spring pressure devices for wire connections.
- G. Install coverplates on switch, receptacle, and blank outlets.

3.4 CONSTRUCTION

- A. Interface with other work:
 - 1. Coordinate locations of outlet boxes provided under Section 260533 to obtain mounting heights indicated on Drawings.

3.5 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush, level and plumb with wall.

3.7 CLEANING

- A. Section 017300 Execution: Cleaning installed work.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

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Last revised: 8/9/2016

SECTION 262816
ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fusible Switches.
 - 2. Nonfusible Switches.
 - 3. Fuses.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA KS 1 - Enclosed Switches.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 - 1. Product Data:
 - a. Switch ratings and enclosure dimensions.
 - b. Fuse data sheets showing electrical characteristics including time-current curves.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Record actual locations of enclosed switches and actual fuse sizes.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Perform Work in accordance with NECA SI.

1.5 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to USPS Project Manager.
 - 1. Three of each size and type fuse installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Switches: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - 1. Eaton/Cutler Hammer Corp., Pittsburg, PA (800) 525-2000.
 - 2. General Electric Company (800) 626-2000.
 - 3. Siemens Energy & Automation, Alpharetta, GA (800) 964-4114.
 - 4. Square D Company, Palatine, IL (800) 392-8781.
- B. Fuses: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Cooper Industries Incorporated, Waukesha, WI (414) 524-3300.
 - 2. General Electric Company (800) 626-2000.
 - 3. Gould Shawmut, Newburyport, MA (508) 462-6662.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 FUSIBLE ENCLOSED SWITCH ASSEMBLIES

- A. NEMA KS 1, Type HD heavy duty, 100,000 AIC load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Cover shall be equipped with a manual defeat to allow opening by authorized personnel while energized. Handle shall be lockable in ON or OFF position.
- B. Rating: 250 volts AC or 600 volts AC as indicated on Drawings.
- C. Fuse Clips: Designed to accommodate Class R fuses.
- D. Enclosures: NEMA KS 1.
 - 1. Interior Dry Locations: NEMA Type 1 or 12.
 - 2. Exterior Locations: NEMA Type 3R or 12.
- E. Provide factory grounding lug and neutral block if required.

2.3 NONFUSIBLE SWITCH ASSEMBLIES

- A. NEMA KS 1, Type GD, general duty load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Cover shall be equipped with a manual defeat to allow opening by authorized personnel while energized. Handle shall be lockable in ON or OFF position.
- B. Rating: 250 volts AC or 600 volts AC as indicated on Drawings.
- C. Enclosures: NEMA KS 1.
 - 1. Interior Dry Locations: NEMA Type 1 or 12.

2. Exterior Locations: NEMA Type 3R or 12.

D. Provide factory grounding lug and neutral block if required.

2.4 FUSES

A. NEMA FU 1, Class RK5, dual element, current limiting, time delay, 250 volt AC or 600 volt AC as indicated on Drawings.

B. Interrupting Rating: 100,000 rms amperes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

A. Switches:

1. Install in accordance with manufacturers published instructions and NECA SI.
2. Install where indicated on Drawings, where required by equipment, and where required by NFPA 70.
3. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

B. Fuses:

1. Install fuses in fusible switches in accordance with manufacturer's published instructions, as indicated on Drawings, or as required by loading per NFPA 70.
2. Install fuse with label oriented with manufacturer, type, and size easily read.

3.3 FIELD QUALITY CONTROL

A. As specified in Section 260500 - Common Work Results for Electrical.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
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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 265600 - Exterior Lighting.
 - 3. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.
 - 4. Section 283100 - Fire Detection and Alarm.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. IEEE C62.41.1, IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits.
- C. IEEE C62.41.2, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
- D. IEEE C62.45, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits.
- E. NFPA 70; National Electrical Code: Article 285.
- F. UL 1283 - Electromagnetic Interference Filters.
- G. UL 1449, Third Edition, effective September 29, 2009 - Surge Protective Devices.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Section 013300 - Submittal Procedures: Procedures for submittals.

1. Shop Drawings: Indicate outline and support point dimensions, voltage, integrated short circuit ampere rating, and sizes.
 2. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
 3. Certification submitted SPDs are manufactured in the United States.
 4. Shall include UL 1449, 3rd edition Listing documentation verifying the following:
 - a. Short Circuit Current Rating (SCCR)
 - b. Voltage Protection Ratings (VPRs) for all modes
 - c. Maximum Continuous Operating Voltage rating (MCOV)
 - d. I-nominal rating (I-n)
 - e. Type 1 Device Listing:
 - 1) VPR, MCOV, I-n, and Type 1 information is posted at www.UL.com, under Certifications, searching using UL Category Code: VZCA. SCCR's are posted in manufacturer's UL docs.
 - 2) UL data and visual inspection takes precedence over manufacturer's published documentation.
- C. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
1. Project Record Documents: Record actual locations of Products.
 2. Operation and Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. SPDs must be manufactured in the United States.
- C. Manufacturer Qualifications: Engage a firm with at least ten (10) years experience in manufacturing transient voltage surge suppressors.
- D. Manufacturer shall be ISO 9001 or 9002 certified.
- E. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- F. The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Handle and store equipment in accordance with manufacturer's Installation and Maintenance Manuals. One (1) copy of this document to be provided with the equipment at time of shipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following.
 1. ASCO Power Technologies, Incorporated, Clearwater, FL (800) 237-4567.
 2. Emerson/Liebert Corporation, Columbus, OH (800) 877-9222.

3. Atlantic Scientific Corporation, Melbourne, FL (800) 544-4737.
4. Current Technology Inc., Irving, TX (800) 238-5000.

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

2.2 DISTRIBUTION SURGE PROTECTIVE DEVICES (SPDs)

- A. Models:
 1. Basis of Design: Advanced Protection Technologies: "TEXDS" Series.
- B. Surge Protective Device Description: Non-modular type complying with UL 1283 and UL 1449 3rd Edition Listed. Provide unit with the following features and accessories:
 1. LED indicator lights for power and protection status.
- C. Short Circuit Current Rating: SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
- D. SPD Type: SPD shall be UL labeled as Type 1 (verifiable at UL.com), intended for use without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- E. In Rating: SPD shall be UL labeled with 20kA Inominal (I-n) (verifiable at UL.com).
- F. SPD shall provide surge current diversion paths for all modes of protection; L-N, L-G, N-G, and L-L in WYE systems, and L-L, L-G in DELTA Systems.
- G. Minimum Single Impulse Surge Current Capability (single pulse rated) per phase shall be.
 1. Single Impulse Surge Current Capacity is to be 150 kA.
- H. Connection Means: Permanently wired via internal or external disconnecting means.
- I. Protection modes and UL 1449 3rd Edition Voltage Protection Rating for grounded WYE circuits with voltages of 480Y/277, 3-phase, 4-wire shall be as follows:

VOLTAGE	L-N	L-G	N-G
208Y/120V	700V	700V	700V
480Y/277V	1500V	1500V	1500V

- J. Install devices as close as possible to distribution or branch panelboards.
- K. Test unit in accordance with manufacturer's written instructions.

2.3 FIRE ALARM AND SECURITY SYSTEM SURGE PROTECTIVE DEVICES (SPDs)

- A. Power Surge Protection:
 1. SPD shall be listed or recognized in accordance with UL 1449 Third Edition verifiable by visiting UL.com.
 2. SPD shall provide surge current L-N or L-G mode of protection.
 3. SPD shall be chase.
 4. Every mode of protection, shall be protected by internal overcurrent and thermal overtemperature controls.
 5. SPD shall meet or exceed the following criteria:
 - a. Minimum surge current capability (single pulse rated) per phase shall be:
 - 1) 120/240 Panel Application 50kA per phase.

- b. UL 1449 3rd Edition listed Voltage Protection Ratings for shall not exceed the following:
- | <u>VOLTAGE</u> | <u>L-N/L-G</u> | <u>MCOV</u> |
|------------------|----------------|-------------|
| 120V or 240/120V | 600V | 150V |
6. SPD shall have a warranty for a period of two years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. The installation shall meet the following criteria:
1. Install per manufacturer's recommendations and contract documents.
 2. Install units plumb, level and rigid without distortion.
 3. One primary lightning arrestor shall be installed external to the service entrance in accordance with manufacturer instructions.
 4. Service Entrance SPD shall be installed on the load side of the main service disconnect.
 5. Service Entrance SPD ground shall be bonded to the service entrance ground.
 6. At Service Entrance, a UL approved disconnecting means shall be provided as a means of servicing.
 7. One SPD shall be installed external to each designated distribution panelboard.
 8. At Distribution and Branch, SPD shall have an independent means of disconnect such that the protected panel remains energized. A 30A breaker (or larger) may serve this function.
 9. SPD shall be installed per manufacturer's installation instructions with lead lengths as short (less than 24") and straight as possible. Gently twist conductors together.
 10. Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers per NEC.

3.3 ADJUSTMENTS AND CLEANING

- A. Remove debris from SPD and wipe dust and dirt from all components.
- B. Repaint marred and scratched surfaces with touch up paint to match original finish.

3.4 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Check tightness of all accessible mechanical and electrical connections to assure they are torqued to the minimum acceptable manufacture's recommendations.
- C. Check all installed panels for proper grounding, fastening and alignment.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/4/2018

SECTION 265100

INTERIOR LIGHTING (LED-SOLID STATE)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior Luminaires and Accessories.
 - 2. Emergency Lighting Units.
 - 3. Exit Signs.
 - 4. Ballast/Light Emitting Diode (LED) Drivers.
 - 5. Lamps.
 - 6. Luminaire Accessories.
- B. Substitutions:
 - 1. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not allowed.
- C. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- D. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.
 - 2. Section 260623 - Lighting Controls.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Illuminating Engineering Society (IES):
 - 1. IES LM-79 - (2008) Electrical and Photometric Measurements of Solid-State Lighting Products.
 - 2. IES LM-80 - (2015) Measuring Lumen Maintenance of LED Light Sources.
 - 3. IES TM-21 - (2011; Addendum B 2015) Projecting Long Term Lumen Maintenance of LED Light Sources.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 101 - Life Safety Code.
 - 2. NFPA 70 - National Electrical Code.
- D. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA ANSI/IEC C78.377 - (2017) Electric Lamps Specifications for the Chromaticity of Solid State Lighting Products.
 - 2. NEMA SSL 1 - (2010) Electronic Drivers for Led Devices, Arrays, or Systems.
 - 3. NEMA SSL 3 - (2011) High-Power White LED Binning for General Illumination.
- E. Federal Communications Commission Parts 18.305, 18.307 (EMI RFI).
- F. American Society of Heating, Refrigerating and Air Conditioning, Inc.
 - 1. ANSI/ASHRAE/IES Standard 90.1.
- G. Underwriters Laboratories (UL):

1. UL 1472 - (2015) UL Standard for Safety Solid-State Dimming Controls.
2. UL 1598 - (2008; Reprint Oct 2012) Luminaires.
3. UL 844 - (2012; Reprint Mar 2016) UL Standard for Safety Luminaires for Use in Hazardous (Classified) Locations.
4. UL 8750 - (2015; Reprint Feb 2018) UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products.
5. UL 924 - (2016; Reprint Nov 2017) UL Standard for Safety Emergency Lighting and Power Equipment.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 1. Product Data: Submit catalog cuts, drawings, descriptive matter and lighting performance characteristics as required to completely define the materials and construction details employed, finishes applied, dimensions, hinging, latching and relamping provisions, and electrical characteristics.
 2. Assurance/Control Submittals:
 - a. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
 1. Operation and Maintenance Data: Submit manufacturer's operation and maintenance instructions for each type of luminaire.

1.4 DEFINITIONS

- A. For LED luminaire light sources, "Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions. This is also known as 70 percent "Rated Lumen Maintenance Life" as defined in IES LM-80.
- B. For LED luminaires, "Luminaire Efficacy" (LE) is the appropriate measure of energy efficiency, measured in lumens/watt. This is gathered from LM-79 data for the luminaire, in which absolute photometry is used to measure the lumen output of the luminaire as one entity, not the source separately and then the source and housing together.
- C. Total harmonic distortion (THD) is the root mean square (RMS) of all the harmonic components divided by the total fundamental current.

1.5 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Products shall be tested, approved and labeled/listed by Underwriters Laboratories, Inc., or by a nationally recognized testing laboratory (NRTL).
- C. Electrical equipment and materials shall be new and within one year of manufacture, complying with the latest codes and standards. Re-built, refurbished and/or re-manufactured electrical equipment and materials shall not be furnished on this project.

1.6 MAINTENANCE

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

- B. Extra Products: At completion of installation, deliver to the USPS Project Manager.
 - 1. Two of each luminaire lens type.
 - 2. Each component type: Provide quantity for each unique ballast/driver, relay, I/O module and lamp equal to 2 percent of luminaire total, but not less than two of each type.

PART 2 - PRODUCTS

2.1 LUMINAIRE MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Alphabet Lighting, Tustin, CA (714) 259-9959.
 - 2. Beghelli, Miramar, FL (954) 442-6600.
 - 3. Chloride Systems, Burgaw, NC (910) 259-1000.
 - 4. Columbia Lighting, Greenville, SC (864) 678-1000.
 - 5. Cooper Lighting (Halo, Invue, Lumark, Metalux, Portfolio, Sure-Lites), Peachtree City, GA (770) 486-4800.
 - 6. Compass Lighting Products, Greenville, SC (866) 313-3909.
 - 7. Day-Brite, Tupelo, MS (662) 842-7212.
 - 8. Dual-Lite, Cheshire, CT (203) 699-2000.
 - 9. Edison-Price Lighting, Long Island City, NY (718) 685-0700.
 - 10. Elcast Lighting, Addison, IL (630) 543-5390.
 - 11. Gardco Lighting, San Leandro, CA (800) 227-0758.
 - 12. GE Lighting Systems, Charlotte, NC (803) 462-2016.
 - 13. Gotham Lighting, Conyers, GA (800) 315-4982.
 - 14. Guth Lighting, St. Louis, MO (314) 533-3200.
 - 15. H.E. Williams, Carthage, MO (417) 358-4065.
 - 16. Holophane, Newark, OH (740) 345-9631.
 - 17. Hubbell Lighting, Inc., (Columbia, Spaulding, Sterner) Spartanburg, SC (864) 599-6000.
 - 18. Intense Lighting LLC, Anaheim, CA (800) 961-5321.
 - 19. Indy Lighting, Fishers, IN (817) 849-1233.
 - 20. Kenall Manufacturing, Gurnee, IL (847) 360-8200.
 - 21. Kirlin Lighting, Detroit, MI (313) 259-6400.
 - 22. Kramer Lighting, Sturtevant, WI (800) 236-6800.
 - 23. Kurt Versen Company, Westwood, NJ (201) 664-8200.
 - 24. Kurtzon Lighting, Chicago, IL (773) 277-2121.
 - 25. LightAlarms (Thomas & Betts) Montreal, ON (888) 552-6467.
 - 26. Lithonia Lighting, Conyers, GA (770) 922-9000.
 - 27. LSI Industries, Cincinnati, OH (513) 793-3200.
 - 28. Lumax Industries, Altoona, PA (814) 944-2537.
 - 29. Omega Lighting, Tupelo, MS (800) 234-1890.
 - 30. Phoenix Products, Milwaukee, WI (414) 438-1200.
 - 31. Prescolite Lighting, Spartanburg, SC (864) 599-6000.
 - 32. Prudential Lighting, Los Angeles, CA (213) 746-0360.
 - 33. Vista Lighting, Tupelo, MS (662) 690-4105.
 - 34. Zumtobel Staff, Highland, NY (800) 448-4131.

2.2 LUMINAIRE TYPES

- A. **Type A1** Lithonia #2BLT4-XXX-ADP-EZ1-LP840 Series.
 - 1. Description: Recessed, 2' W x 4' L x 3" D LED type troffer with side reflectors and dropped acrylic center lens, non-air handling.
 - 2. Lens: High performance extruded acrylic diffuser with curved linear prisms.
 - 3. Housing:
 - a. 22 gauge steel body, flush steel door with mitered corners.

- b. Frame and housing white baked enamel or powder coated finish.
 4. Ballast/Driver: LED high efficiency – 30W at 3000 Lumen, 34W at 4000 Lumen, 45W at 4800 Lumen or 53W at 6000 Lumen. Wattage based on lumen package selected.
 5. Mounting:
 - a. Recessed in Inverted T suspended ceiling.
 - b. Recessed in gypsum board ceiling; provide flanged frame-in kit.
 6. Lamps: 3000 Lumen, 4000 Lumen, 4800 Lumen or 6000 Lumen LED array; 4000K rated 60,000 hours at LLD = 0.8.
 7. Marking: luminaires are to be labeled on the interior side with lumen package used.
 8. Alternate Manufacturers:
 - a. Columbia #LCAT24-40-XXXX-G-ED-U.
 - b. Metalux #24RTC-XX-UNV-L840-CD-U.
 - c. As listed in paragraph 2.1A.
- B. **Type A6** Lithonia #WL4-XXX-EZ1-LP840 Series.
 1. Description: 5" W x 4'L x 3 7/8" D surface mounted LED luminaire, non-air handling.
 2. Refractor: Impact modified, linear – faceted refractor with diffusing film.
 3. Housing:
 - a. 20 gauge steel with die cast end caps.
 - b. White polyester powder coated finish.
 4. Ballast/Driver: LED high efficiency – 19W at 2000 Lumen, 28W at 3000 Lumen or 40W at 4000 Lumen. Wattage based on lumen package selected.
 5. Mounting: Surface ceiling mounted.
 6. Lamps: 2000 Lumen, 3000 Lumen or 4000 Lumen LED array; 4000K rated 60,000 hours at LLD = 0.9.
 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
 8. Alternate Manufacturers:
 - a. Metalux #4SWLED-LD4-XXXX-UNV-CD1-U.
 - b. Columbia #CWM4-40-XX-SM-FR-FA-ED-U.
 - c. As listed in paragraph 2.1A.
- C. **Type CL1** Lithonia #ZLIN-L48-XXXX-FST-40K Series.
 1. Description; 4 ft. long, LED strip luminaire with protective lens/diffuser.
 2. Lens: Snap on frosted, diffused lens.
 3. Housing:
 - a. 20 gauge cold rolled steel housing with punched knockouts for mounting.
 - b. End plates shall be die-formed heavy gauge rolled steel with punched knockouts for through wiring.
 - c. White baked enamel finish with a minimum 90 percent reflectance.
 4. Ballast/Driver: LED high efficiency – 25W at 3000 Lumen, 34W at 5000 Lumen or 52W at 7000 Lumen. Wattage based on lumen packages selected.
 5. Mounting:
 - a. Surface mounted to the underside of the ceiling. Attach luminaire to ceiling grid by means of a gripper hanger which attaches to any standard ceiling grid system.
 - b. For spaces without ceiling, suspend from structure with all-thread rods to required height.
 - c. Electrical Contractor to determine quantity of hangers required for either method.
 6. Lamps: 3000 Lumen, 5000 Lumen or 7000 Lumen LED arrays, 4000K rated 60,000 hours at LLD=0.7.
 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
 8. Alternate Manufacturers:
 - a. Lumax Industries #CNLED-XXL-4K-48-9-FAF.
 - b. Metalux #4SNLED-LD5-XXX-LW-UNV-L840-CD1-U.
 - c. As listed in paragraph 2.1A.
- D. **Type P1** D.L. Manufacturing Versa-Light Model #450.
 1. Description: Flexible/Rotatable, shock and vibration resistant "LED" dock light with protective lamp shield.

2. Power Supply: Solid state, fan cooled, integral transformer with integral switch and cord connection.
 3. Housing and Arm: Welded steel housing with stainless steel flexible tube.
 4. Mounting: Wall mounted.
 5. Voltage: 120 volt with 15 Amp, 120 volt plug and cord.
 6. Lamps: 57 Watt, 3000K, 85,000 hrs LED array.
 7. Alternate Manufacturers:
 - a. Phoenix #DLP-FLEX-LED.
 - b. APS Resource - FT Ultra LED.
 - c. Substitutions permitted.
- E. **Type RK1** Lithonia #2VTL4RT-XXX-ADP-EZ1-LP840.
1. Description: LED relight retrofit kit for exiting fluorescent troffer.
 2. Lens: Volumetric with linear refracted cavity.
 3. Housing: Reuse existing.
 4. Ballast/Driver: High efficiency eldo LED.
 5. Mounting: Universal end bracket into existing housing.
 6. Lamps: LED.
 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
 8. Alternate Manufacturers:
 - a. As listed in paragraph 2.1A.
- F. **Type X1** Lithonia #LQM-S-W-3R-120/277-ELN-SD Series.
1. Description: Ceiling or wall mount, single face LED exit sign with canopy. Self Powered and with self diagnostics.
 2. Features: Red Letters, White Stencil, White Housing (verify colors with local jurisdiction). Injection molded UL94-5V rated polycarbonate frame and canopy.
 3. Mounting: Ceiling, back or end-mounted.
 4. Battery: Maintenance free sealed Nickel Cadmium with long life, full recharge time of 24 hours max.
 5. Voltage: 120.
 6. Lamps: LED lamp module.
 7. Alternate Manufacturers:
 - a. Sure-Lites #LPX7-X-SD.
 - b. Compass #CERSD.
 - c. As listed in paragraph 2.1A.
- G. **Type X2** Lithonia #LQM-S-W-3R-120/277-ELN-SD Series.
1. Description: Ceiling or end mount, double face LED exit sign with canopy.
 2. Features: Red Letters, White Stencil, White Housing (verify colors with local jurisdiction). Injection molded UL94-5V rated polycarbonate frame and canopy.
 3. Mounting: Ceiling or end-mount.
 4. Battery: Maintenance free sealed nickel-cadmium with long life, full recharge time of 24 hours maximum.
 5. Voltage: 120.
 6. Lamps: LED lamp module.
 7. Alternate Manufacturers:
 - a. Sure-Lites #LPX7-X-SD.
 - b. Compass #CERSD.
 - c. As listed in paragraph 2.1A.

2.3 LUMINAIRES

- A. Provide luminaires as indicated in luminaire schedule and details on project plans. Provide luminaires complete with light sources of quantity, type and wattage indicated. Provide all luminaires of the same type by the same manufacturer. Luminaires must be specifically designed for use with the driver or ballast and light source provided.
- B. LED Luminaires:
 - 1. Install ballast/drivers, LED arrays and specified accessories at the factory.
 - 2. Luminaires must have a minimum 5 year manufacturer's warranty.
 - 3. Luminaires must have a minimum L70 lumen maintenance value of 50,000 hours as calculated by IES TM-21, with data obtained per IES LM-80 requirements.
 - 4. Luminaire drive current value must be identical to that provided by test data for luminaire in question.
 - 5. Luminaires must be listed with the DesignLights Consortium 'Qualified Products List' when falling into category of "General Application" luminaires, i.e. Interior Directional, Display Case, Troffer, Linear Ambient, or Low/High Bay. Requirements are shown in the DesignLights Consortium "Technical Requirements Table" at <https://data.energystar.gov/dataset/EPA-Recognized-Laboratories-For-Lighting-Products/jgwf-7qrr>.
 - 6. Provide Department of Energy 'Lighting Facts' label for each luminaire.
- C. Luminaires for Hazardous Locations:
 - 1. In addition to requirements stated herein, provide LED luminaires for hazardous locations which conform to UL 844 or which have Factory Mutual certification for the class and division indicated.

2.4 LED DRIVERS

- A. NEMA SSL 1, UL 8750. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:
 - 1. Output power (watts) and luminous flux (lumens) as shown in luminaire schedule for each luminaire type to meet minimum luminaire efficacy (LE) value provided.
 - 2. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided.
 - 3. Current draw Total Harmonic Distortion (THD) of less than 20 percent.
 - 4. Class A sound rating.
 - 5. Operable at input voltage of 120-277 volts at 60 hertz.
 - 6. Minimum 5 year manufacturer's warranty.
 - 7. RoHS compliant.
 - 8. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.
 - 9. UL listed for dry or damp locations typical of interior installations.
 - 10. LED driver shall tolerate sustained open circuit and short circuit output conditions without damage.
 - 11. LED driver shall comply with the requirements of the FCC rules and regulations, Title 47 CFR Part 15 Non-Consumer (Class A).

2.5 LIGHT SOURCES

- A. NEMA ANSLG C78.377, NEMA SSL 3. Provide type and wattage as indicated in luminaire schedule on project plans.
- B. LED arrays shall have a correlated color temperature (CCT) of 4000K; minimum color rendering index (CRI) value of 80.

- C. High power, white light output utilizing phosphor conversion (PC) process or mixed system of colored LED's typically red, green and blue (RGB).
- D. Provide light source color consistency by utilizing a binning tolerance within a 4 step McAdam ellipse.
- E. Luminaire shall have door frame and lens compatible for use with LED arrays and integral airflow ventilation system.

2.6 LED EMERGENCY DRIVERS

- A. Provide LED emergency driver with automatic power failure detection, test switch and LED indicator (or combination switch/indicator) located on luminaire exterior and provide self-diagnostic function integral to emergency driver. Integral lead-calcium battery is required to supply a minimum of 90 minutes of emergency power at 1400 Lumens. Driver must be RoHS compliant, rated for installation in plenum-rated spaces and damp locations, and be warranted for a minimum of five years.

2.7 LUMINAIRE SUPPORT HARDWARE

- A. Wire:
 1. ASTM A641/A641M; Galvanized, soft tempered steel, minimum 0.11 inches in diameter, or galvanized, braided steel, minimum 0.08 inches in diameter.
- B. Threaded Rods:
 1. Threaded steel rods, 3/16 inch diameter, zinc or cadmium coated.
- C. Straps:
 1. Galvanized steel, one inch by 3/16 inch, conforming to ASTM A653/A653M, with a light commercial zinc coating or ASTM A1008/A1008M with an electrodeposited zinc coating conforming to ASTM B633, Type RS.

2.8 EQUIPMENT IDENTIFICATION

- A. Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
- B. Provide labeled luminaires in accordance with UL 1598 requirements. All luminaires must be clearly marked for operation of specific light sources and ballasts or drivers. Note the following light source characteristics in the format "Use Only _____":
 1. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.
 2. All markings related to light source type must be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when light sources are in place. Ballasts or drivers must have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

2.9 FACTORY APPLIED FINISH

- A. Provide all luminaires and lighting equipment with factory-applied painting system that as a minimum, meets requirements of NEMA 250 corrosion-resistance test.

2.10 RECESS- AND FLUSH-MOUNTED LUMINAIRES

- A. Provide access to lamp and ballast from bottom of luminaire. Provide trim and lenses for the exposed surface of flush-mounted luminaires as indicated on project drawings and specifications.

2.11 SUSPENDED LUMINAIRES

- A. Provide hangers capable of supporting twice the combined weight of luminaires supported by hangers. Provide with swivel hangers to ensure a plumb installation. Provide cadmium-plated steel with a swivel-ball tapped for the conduit size indicated. Hangers must allow fixtures to swing within an angle of 45 degrees. Brace pendants 4 feet or longer to limit swinging. Single-unit suspended luminaires must have twin-stem hangers. Multiple-unit or continuous row luminaires must have a tubing or stem for wiring at one point and a tubing or rod suspension provided for each unit length of chassis, including one at each end. Provide rods in minimum 0.25 inch diameter.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. Electrical installations must conform to IEEE C2, NFPA 70, and to the requirements specified herein. Install luminaires to meet the requirements of ASHRAE 90.1 and ASHRAE 189.1. To encourage consistency and uniformity, install luminaires of the same manufacture and model number when residing in the same facility or building.
- B. Luminaires:
 - 1. Set luminaires plumb, square, and level with ceiling and walls, in alignment with adjacent luminaires and secure in accordance with manufacturers' directions and approved drawings. Installation must meet requirements of NFPA 70. Obtain approval of the exact mounting height on the job before commencing installation and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed.
 - 2. Recessed and semi-recessed luminaires must be independently supported from the building structure by a minimum of four wires, straps or rods per luminaire and located near each corner of the luminaire. Ceiling grid clips are not allowed as an alternative to independently supported luminaires.
 - 3. Round luminaires or luminaires smaller in size than the ceiling grid must be independently supported from the building structure by a minimum of two wires, straps or rods per luminaire, spaced approximately equidistant around. Do not support luminaires by acoustical tile ceiling panels.
 - a. Where luminaires of sizes less than the ceiling grid are indicated to be centered in the acoustical panel, support each independently and provide at least two 3/4 inch metal channels spanning, and secured to, the ceiling tees for centering and aligning the luminaire. Provide wires, straps, or rods for luminaire support in this section.
- C. Suspended Luminaires:
 - 1. Provide suspended luminaires with swivel hangers so that they hang plumb and level. The stem, canopy and luminaire must be capable of 45 degree swing. Pendants, rods, or chains, 4 feet or longer excluding luminaire, must be braced to prevent swaying using three cables at 120 degree separation.
 - 2. Suspended luminaires in continuous rows must have internal wireway systems for end to end wiring and must be properly aligned to provide a straight and continuous row without bends, gaps, light leaks or filler pieces.

3. Match supporting pendants with supported luminaire. Aircraft cable must be stainless steel. Canopies must be finished to match the ceiling and must be low profile unless otherwise shown.
 4. Maximum distance between suspension points must be 10 feet or as recommended by the manufacturer, whichever is less.
- D. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
 - E. Install surface mounted luminaires and exit luminaire signs plumb and adjust to align with building lines and with each other. Secure to prevent movement. Mount exit signs to outlet box mounted flush in wall or ceilings. Outlet box for ceiling mounted exit signs: Connect to rigid conduit system.
 - F. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating. In fire rated ceilings recessed luminaires must carry 1 hour UL fire rating classification.
 - G. Install earthquake clips to secure recessed grid-supported luminaires in place.
 - H. Install wall mounted luminaires, emergency lighting units and exit luminaire signs at height as scheduled.
 - I. Install accessories furnished with each luminaire.
 - J. Bond products and metal accessories to branch circuit equipment grounding conductor.
 - K. Install specified light sources in each emergency lighting unit, exit luminaire sign, and luminaire.
 - L. Wire exit signs and emergency lighting units ahead of the local switch, to the normal lighting circuit located in the same room or area.
 - M. Luminaire whips shall be steel or aluminum. M/C cable shall be permissible for luminaire whips/connections. Luminaire whips/connections shall be made with a minimum of #12 AWG copper conductors. Equipment grounding conductors shall be provided in all luminaire whips and/or connections.
 1. All luminaire whips shall be supported to luminaire support wire/cable with an approved fastener equal to an Erico "KX" flexible conduit hanger or other UL listed supports and fasteners.
 - N. Luminaires are not to be used as a raceway unless stamped for use as raceway by manufacturer. Single luminaire in lay-in ceilings shall not be used for raceway and shall be connected to an outlet box located within six feet (6') of fixture with flexible conduit or luminaire whips.

3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.
- C. Final acceptance will be based on measurement of initial lighting levels after required hours of burn in as specified in USPS Customer Service Facilities Design Criteria, not maintained lighting levels.

3.4 WARRANTY

- A. Provide a written 5 year on-site replacement warranty for material, luminaire finish, and workmanship. On-site replacement includes transportation, removal, and installation of new products.
 1. Include finish warranty to include failure and substantial deterioration such as blistering, cracking, peeling, chalking, or fading.
 2. Material warranty must include:

- a. All drivers.
 - b. Replacement when more than 10 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.
- B. Warranty period must begin on date of beneficial occupancy. Provide the USPS Project Manager with signed warranty certificates prior to final payment.

3.5 ADJUSTING

- A. Aim and adjust luminaires as directed by the USPS Project Manager.
- B. Position exit luminaire sign directional arrows as indicated.

3.6 CLEANING

- A. Conform to Section 017300 - Execution: Cleaning installed work.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/4/2018

SECTION 265600
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior Luminaires and Accessories.
 - 2. Poles.
 - 3. Ballast/Drivers.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- C. Related Sections:
 - 1. As specified in Section 260500 - Common Work Results for Electrical.
 - 2. Section 033000 - Cast-in-Place Concrete.
 - 3. Section 260623 - Lighting Controls.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Illuminating Engineering Society North America (IESNA):
 - 1. IESNA RP-8 - Recommended Practice for Roadway Lighting.
 - 2. IESNA RP-20 - Recommended Practice for Lighting for Parking Facilities.
 - 3. IESNA RP-33 - Recommended Practice for Lighting for Exterior Environments.
- C. Federal Communications Commission Parts 18.305, 18.307 (EMI RFI).
- D. American Society of Heating, Refrigerating and Air Conditioning, Inc.
 - 1. ANSI/ ASHRAE/ IES Standard 90.1.

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
 - 1. Product Data:
 - a. Luminaire dimensions, ratings, and performance data.
 - b. Complete computer data printout of illumination levels based on a 5 ft. by 5 ft. grid pattern.
 - 2. Shop Drawings:
 - a. Indicate dimensions and components for each luminaire which is not a standard Product of the manufacturer.
 - b. Indicate illumination levels in accordance with layout and scheduled luminaires indicated on Drawings.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Material and Equipment: Transport, Handle, Store, and Protect Products.

1.6 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training. Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to the USPS Project Manager.
 - 1. Each component type: Provide quantity for each unique ballast/driver, surge protector and LED array equal to two (2) percent of luminaire total, but not less than two of each type.

PART 2 - PRODUCTS

2.1 LUMINAIRE MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Alphabet Lighting, Tustin, CA (714) 259-9959.
 - 2. Architectural Landscape Lighting, Santa Ana, CA 92704 (714) 668-1107.
 - 3. Barron Lighting Group (Trace-Lite), Phoenix, AZ 85027 (888) 533-3948.
 - 4. Bronzelite Commercial Landscape Lighting, (800) 273-1569.
 - 5. CGF Design Inc., Morton Grove, IL (847) 815-5079.
 - 6. Cooper Lighting (Halo, Invue, Lumark, Lumiere, McGraw-Edison, Portfolio), Peachtree City, GA (770) 486-4800.
 - 7. Deco Lighting, Commerce, CA (800) 613-3326.
 - 8. Gardco/Philips Lighting, San Leandro, CA (800) 227-0758.
 - 9. Gotham Lighting, Conyers, GA (800) 315-4982.
 - 10. H.E. Williams, Carthage, MO (417) 358-4065.
 - 11. Holophane, Newark, OH (740) 345-9631.
 - 12. Hubbell Lighting, Inc., (Kim, Spaulding, Sterner) Spartanburg, SC (864) 599-6000.
 - 13. Hydrel Architectural and Landscape Products, Sylmar, CA 91342 (818) 362-9465.
 - 14. Intense Lighting, Anaheim, CA (800) 961-5322.
 - 15. Kenall Manufacturing, Gurnee, IL (847) 360-8200.
 - 16. Kim Lighting, City of Industry, CA (626) 968-5666.
 - 17. Kirlin Lighting, Detroit, MI (313) 259-6400.
 - 18. Ligman Lighting USA, Hillsboro, OR (503) 645-0500.
 - 19. Lithonia Lighting, Conyers, GA (770) 922-9000.
 - 20. LSI Industries, Cincinnati, OH (513) 793-3200.
 - 21. McPhilben Lighting, San Leandro, CA (510) 357-6900.
 - 22. Neptun Light Inc., Lake Bluff, IL (888) 735-8330.
 - 23. Pathway Lighting, Old Saybrook, CT (800) 342-0592.
 - 24. Quality Lighting, Franklin Park, IL (847) 451-0090.
 - 25. Visionaire Lighting, Rancho Dominguez, CA (310) 512-6480.
 - 26. Wide-Lite, San Marcos, TX (512) 392-5821.
- B. Substitutions:
 - 1. Section 016000 - Product Requirements: Product options and substitutions, substitutions not permitted.

2.2 LUMINAIRE TYPES

- A. **Type MH3** (exterior) Lithonia #MRWLED-XX-40K-SRX Series.
 - 1. Description: 18 inch dia. half cylinder wall mounted full cut-off, solid state, LED luminaire. Lens door is fully gasketed with one-piece solid silicone and UL listed for wet locations.

2. Lens: Precision molded acrylic.
 3. Housing: Die-cast single piece aluminum housing. Finish by the USPS Project Manager.
 4. Ballast/Driver: 20W @ 2200 Lumen, 29W @ 3000 Lumen, 40W @ 4500 Lumen or 61W @ 6000 Lumen. Wattage based on lumen packaged selected.
 5. Mounting: Surface wall.
 6. Voltage: [277] [120].
 7. Lamp: 2200 Lumen, 3000 Lumen, 4500 Lumen or 6000 Lumen LED array; 4000K, 60,000 hours @ LLC = 0.9.
 8. Label: UL listed for wet locations; IP65 rated.
 9. Warranty: Full five (5) year factory replacement warranty (internal components).
 10. Alternate Manufacturers:
 - a. Gardco/Philips: 104LED/55LA Series.
 - b. Hubbell: RDI-50L8.
 - c. Lithonia: WSRLED-XX-40K-SRX.
 - d. McGraw Edison: ISC-C02-LED-E1-BL3.
 - e. Barron Trace-Lite TLED111P Series.
 - f. Deco Lighting #D440-LED-XX-40-UNV-D-XX Series.
 - g. As listed in paragraph 2.1A.
- B. **Type PL1** (exterior) Lithonia #DSXSLED-XXX-1000-40K-T5M-MVOLT-SRM-DWH-XD.
1. Description: Low profile, square, full cut-off canopy light U.L. listed for wet locations.
 2. Housing/Lens: Die-cast aluminum housing with tempered, flat glass lens and pressure stabilizing vent.
 3. Ballast/Driver: 37W @ 3800 Lumen thru 107W @ 11,000 Lumen. Wattage based on lumen package selected.
 4. Mounting: [Surface or wall mounted with recessed outlet box.][Surface mounted with surface box.]
 5. Lamp: 3800 Lumen thru 11,000 Lumen LED array; 4000K, 60,000 hours; LLD=0.85.
 6. Voltage: 120.
 7. Label: U.L. listed for wet locations; IP66 rated with 5-year factory warranty.
 8. Alternate manufacturers:
 - a. Philips/Gardco # M3L-48G2 Series.
 - b. LSI #XSL2 Series (recessed only).
 - c. Deco Lighting #D533-LED-XX-40-UNV Series.
 - d. McGraw-Edison #CNC-XXX-LED-E1-XX Series.
 - e. McGraw Edison #LRC-B-XX-7-LED-E1-XXX Series (recessed only).
 - f. As listed in paragraph 2.1A.
- C. **Type SF1** LSI #XIGB-LED-19-350-NW-UE-SP10-SVG-XXX Series.
1. Description: Round, direct burial spotlight to illuminate flagpole (3 required).
 2. Reflector: 10 degree beam pattern, specular aluminum spun reflector.
 3. Housing: Single piece, compression-molded, composite housing with integral junction box and brass trim ring.
 4. External Lens: ¼ inch thick, slip-resistant walk-over, clear high-impact tempered glass lens with cast aluminum directional shield.
 5. Internal Lens and Gasket: Clear, high-impact, tempered glass lens with silicone gasket.
 6. Ballast/Driver: 22W @ 2159 Lumen, 350 mA, LED array.
 7. Mounting: Direct burial mounting. Provide [6 inch deep gravel bed] [cast in-place rough-in housing].
 8. Voltage: 120.
 9. Lamp: 2159 Lumen LED array; 4000K, 60,000 hours at LLD = 0.7.
 10. Label: UL listed for wet locations; 5-year factory warranty.
 11. Alternate Manufacturers:
 - a. Kim #LTV8IFF-NF-36L-4K-UV-SR Series.
 - b. Ligman Lighting #UKI60781-31WLED-N-W40-UNV-A61312.
 - c. As listed in paragraph 2.1A.
- D. **Type SP1** Lithonia #DSX1LED-40C-1000-40K-TXX-MVOLT Series.

1. Description: Rectilinear architectural arm-mounted sharp cut-off, solid state, LED luminaire.
2. Reflector: Anodized segmented reflectors. Beam distribution as required.
3. Housing: Rugged aluminum rectilinear housing with all seams continuously welded for integrity. Corrosion-resistant polyester powder coat. Finish by the USPS Project Manager.
4. Ballast/Driver: 138W @ 12,000+ Lumen, 1000 mA.
5. Mounting: 20 – 25 ft. high straight square aluminum pole.
6. Voltage: 120.
7. Lamp: 12,000+ Lumen LED array; 4000K, 60,000 hours @ LLD = 0.7.
8. Quantity of luminaires per pole as shown on the design drawings.
9. Label: UL listed for wet locations.
10. Warranty: Full five (5) year factory replacement warranty (internal components).
11. Alternate Manufacturers:
 - a. Gardco/Philips #ECF-S-48L-1A-NW-G2-AR Series.
 - b. Deco #D824-LED-120-40-UNV-LP-XX-PM Series.
 - c. McGraw-Edison #GLEON-AF-02-LED-E1-XXX-XX Series.
 - d. As listed in paragraph 2.1A.

2.3 LUMINAIRES

- A. Provide luminaires as indicated in luminaire schedule and details on project plans. Provide luminaires complete with light sources of quantity, type and wattage indicated. Provide all luminaires of the same type by the same manufacturer. Luminaires must be specifically designed for use with the driver or ballast and light source provided.
- B. LED Luminaires:
 1. Install ballast/drivers, LED arrays and specified accessories at the factory.
 2. Luminaires must have a minimum 5 year manufacturer's warranty.
 3. Luminaires must have a minimum L70 lumen maintenance value of 50,000 hours as calculated by IES TM-21, with data obtained per IES LM-80 requirements.
 4. All luminaires shall be fused. Locate fuses within handhole of pole for pole mounted luminaires.
 5. Voltage: 120.

2.4 LED DRIVERS

- A. NEMA SSL 1, UL 8750. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:
 1. Output power (watts) and luminous flux (lumens) as shown in luminaire schedule for each luminaire type to meet minimum luminaire efficacy (LE) value provided.
 2. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided.
 3. Current draw Total Harmonic Distortion (THD) of less than 20 percent.
 4. Class A sound rating.
 5. Operable at input voltage of 120-277 volts at 60 hertz.
 6. Minimum 5-year manufacturer's warranty.
 7. RoHS compliant.
 8. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.
 9. UL listed for wet locations typical of exterior installations.
 10. LED driver shall tolerate sustained open circuit and short circuit output conditions without damage.
 11. LED driver shall comply with the requirements of the FCC rules and regulations, Title 47 CFR Part 15 Non-Consumer (Class A).

2.5 LIGHT SOURCES

- A. NEMA ANSLG C78.377, NEMA SSL 3. Provide type and wattage as indicated in luminaire schedule on project plans.
- B. LED arrays shall have a correlated color temperature (CCT) of 4000K; minimum color rendering index (CRI) value of 70.
- C. High power, white light output utilizing phosphor conversion (PC) process or mixed system of colored LEDs, typically red, green and blue (RGB).
- D. Provide light source color consistency by utilizing a binning tolerance within a 4 step McAdam ellipse.
- E. Luminaire shall have door frame and lens compatible for use with LED arrays and integral airflow ventilation system.

2.6 EQUIPMENT IDENTIFICATION

- A. Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
- B. Provide labeled luminaires in accordance with UL 1598 requirements. All luminaires must be clearly marked for operation of specific light sources and ballasts or drivers. Note the following light source characteristics in the format "Use Only _____":
 - 1. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.
 - 2. All markings related to light source type must be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when light sources are in place. Drivers must have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

2.7 POLES

- A. Manufacturers:
 - 1. As listed in paragraph 2.1A.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Material and Finish: Aluminum. Finish by the USPS Project Manager.
- C. Section Shape and Dimensions: Straight Square.
- D. Height: 20 feet.
- E. Base: Nonbreakaway.
- F. Accessories:
 - 1. Handhole.
 - 2. Anchor bolts.
 - 3. Base Cover.
 - 4. Bolt covers.
 - 5. Ground rod and conductor.
- G. Approximate Loading Capacity Ratings:
 - 1. Luminaire Weight: 27 pounds.
 - 2. Luminaire and Bracket Effective Projected Area: 1.01 square feet.
 - 3. Steady Wind: 110 miles per hour minimum, with gust factor of 1.3.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. Provide 3000 PSI minimum concrete for lighting pole bases at locations indicated, in accordance with Section 033000 and details shown on drawings.
- B. Install poles plumb and provide double nuts to adjust plumb. Grout around each base and provide bolt covers.
- C. Bond luminaires, metal accessories and metal poles to branch circuit equipment grounding conductor. Provide supplementary 3/4 inch x 10 foot copper clad rod with #2/AWG copper grounding electrode at each pole.

3.3 FIELD QUALITY CONTROL

- A. As specified Section 260500 - Common Work Results for Electrical.
- B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.
- C. Measure illumination levels to verify conformance with layout and performance requirements.
- D. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.4 ADJUSTING

- A. Aim and adjust luminaires to provide illumination levels and distribution as directed.

3.5 CLEANING

- A. Conform to Section 017300 - Execution: Cleaning installed work.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure, pole and base.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

3.6 PROTECTION OF FINISHED WORK

- A. Conform to Section 017300 - Execution: Protecting installed work.

END OF SECTION

265600 - 6

SECTION 270500

COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured cabling system provisions:
 - 1. Pre-Construction Design Review/Monthly Status Meetings.
 - 2. Pre-Work Submittals.
 - 3. Contractor RCDD/Installer Requirements.
 - 4. Labeling.
 - 5. Post Work Close-Out Submittals.
- B. Related Documents:
 - 1. The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section.
 - 2. USPS LAN Infrastructure Best Practices, 01 October 2018.
 - 3. USPS Requirements for Entrance Facilities and DEMARC - October 1, 2017.
 - 4. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 078400 - Fire stopping: Fire stopping sealant at penetrations of fire-rated assemblies.
 - 2. Section 260500 - Common Work Results for Electrical.
 - 3. Section 260533 - Raceway and Boxes for Electrical Systems.
 - 4. Section 271100 - Communications Equipment Room Fittings.
 - 5. Section 271300 - Communications Backbone Cabling.
 - 6. Section 271500 - Communications Horizontal Cabling.
 - 7. Section 275116 - IP Integrated, Public Address Zone Paging System.
 - 8. Section 281600 - Intrusion Detection.
 - 9. Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System.

1.2 REFERENCES

- A. Telecommunication Industry Association (TIA) Series (refer to current Edition):
 - 1. TIA-568.0-D - Generic Telecommunications Cabling for Customer Premises.
 - 2. TIA-568.1-D - Commercial Building Telecommunications Infrastructure Standard.
 - 3. TIA-568-C.2 - Twisted Pair Copper Cabling and Components.
 - 4. TIA-568.3-D - Optical Fiber Cabling and Components.
 - 5. TIA-568-C.4 - Broadband Coaxial Cabling and Components.
 - 6. TIA-569 - Telecommunications Pathway and Spaces.
 - 7. TIA-570 - Residential Telecommunications Infrastructure Standard.
 - 8. TIA-598 - Fiber Optic Color Codes.
 - 9. TIA-607 - Generic Telecommunications; Bonding and Grounding (Earthing) for Customer Premises.
 - 10. TIA-758 - Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
 - 11. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.
 - 12. TIA-426-14 - Optical Power Loss of Installed Multimode Fiber Cable Plant.
 - 13. BICSI Telecommunications Distribution Methods Manual (Latest Edition including all addendums.)
- B. National Electrical Manufacturer's Association (NEMA):
 - 1. NEMA WC 26 - Wire and Cable Packaging.

- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code. (current version).
- D. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Products: Listed and classified by Underwriter's Laboratories Incorporated as suitable for the purpose specified and indicated.
 - 3. Perform Work that interfaces with Telephone Utility Company in accordance with Telephone Utility Company rules and regulations.
 - 4. Conform to current TIA standards and current BICSI TDMM for telecommunications installation.
- E. Fire Stopping:
 - 1. Fire stop penetrations of fire-resistive rated assemblies as specified in Section 078400 - Fire Stopping.
 - a. Installed Fire Stopping system shall be a complete UL Fire Stopping System. Installer must provide UL letter describing the suitability of installed UL Fire Stopping System prior to installation. S.T.I. "EZ-Path" Fire Stopping is preferred firestopping U.L. system.

1.3 PRE-CONSTRUCTION DESIGN REVIEW/MONTHLY STATUS MEETINGS

- A. Pre-Construction Design Review Meetings:
 - 1. Convene 30% Design Review meeting with Raleigh IT Service Center representative.
 - 2. Convene 70% Design Review meeting with Raleigh IT Service Center representative.
 - 3. Convene 95% Design Review meeting with Raleigh IT Services Center representative.
 - 4. Convene Issued for Construction (IFC) Design Review meeting with Raleigh IT Service Center representative.
 - 5. Require attendance of parties directly affecting Work of this Section. The USPS telecommunications system representative for Customer Service Facilities projects will be the Raleigh Information Technology Support Center (RITSC) Subject Matter Expert, Area Maintenance Representative, Local Maintenance Manager, and the District IS Manager or his representative.
 - 6. Review conditions of operations, procedures and coordination with related Work.
 - 7. Agenda:
 - a. Tour, inspect, and discuss building conditions relating to communications cabling and equipment.
 - b. Coordination with Telephone Utility Company (LEC) and the USPS telecommunications system representative will be by the Raleigh Service Center IT SME through the USPS Project Manager.
 - c. Review exact location of each network related item within building construction, casework, and fixtures and their requirements.
 - d. Review/Approve required Pre-Work Submittals.
 - e. Review Drawings and Specifications.
 - f. Review and finalize construction schedule related to voice and data installation, verify availability of materials, personnel, equipment and facilities needed to complete project and avoid delays.
 - g. Review required labeling process, inspections and testing.
 - h. Review cable routing and support.
- B. Convene re-occurring Monthly Status Meetings at the construction site with Local Maintenance Manager, Raleigh IT Service Center SME representative and District IS Mgr.

1.4 PRE-WORK SUBMITTALS

- A. All of the following are required to be submitted immediately after contract award to General Contractor/Low Voltage installer who will then submit to the Raleigh IT SME for approval. No work can proceed or materials ordered without Raleigh IT Service Center representative approving all submittals.

- B. Low Voltage company performing the cabling installation shall provide the following:
 - 1. Name of full time BICSI RCDD on staff and copy of RCDD certification which can be verified at BICSI.
 - 2. Name of full time BICSI TECH on staff and copy of TECH certification for the Lead Installer on this project. The BICSI certification should be verified with BICSI. This Lead Installer will be onsite the entire project, 5 days a week minimum.
 - 3. Name of full time BICSI Installers (INST1 minimum certified). At least 50% of onsite installers are required to be BICSI INST1 certified within the last 3 years.
- C. Lead Low Voltage installer name and install certifications.
- D. Low Voltage installer names with installer certifications for system being installed (50% of installers need current certification within 3 year period).
- E. Product Data: Provide detailed data sheet clearly showing manufacturer Unit Price, Total Price, Model Number, Part Number, color, length, quantity for each material or equipment item specified. Backbone copper, horizontal copper, patch panels, Bonding busbars, wire baskets, ladder trays, wire managers (horizontal and vertical), equipment racks, patch cords, fiber interconnect panels, UPS's, rack mounted power strips, etc. are products requiring mandatory Submittals. Every different type of material being used for the project must have an approved Submittal submitted to the RITSC SME.

1.5 LOW VOLTAGE CONTRACTOR COMPANY/RCDD/LOW VOLTAGE INSTALLER REQUIREMENTS

- A. Qualifications:
 - 1. Low Voltage Contractor Company - Contractor shall have a minimum of one BICSI certified Technician on the job site at all times with documented formal training in the installation of Category 6, Category 6A and LOMF fiber optic cabling systems. 50% of onsite Installers shall possess a certification for a total systems solution being installed from the manufacturer of the cabling and terminating hardware. The contractor must present these certifications to the Raleigh IT SME before beginning work.
 - 2. RCDD - General Contractor or Low Voltage Installer company must have a full time BICSI RCDD with current credentialing on staff.
 - 3. Installer: Company specializing in the installation of Category 6, Category 6A and Laser Optimized Multi-Mode (LOMF) fiber optic Structured Cabling Systems with minimum 5 years documented experience. Installation certification – 50% of Low voltage installers must be trained by the manufacturer and currently certified to install manufactures product line of copper/fiber wiring. Low voltage company must provide current installer certifications before doing any copper or fiber installations. This certification is part of the 15 year warranty.
 - 4. Lead installer must have a minimum of BICSI Technician Certification.
 - 5. Warranty: Total Systems Solution required providing minimum 15 year warranty from both manufacturer of cabling as well as connecting hardware when installed together according to predetermined manufacturers' specifications. Installer shall possess certifications from manufacturers of the components installed as a total systems solution and must present said certifications to the contracting officer through the USPS Project Manager in advance of beginning the Work.

1.6 LABELING

- A. Common Work Results for Electrical; furnish and install machine generated labels.
 - 1. Patch Panels and Outlet Faceplates: Display outlet or cable identification number in uppercase lettering on permanent machine generated adhesive label stock. Each individual port requires a port number label. The faceplate cannot be labeled as a range and expect the end user to know which port is which.
 - 2. Label the Telecommunications Equipment Room as ER and TR's as 01, 02, 03, etc.

3. Label all copper patch panel ports in a horizontal fashion left to right in numerical sequence. Example: If there are three 48 port copper patch panels in a rack, the ports are numbered consecutively from port 1 all the way through 144.
4. Label Copper Patch Panel ports in the order the cables were terminated beginning with all T/O terminations in the order of Six-plexes, Quads and Triplexes.
5. Label telecommunications outlet faceplate in the same manner as the patch panel.
6. Display cable identification number in black uppercase lettering on machine generated permanent adhesive self-laminating label of contrasting color from cable sheath.
7. Place labels on each end of cable, maximum 6 inches from cable termination.

1.7 POST-WORK SUBMITTALS

- A. Assurance/Control Submittals:
 1. Test Reports: Submit the following reports directly to Raleigh Service Center IT SME through the USPS Project Manager from Testing Laboratory, with copy to General Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.
 - a. End-to-end tests.
 2. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 3. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals. Deliver prior to Final Acceptance.
- C. Certification: Comprehensive test results for Category 6, Category 6A and fiber optic certification of cable plant per specifications of TIA/EIA-568-C, and all addendums. Immediately following new Category 6/6A copper and laser optimized multi-mode fiber installation, submit raw test results via e-mail to the Raleigh IT Service Center representative who will be performing copper and fiber site acceptance. All testing must be performed using an industry standard compliant test device. Test results must be furnished in format used by testing device. Vender generated spreadsheets or PDF's will not be accepted. No paper test results are ever acceptable. There is a USPS 10MB attachment limit. There should never be test results over 10MB. USPS cannot access DropBox.
- D. Project Record Documents: Accurately record the following:
 1. Cable pulling schedules, in printed form on CD-ROM.
 2. Cable routings (as-built drawings) shall be provided with cable plant depicted on floor plans prior to acceptance. The drawings must identify location of all T/Os (Telecommunications Outlets), TR/TE's (Telecommunication Rooms / Enclosures), Consolidated Computer Room (CCR) and any other installed component of the cabling solution. The actual routing of the cable bundles (pathways) and backbone cables on the floor plans shall also be shown. Provide master overall set plus one set for each TR/TE which will detail T/O's and CP's served by that TR/TE. As-built drawings will be provided to USPS IT by the installing Contractor electronically in a USPS compatible version of AutoCAD on a CD-ROM.
 - a. Labeling shall conform to the USPS labeling guidelines. For simplicity, all 48 port Copper Patch Panels in the CCR, TR's or TE's shall be labeled 1 thru the end port number. For any questions, contact RITSC SME for clarification.
 - b. A detailed cable termination record will be provided in sufficient detail, so that:
 - 1) Telephone Utility Company or telephone interconnect company can install cross connects.
 - 2) Postal Service users can install and maintain patch cords at patch panel fields.
 - 3) The location and size of the service entrance conduits are known.
- E. Operations and Maintenance Data: Data including wiring diagrams, parts lists, shop drawings, product data, manufacturer's instructions for cables and equipment and certifications identified above shall be provided.
- F. Manufacturers 15 year warranty for Fiber and Copper and all termination components.

PART 2 - PRODUCTS

2.1 CONDUITS, BOXES AND TRAYS

- A. Specified in Section 260533 - Raceway and Boxes for Electrical Systems.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

3.2 INSTALLATION GUIDELINES

- A. Special Requirements for Cable Routing and Installation:
 - 1. The majority of the structured cabling system wiring in this building will be installed above ceilings without conduit. All cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed.
 - 2. Sealing of openings between floors, through rated fire and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the contractor. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.
- B. Support cables installed in ceiling spaces with Category 6/6A compliant, wide-base J-hooks suspension devices, anchored to building structural steel (red iron).
 - 1. Minimum and Maximum spacing between supports: 4 feet.
 - 2. Maximum Number of 4 Pair Cables per Support: 25.
 - 3. Furnish and install additional supports as required.
 - 4. Install complete cable support device system before starting installation of cable.
 - a. Installation of cable before completion of support system not permitted.
 - b. Unsupported cable shall not be permitted.
 - 5. Organize and group cables. Install cable group as single run through ceiling spaces following column and building lines. Do not install cable group runs diagonally across center of building.
 - 6. Install armored fiber optic cabling in cable tray or approved support solution.
 - 7. Cabling shall not be suspended from any electrical conduits, HVAC ducts, sprinkler systems, gas, or water pipes, etc.
 - 8. Cabling shall not be attached to suspended ceiling grid system.
 - 9. Cabling system shall be installed in approved suspension devices for telecommunications cabling.
 - 10. Vertical runs of backbone and horizontal cables (e.g.: cables exiting thru-wall penetrations) shall be equipped with factory manufactured cable drop out fittings and kellums cord grips to properly support the cables at the vertical bends.
- C. Cable trays shall be required for areas of heavy cable concentration including but not limited to the "ER" and TRs.
 - 1. Maximum spacing between each cable tray support: Specified by manufacturer of cable tray.
 - 2. Maximum number of cables supported by cable tray: Specified by manufacturer of cable tray not-to-exceed 40% fill ratio.
 - 3. Install complete cable tray system before starting installation of cable.
 - a. Installation of cable before completion of tray system not permitted.
 - b. Cabling shall not be bundled within cable tray.

- c. Provide factory manufactured cable drop-out fittings for transportation of cabling entering or exiting the cable tray.
4. Cable/Ladder trays, wire mesh tray or solid bottom cable tray shall be provided as specified in USPS CSF specification section 260533, paragraph 2.12.
- D. Cabling routed underground, exterior of the building, through inaccessible ceilings or less than 10'-0" A.F.F. in the workroom shall be contained in conduit. Provide flush boxes within finished areas and surface mounted, cast aluminum, "FS" factory boxes in unfinished areas. Provide 1" conduit risers with 90 degree bend and bushing for all T/O's.
 1. Conduit/EMT, cable tray or wire basket shall be used in the ceiling of the work room floor or wherever a suspended ceiling system is not present.
 2. All conduit stubs must have a plastic bushing/collar installed at each end.
 3. All conduit runs require an accessible pull-string in each conduit.
 4. Interior conduits shall be a minimum of 1" diameter. Conduits shall adhere to the 40% fill ratio.
 5. No conduit is to be buried in the slab.
 6. There shall be no more than 180 degrees of bend in a conduit longer than 30 feet. All conduits that are comprised of more than two (2) ninety degree bends or a reverse bend shall have a properly installed pull box. Pull boxes shall be 12" x 12" x 6" for up to 1" EMT, 18" x 18" x 8" for up to 1-1/2" EMT. Ninety degree bends in fiber runs shall be installed using dual forty-five degree bends.
 7. Under no circumstances shall a pull box be used to change direction of a conduit. All conduits shall be installed in a manner so that cabling passes directly through the pull box without changing direction.
 8. Underground service and interbuilding conduits shall be a minimum of 4 inch diameter, buried minimum of 24" BFG, equipped with heavy wall rigid galvanized steel conduit elbows and risers and marked with red magnetic warning tape, refer to Module 1, 5-2.7.2. Conduits shall adhere to the 40 per cent fill ratio and shall be provided with mesh innerduct and individual pull strings.
- E. Route cable for T/O (telecommunications outlets) as follows:
 1. Wall Mounted: Through ceiling spaces to conduit stub-ups or junction boxes. Include drag lines.
 2. Furniture System Cable Raceway: Point of entry to outlet.
 3. Floor Outlet Box: Through under floor conduit to box. (This method is highly discouraged and requires approval from Raleigh IT SME.)
 4. Column Mounted-Workroom Floor: Through surface mount conduit stubs to junction box or cable tray.
 5. Telecommunications Equipment Room: Along ladder rack from rack to locations to be run in ladder tray / basket tray.
- F. Separate communications cables from other cables and fixtures minimum distance as follows:
 1. Non-Shielded Electrical Cables: 12 inches.
 2. Fluorescent Light Fixtures: 12 inches.
- G. Cross electrical cables with communications cables at 90 degrees only. Data cables shall not run parallel with electrical cables, unless separated by 12 inch minimum.
- H. Comply with cable manufacturers minimum bend radius requirements. For Category 6/6A, minimum bend radius shall be no less than 4 times diameter of outer sheath of cable. For Fiber Optic cabling, minimum bend radius shall be no less than 10 times diameter of outer sheath of cable.
 1. Do not stretch, stress, tightly coil, bend or crimp cables.
 2. Replace cables that are severely stressed during installation at no additional cost to United States Postal Service.
 3. Any armored cable that has had its armor sheathing broken shall be replaced in its entirety, end to end at no additional cost to USPS.
- I. Cabling installed in plenum or non-plenum air returns.
 1. **Plenum Environments:** If the majority of the area for the cabling installation is deemed to be a return air plenum, all components of the installation in those areas shall be rated for the plenum environment in which they are installed. There shall be no installation of any non-plenum

component of this cabling system in the plenum environment unless those components are enclosed in such a manner as to maintain the integrity of the plenum environment. If the area beneath a raised floor is considered a plenum environment, there shall be no installation of any components of the cabling system that are not rated for a plenum environment unless they are completely enclosed in such a manner as to maintain the integrity of the plenum environment. This includes, outlets, jacks, patch cords, copper or fiber cabling or any other component that are not rated for installation in a plenum environment.

2. **Non-Plenum Environments:** The work room floor is considered a non-plenum environment and all components of the Structured Cabling System shall be rated for installation in non-plenum area. If, at any point, the non-plenum cabling enters or passes through a plenum area, the cabling shall be encased in a continuous EMT conduit pathway throughout the entire plenum area.
- J. Cable Run Lengths: Route cables so that cable run length does not exceed recommended maximum distance.
1. UTP cabling from the back of the patch to the Telecommunications Outlet (T/O) is limited to a maximum total run of 90m (295 feet).
 2. Cable conductors shall be continuous ("Homerun") from originating termination equipment to destination termination equipment.
- K. Cables: Furnish and install communications cables as specified, in accordance with Cable Pulling Schedules, manufacturer's published instructions, TIA-568-C including all addendums and as indicated on Drawings.
1. Dress cable to final location, remove sheath to point allowing splaying of conductor, and terminate. Make each termination uniform and precise. Hook and Loop "velcro" cable ties shall be used for bundling and dressing all cabling. No nylon zip ties shall be used for cable bundling or attachment. No wire managers will be used/substituted for Strain Relief Bars.
 2. Maintain sheath integrity. Remove minimum amount of sheath required for termination up to a maximum of 1 inch.
 3. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify, or add to manufacturer's twisting of cable. Do not untwist more than ½ inch of the stripped cable.
 4. Label each end with a machine generated, self laminating label.
 5. Mechanical couplers or splices not permitted in copper cabling.
 6. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 3 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturer's instructions.
 7. When installing Armored Fiber Optic cabling, proper telecom bonding techniques to bond the metallic member of the Armored Fiber Optic Cable must be maintained. Armored fiber will be bonded on the ER/TR end only to the "PBB" or "SBB".

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 8/31/2018

SECTION 271100

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured wiring system components:
 - 1. Table of Contents.
 - a. Open Relay/Equipment Racks for ER/TR's.
 - b. Cat6 / Cat6A (Wireless) 110 Style Copper Patch Panels.
 - c. Wire Management Panels.
 - d. PPB for TEF/ER.
 - e. SBB for TR.
 - 2. Telecommunications Equipment Room (ER).
 - 3. Telecommunications Room (TR).
- B. Related Documents:
 - 1. Specified in Section 270500 - Common Work Results for Communications.
- C. Related Sections:
 - 1. Sections 096536 - Static Control Resilient Flooring.

1.2 REFERENCES

- A. Specified in Section 270500 - Common Work Results for Communications.

1.3 SUBMITTALS

- A. Specified in Section 270500 - Common Work Results for Communications.

1.4 QUALITY ASSURANCE

- A. Specified in Section 270500 - Common Work Results for Communications.

PART 2 - PRODUCTS

2.1 OPEN EQUIPMENT / RELAY RACKS WITH VERTICAL WIRE MANAGERS FOR ER/TRs

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Chatsworth Products, Inc.
 - 2. CommScope Uniprise
 - 3. Hoffman
 - 4. Ortronics (Legrand)
 - 5. Panduit
 - 6. Rittal
 - 7. Product options and substitutions. Substitutions: Not permitted.

- B. Constructed of aluminum extrusion framework. Dimensions: 84 inch high x 3 inch deep x 19 inch wide. Double sided, 12/24 tapped holes with universal EIA rack unit spacing. Black or Aluminum finish.
 - 1. Each equipment rack shall have two double depth vertical cable managers: Dimensions: No less than: 6 inch x 6 inch x 78 11/16 inch for the front side of the relay rack and no less than 6 inch x 6 inch x 78 11/16 inch for the back side of the relay rack. Black or aluminum finish. Attach to sides of relay racks. Must be able to cover and conceal patch cabling. Each end rack will have outside double depth vertical wire managers attached to each outside end.
 - 2. Each equipment rack shall be connected to the overhead cable tray/wire basket system for added rigidity. Equipment racks shall be properly supported to avoid wobbling.
 - 3. Vertical and horizontal wire managers shall be equipped with opaque covers to completely conceal the patch cords.

2.2 CATEGORY 6/6A, 8-PIN MODULAR IDC "110" STYLE PATCH PANELS FOR ER/TRs

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. CommScope Uniprise
 - 2. Hubbell, Inc.
 - 3. 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 Velcro straps. Plastic tie wraps are not acceptable.

2.3 WIRE MANAGEMENT PANELS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Chatsworth Products, Inc.
 - 2. CommScope Uniprise
 - 3. Leviton
 - 4. Ortronics (Legrand)
 - 5. Panduit
 - 6. Product options and substitutions. Substitutions: Not permitted.
- B. Cable Management Panels: Rack mounted horizontally and vertically. USPS has final say on how each equipment rack is laid out. Ensure Raleigh IT contact approves of all Rack Elevations well before Issued for Construction (IFC) drawings are distributed. See latest USPS Best Practices document (located on most current BDS DVD – folder F) for guidelines on rack layouts.
 - 1. Horizontal management panel for use at top of each ER equipment rack will be Quantity (1) one 2RU panel along the top of each equipment rack. See USPS Best Practices Diagram – Latest Version.
 - 2. Horizontal management panels for use at top of TR equipment racks will be one (1) 2RU panel along the top of each equipment rack. See USPS Best Practices Diagram – Latest Version. Note that this management panel is not required for single equipment rack installations.
 - 3. Each vertical wire management panel will be at least 6" x 12" deep on the front side and at least 6" x 12" deep on the back side of the equipment rack to form a Full Height Double-depth Vertical Wire Management system. No exceptions.

2.4 PRIMARY BONDING BUSBAR - PBB for TEF/ER (REFER TO TIA-607-C)

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Harger. P/N GBI14412TMGB
 - 2. Chatsworth – P/N 40158-012
 - 3. Legrand
 - 4. Product options and substitutions. Substitutions: Not Permitted.
- B. Provide and install one PBB at the Telecom Entrance Facility (TEF) below ceiling acoustic tile with all bonding leads clearly labeled by machine labeler. All bonding leads are 2 hole compression lugs. This PBB shall be bonded to the building grounding electrode system using minimum #2/AWG/CU conductor. Size according to number/size of Telecom Bonding Backbone (TBB) leads being attached to the PBB. Minimum size will be 4"H x 0.25"W x 12"L. The PBB shall be mounted as close as possible to the building grounding electrode system busbar to keep the Telecom Bonding Conductor (TBC) as straight and as short as possible.
 - 1. Typically the TEF is located adjacent to the MC rack(s) within the ER of a "CSF". Therefore the Primary Bonding Busbar (PBB) located at the TEF can be utilized for bonding of the ER in this application.
- C. Each (2) lug compression connector shall have anti-oxidant coating applied to lug and busbar prior to attachment.
- D. The maximum value of resistance between any point in the Telecommunications bonding system and the building electrical grounding electrode system shall be (1) ohm. This resistance value shall be tested and certified, in the presence of the Raleigh IT SME, by an independent 3rd party testing agency, prior to applying power to any telecommunications equipment.

2.5 SECONDARY BONDING BUSBAR – SBB FOR ER, TR's (REFER TO TIA-607-C)

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Harger – P/N GBI/14212
 - 2. Chatsworth – P/N CPI 13622
 - 3. Legrand – P/N OR-GB2X12TGB
 - 4. Product options and substitutions. Substitutions: Not Permitted.
- B. Provide and install one SBB in the ER and in every TR below ceiling acoustic tile with all bonding leads clearly labeled by machine labeler. All bonding leads shall be 2 hole compression lugs. This SBB will connect to the PBB using minimum of #6/AWG/CU via Telecom Bonding Backbone (TBB). Size accordingly to number/size of ground leads being attached to SBB. Minimum size will be 2"H x 0.25"W x 12"L.
 - 1. Provide Secondary Bonding Busbar (SBB) within the ER, if the ER and the Telephone Entrance Facility (TEF) are located remote from each other. The SBB shall be bonded to the PBB using a minimum #6/AWG/CU bond conductor. The SBB shall be utilized for all bonding needs within the ER.
- C. Each (2) lug compression connector shall have anti-oxidant coating applied to lug and busbar prior to attachment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. ER (Telecommunications Equipment Room):

1. Furnish, install, and bond, floor mounted, 84 inch high x 3 inch deep x 19 inch wide relay racks shoulder-to-shoulder separated by 6 inch wide, double depth, full height, vertical wire managers perpendicular to wall housing plywood backboards.
 - a. Mount relay racks in a "side by side" fashion with one double-depth vertical wire management channel between each rack, and one double-depth wire management channel on outside side rail of both end racks.
 - 1) Place one 2RU horizontal wire manager at the top of each rack, if more than one rack is required.
 - 2) Supply four (4) 1RU wire managers for each rack containing 48 port patch panels for USPS use. These (4) 1RU wire managers are in addition to the 2RU wire managers placed between the patch panels and at the top of each rack.
 - b. Sections of 12 inch wide ladder or basket tray shall be mounted to top of relay rack(s) and extend to plywood backboard or other ladder or basket tray for each relay rack installed. This tray serves as additional support for relay racks as well as cable routing from relay rack to backboard.
 - c. Each rack will receive a separate #6 AWG bond wire homerun to the SBB or PBB in the ER.
 - d. Each rack shall be equipped with a factory manufactured power strip equipped with (12) NEMA5-15R receptacles. Rack mount each power strip in the middle of each equipment rack. Preferred rack mounted power strip: Tripp-Lite #RS-1215-RA.
 - e. Each rack shall be provided with an installation kit and isolation pads for securing and isolating the rack to and from the floor.
2. Furnish and install three (3) 4 ft. x 8 ft. plywood backboard(s) along walls behind and perpendicular to ER rack(s).
 - a. Plywood: 48-inch x 96-inch x 3/4-inch A/C rated (A = smooth side; C = slight blemishes against wall), fire rated, void-free, smooth side out. Absolutely no knot holes or voids shall be visible on outer face of plywood, anywhere.
 - b. Install plywood with long dimension in vertical orientation with bottom of sheet 8 inches AFF.
 - c. Field paint with white or gray enamel fire resistant paint prior to installation of equipment.
 - d. Furnish and install an industry approved Secondary Bonding Busbar SBB (per 2.4 B.1 and 2.5 B.1) and attach minimum #6 AWG bonding conductors using 2 hole compression type fittings for all bonding needs within the ER. All bonding cable connections shall be clearly labeled on the SBB indicating where the connection is coming from/going to via machine made labels. All metallic components of ER shall be bonded to install Secondary Bonding Busbar SBB. Interconnect the SBB to the PBB utilizing minimum #2/AWG/CU bonding conductor.
3. Install 12 inch wide ladder rack/basket tray with 2 inch side bars the entire width of plywood back boards at 7'-6" to 8 feet AFF (Racks are 84 inches high).
 - a. Furnish and install 12 inch wide ladder rack/basket tray with 2 inch side bars at 7'-6" to 8 feet AFF between plywood backboards and relay racks (racks are 84 inches high). All sections of ladder rack and or basket tray shall be joined with manufacturer approved devices. No sections of ladder rack or basket tray shall be zip tied together. All sections of ladder rack and/or basket tray will be grounded or bonded. All wall connections will be made with factory wall mounts. No homemade connectors are permitted.
 - b. Provide (2) factory manufactured cable "drop out" fittings at each rack within the "ER".
4. Install number of Category 6 48-port patch panels in relay rack(s) that the 4-pair cables serving only the ER are to be terminated.
5. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 10 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturers' instructions.

6. All metallic ladder tray, basket tray, equipment racks and enclosures shall be bonded using a #6 AWG stranded bond wire with green insulation using 2 hole compression type fittings approved for basket tray installation. All painted surfaces shall be fully burnished for paint removal to achieve maximum bond connection. Provide all UL documentation on how the support system should be bonded to form a system.
7. All bonding in ER shall be made at the SBB installed by the contractor. This SBB shall be below the acoustic ceiling if one is installed and all bond wires will be on two lug compression fitting with full machine made labeling clearly showing where the bond originates.
8. Contractor shall provide enough 12/24 mounting screws or screws/square cage nuts for (32) connections per equipment rack in the ER and each TR rack for installation of USPS PFE active electronic components. Example: If 8 new relay racks are installed, provide (256) 12/24 pitch screws or 256 square cage nuts.

B. Telecommunications Room (TR):

1. Furnish and install appropriate number of 4-pair Category 6 UTP cables from each office area and workroom column mounted T/O (Telecommunications Outlets) to Telecommunications Room (TR) as indicated on drawings.
2. Furnish and install two (2) each 4-pair Category 6A UTP cables from each Wireless Access Point (WAP) to Telecommunications Rooms as indicated on drawings to 24 port Category 6A copper patch panels.
3. Provide a minimum 20 foot service loop in a figure eight coil, in the ceiling/wire basket for all copper cables terminated in TR's.
4. Furnish, install, and bond, floor mounted, 84 inch high x 3 inch deep x 19 inch wide relay racks shoulder-to-shoulder, separated by double-depth vertical wire managers, perpendicular to wall housing plywood backboards with double-depth vertical wire managers on each outer end of equipment racks.
 - a. Rack will be used to house fiber/copper wiring and PFE.
 - b. Allow minimum (16) empty rack units per rack for PFE data equipment.
 - c. Provide (1) factory manufactured cable drop out fitting at each rack within the "TR".
 - d. Each rack shall be equipped with a rack mounted power strip equipped with (12) NEMA5-15R receptacles. Mount power strip below last 48 port copper patch panel. Preferred; Tripp-Lite #RS-1215-RA.
 - e. Each rack shall be provided with an installation kit and isolation pads for securing and isolating the rack to and from the floor.
5. Furnish and install one 2RU rack mounted wire manager at top of rack.
6. Furnish and install one rack mounted, 24 strand fiber optic interconnect center below 2RU wire manager.
7. Furnish and install one 1RU rack mounted, 24 pair Cat3 or Cat5e Copper Patch Panel for Analog Voice connections below the fiber optic interconnect panel.
8. Furnish and install needed 48-port Copper Patch Panels separated by 2RU Wire Managers.
9. Furnish and install one (1) plywood backboard on one wall of Telecommunications Room.
 - a. Plywood: 48-inch x 96-inch x 3/4-inch A/C rated (A = smooth side; C = slight blemishes against wall), fire rated, void-free, smooth side out. Absolutely no knot holes or voids shall be visible on outer face of plywood, anywhere.
 - b. Field paint with white or gray enamel fire resistant paint prior to installation of equipment.
 - c. Install plywood with long dimension in vertical orientation with bottom of sheet 8 inches AFF.
 - d. Each rack shall be equipped with separate #6 AWG bond conductor homerun to the Secondary Bonding Busbar (SBB).in that ER.
 - e. Furnish and install an industry approved Secondary Bonding Busbar (SBB) and attach minimum #6 AWG bonding conductors using 2 hole compression type fittings for all bonding needs with the TR. All bonding cable connections shall be clearly labeled on the SBB indicating where the connection is coming from/going to via machine made labels. All metallic components of the "ER" shall be bonded to the installed Secondary Bonding Busbar (SBB). Interconnect the SBB to the PBB utilizing minimum #6/AWG/CU bonding conductor.

10. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 10 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturers' instructions.
 11. Provide a minimum of one 3KVA (120V – input/output) uninterruptible rack mounted power supply with 30 minute battery reserve rack mounted in each TR. Mount on the lowest RU of the right-most open relay rack and ensure power plug is wired as NEMA 5-30P, 3 wire.
 12. Contractor shall provide enough 12/24 screws or screws/square cage nuts for 32 connections per rack for the installation of USPS PFE active electronic components. Example: If 2 new relay racks are installed, provide 64 12/24 pitch screws or (64) square cage nuts/screws.
- C. Patch Panels: Install 24-port and 48-port, 8-pin module Category 6/6A patch panels at main cross-connect and horizontal cross-connect for termination of cables installed as part of Work of this Section.
1. Install patch panels on floor mounted 19 inch wide by 84 inch high open relay racks at ER and TR room locations only.
 2. Furnish and install wire management panel (2RU) on rack or cabinet mounting rails above and below each patch panel for all locations.
 3. Furnish 6 additional 1RU wire managers to be used in between PFE.
 4. Furnish manufacturers strain reliefs 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.
 - 4. Fiber Optic Cabling.
- B. Related Documents:
 - 1. Specified in Section 270500 - Common Work Results for Communications.
- C. Related Sections:
 - 1. Specified in Section 270500 - Common Work Results for Communications.

1.2 REFERENCES

- A. Specified in Section 270500 - Common Work Results for Communications.

1.3 SUBMITTALS

- A. Specified in Section 270500 - Common Work Results for Communications.

1.4 QUALITY ASSURANCE

- A. Specified in Section 270500 - Common Work Results for Communications.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver in accordance with NEMA WC 26.

PART 2 - PRODUCTS

2.1 CONDUITS, BOXES AND CABLE TRAYS

- A. Specified in Section 260533 - Raceway and Boxes for Electrical Systems.

2.2 OM4 ARMORED BACKBONE LOMF

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

1. Belden
2. Berk-Tek
3. CommScope Uniprise
4. Corning Cable Systems - Preferred
5. General Cable
6. Leviton
7. Optical Cable Corp.
8. Ortronics (Legrand)
9. Superior Essex
10. Product options and substitutions. Substitutions: NOT permitted.

B. Conductors: 24 / 48 strand.

1. Terminate fiber strands onto "SC" ports, vertically mount, ports 1 through 12, left to right. No deviation allowed.
2. Fiber strands are required to be installed on (1) one 1RU Fiber Optic Interconnection panel, ports 1-12, no exceptions.
3. The same port layout orientation must be preserved on the far end strand terminations. All ports must be installed vertically. No horizontal orientation allowed. No exceptions.
4. All individual Armored Fiber runs are required to be bonded on the ER end only, connected to the SBB in the ER and clearly labeled with machine labels.
5. All backbone fiber strands shall be installed using reverse-pair positioning which allows the use of A-B fiber patch cords. Refer to ANSI-TIA-568.3.D, Annex C.
6. Provide individually insulated plenum rated strands under common plenum rated sheath unless entire cable is contained within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
7. Complies with individual characteristics established in TIA-568-C including all addendums for fiber optic cable performance specification.
8. All underground fiber cable shall be indoor/outdoor rated. Loose tube fiber cable, if utilized, shall be equipped with furcation kits.

2.3 FIBER OPTIC RACK MOUNT INTERCONNECT CENTER

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

1. CommScope Uniprise
2. Corning Cable Systems - Preferred
3. Ortronics (Legrand)
4. Panduit
5. Product options and substitutions. Substitutions: Not permitted.

B. Enclosure connector and adapter panels:

1. SC type laser optimized connectors
2. 12 port coupler panels with SC connectors; 18 port panels are not acceptable.
3. Each rack mount enclosure used in ER/TR will be 1.75 inches (1 Rack Unit) with (1) 12-port SC/SC style laser optimized coupler panels to house the backbone fiber. The "ER" and each individual TR will receive a dedicated rack mount enclosure.
4. Complies with TIA-568-C specification.

2.4 OM4, OS1, OS2 FIBER OPTIC PATCH CORDS: 2 STRAND, TIGHT BUFFERED

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

1. Belden
2. Berk-Tek
3. CommScope Uniprise

4. Corning Cable Systems – Preferred
5. General Cable
6. Leviton
7. Optical Cable Corp.
8. Ortronics (Legrand)
9. Superior Essex
10. Product options and substitutions. Substitutions: Not permitted.
11. Fiber cord manufacturer shall be the same manufacturer furnishing the backbone fiber. Mixing of manufacturers is not acceptable.

B. Fiber optic duplex patch cords.

1. USPS to specify connector type and length for patch cords based on the total number of fiber ports being installed. Connectors could be SC/LC, SC/SC or LC/LC.
2. Complies with individual characteristics established in TIA-568-C including all addendums for fiber optic patch cable performance specification.
3. Patch cords shall be factory made and factory tested individually, and factory wrapped within non-clear plastic bags. The plastic bag shall clearly identify the manufacturer/testing agency with silk screen on the outside and shall contain the cable test results. Plastic bags shall have perforated or zip-lock top for easy removal of cord. Clear plastic, unlabeled bags are not permitted.
4. Contractor shall provide fiber patch cords for 75 percent of the total fiber ports installed. Example: (50) Duplex fiber ports (100 strands) installed, provide (75) Duplex fiber patch cords. All fiber patch cord colors, lengths and quantities shall be determined by Raleigh IT SME.
5. Fiber optic patch cord connector types, lengths, and quantities shall be specified by U.S. Postal Service personnel prior to procurement.
6. Match performance characteristics of installed fiber optic backbone.

2.5 CATEGORY 3/5e BACKBONE (RISER) CABLING (FOR TR CABLE APPLICATIONS ONLY)

A. Manufacturers:

1. Belden
2. Berk-Tek, Inc.
3. CommScope Uniprise
4. General Cable
5. Mohawk/CDT
6. NORDX/CDT
7. Superior Essex
8. Tyco Electronics AMP NETCONNECT
9. Product options and substitutions. Substitutions: NOT permitted.

B. Conductors: 25 pair twisted – 24 AWG, solid copper.

1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is contained with conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
2. Complies with individual characteristics established in TIA-568-B for Category 3/5e cable performance specification.
3. Nominal Impedance: 100 ohms plus or minus 15 percent.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Specified in Section 270500 - Common Work Results for Communications.
- B. Identification:

1. See Section 270500 - Common Work Results for Communications for additional requirements.
2. Fiber Optic Interconnect Centers: Display ER/TR and cable strand identification numbers in uppercase lettering, or numbers on permanent adhesive label stock.

3.2 FIBER OPTIC TESTING

- A. 10Gb 50/125 micron OM4 Laser Optimized Multi-Mode Fiber (LOMF) Optic Cable Testing.
 1. Fluke testers are the only allowed fiber tester manufacturer. Tester must be Encircled Flux Compliant.
 2. Test Reference Cords (TRC's) must be used. Test Reference Cord verification must be shown in the final test result submission.
 3. Tier 1, Tier Method B (one jumper) and Tier 2 OTDR testing is required. The Tier 2 OTDR requires bi-directional testing.
 4. The installer shall Set a Reference based on Method B (Single Jumper) which includes both mated connector losses and the loss of the link under test.
 5. The installer shall perform Tier 1 Testing with Optical Loss Test Set (OLTS) that includes testing for length.
 6. The installer shall perform Tier 2 testing with OTDR to show all splices.
 7. The supplier shall perform Bi-directional testing on all installed fiber optic cabling. Supplier test equipment shall perform testing of fiber in accordance with the fiber type being tested, 10Gb 50/125 micron laser optimized multi-mode using the procedures outlined in TIA-568-C.0 and TIA-526-14-A, Method B for Multimode fiber (One Jumper/Two Adapters), TIA-526-7 for Single mode fiber.
 8. The fiber testers and test heads shall have passed calibration within one year of actual test date. Any calibration in excess of one year is not acceptable. Each test set and fiber head must have the recent calibration paper printout from the calibration lab for inspection by USPS, prior to testing. The calibration printout must show actual serial numbers of test sets (main and remote and each fiber tested).
 - a. The current calibration for the main and remote fiber units MUST be supplied to Raleigh IT SME PRIOR to any testing.
 - b. USPS RITSC representative will determine test labeling format inside the fiber tester prior to actual testing. The Main Unit must be in the ER or "MC".
Example for fiber strand test: ER to TR 1-01 14 (for strand 14), or MC to HC 1-01 14 (for strand 14). All fiber strands will be tested bi-directionally. Any fiber test results that only show testing in one direction will be rejected.
 9. Multimode fiber optic cable shall be tested bi-directionally at wavelengths of 850nm and 1300nm.
 10. Cable tester test parameter shall be set to correct values for:
 - a. Actual manufacturer of fiber being installed. Tester cannot be a generic 10Gb fiber type and must be specific to the manufacturer's model of fiber cable being tested.
 - b. Index of Refraction based on manufacturer specifications for cable type being tested.
 - c. Quantity of adapters (typically 2). Test Method B. One Jumper, 2 adapters.
 - d. Fiber Type.
 - e. Test to Tier 1 as mandated by TIA-568-C.0.
 - f. Preferred tester is Fluke Versiv series with Encircled Flux.
 11. The Low Voltage Installer shall provide all Fiber tests in one, single file. No multiple files will be accepted.
 12. The Supplier shall review test settings with the USPS technical representative. Supplier shall have cable specifications on site for USPS technical review to verify settings are correct on test equipment.
 13. Fiber optic cables shall pass all attenuation tests referenced to formulas presented in the listed standards.
 14. Perform end-to-end tests of each fiber optic backbone cable as follows (applies to ER and TR applications only):
 - a. Tier 1 Test: Light Source Power meter tests per TIA-568-C specification.
 - b. Optical Time Domain Reflectometer (OTDR) tests per TIA-568-C specification including all addendums.

- c. Both the Tier 1 test and the Tier 2 OTDR test results must be uploaded to the “Link Ware Live” cloud based repository for USPS RITSC access.
 - d. Performing one test and not the other does not satisfy a complete fiber test. Both tests must be submitted in one file, all at the same time.
 - e. Measured effective cable run length.
- 15. Optical photographs of each fiber end shall be submitted for documentation and warranty purposes.

3.3 CONSTRUCTION

- A. Specified in Section 270500 - Common Work Results for Communications.

3.4 FIELD QUALITY CONTROL

- A. Specified in Section 270500 - Common Work Results for Communications.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 9/4/2018

SECTION 271500

COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured wiring system components:
 - 1. CAT 6/6A Copper Communication Cable.
 - 2. Termination Equipment.
 - 3. Patching Equipment.
 - 4. CAT 6/6A Copper Testing.
- B. Related Documents:
 - 1. Specified in Section 270500 - Common Work Results for Communications.
- C. Related Sections:
 - 1. Specified in Section 270500 - Common Work Results for Communications.

1.2 REFERENCES

- A. Specified in Section 270500 - Common Work Results for Communications.

1.3 SUBMITTALS

- A. Specified in Section 270500 - Common Work Results for Communications.

1.4 QUALITY ASSURANCE

- A. Specified in Section 270500 - Common Work Results for Communications.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver in accordance with NEMA WC 26.

PART 2 - PRODUCTS

2.1 CATEGORY 6/6A (CATEGORY 6A IS FOR WIRELESS USE ONLY) HORIZONTAL CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Belden
 - 2. Berk-Tek
 - 3. CommScope Uniprise
 - 4. General Cable
 - 5. Leviton

6. Ortronics (Legrand) - Preferred
7. Panduit
8. Product options and substitutions. Substitutions: Not permitted.

- B. Conductors: 4 twisted pair -minimum 24 AWG, solid copper.
1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
 2. Complies with individual characteristics established in TIA-568-C and all addendums for Category 6/6A cable performance specification.
 3. Nominal Impedance: 100 ohms plus or minus 15 percent.
 4. Certified and capable of performing to a minimum of 250 MHz.

2.2 CATEGORY 6/6A / (CATEGORY 6A WIRELESS USE ONLY), COPPER PATCH CORDS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Belden
 2. Berk-Tek
 3. CommScope Uniprise
 4. General Cable
 5. Leviton
 6. Ortronics (Legrand) - Preferred
 7. Panduit
 8. Product options and substitutions. Substitutions: Not permitted.
- B. Conductors: Straight through type 4 twisted pair minimum 24 AWG, stranded copper.
1. Terminated with male 8-pin modular plugs.
 2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6/6A cable performance specification.
 3. Nominal Impedance: 100 ohms plus or minus 15 per cent. Certified and capable of performing to a minimum of 250 MHz.
 4. Match performance and impedance characteristics of the installed horizontal unshielded twisted pair cable.
 5. Contractor shall provide Category 6/6A copper patch cord for 75 percent of the total copper ports installed. Example: (96) copper ports installed, provide (72) Category 6/6A copper patch cords. Contractor shall provide manufacturer terminated patch cables. All copper patch cord colors and lengths shall be determined by Raleigh IT Service Center SME.
 6. Each patch cord shall have a plastic arch for ease of removal of the connector (rubber boots are not acceptable). Preferred Copper Patch type: Ortronics (Legrand) #OR-MC615-06.
 7. Patch cords shall be factory made, tested and individually factory wrapped within non-clear plastic bags. The plastic bag shall clearly identify the manufacturer/testing agency with silk screen on the outside and shall contain the cable test results. Plastic bags shall have perforated or zip-lock top for easy removal of cord.
 8. All Category 6A wireless patch cords will be white in color. All WAP Category 6A patch cords will be 3 ft. on the WAP end.
- C. Connector:
1. 8-pin modular, Category 6/6A, non-keyed.
 2. Complies with TIA-568-C "T568A" pinning configuration.
 3. Color: Clear.

2.3 OUTLET FACEPLATES/MOUNTING FRAMES

- A. Wall mounted, or raceway mounted outlet faceplates or mounting frames, suitable for the following:
1. Mounting required number of 8-pin modular connectors.

2. Use with approved 8-pin modular connectors.
3. Installation over single gang junction box, double gang junction box, or raceway knockout as indicated on Drawings.

B. Color: White with Machine manufactured permanent labeling with Black lettering.

2.4 CONDUITS, BOXES AND CABLE TRAYS

A. Specified in Section 260533 - Raceway and Boxes for Electrical Systems.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Specified in 270500 - Common Work Results for Communications.

3.2 INSTALLATION

A. Cables: Furnish and install communications cables as specified, in accordance with Cable Pulling Schedules, manufacturer's published instructions, TIA-568-C including all addendums and as indicated on Drawings.

1. Dress cable to final location, remove sheath to point allowing splaying of conductors, and terminate. Make each termination uniform and precise. Hook and Loop "Velcro" cable ties shall be used for bundling and dressing all cabling. No nylon zip ties shall be used for cable bundling or attachment.
2. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify, or add to manufacturer's twisting of cable. Do not untwist more than ½ inch of the stripped cable.
3. Label each end with a machine generated, self laminating label.
4. Mechanical couplers or splices not permitted.
5. Cable conductors shall be continuous from originating termination equipment to destination termination equipment.

B. Telecommunications Outlet: Furnish and install appropriate number of female 8-pin modular jack connectors on one face plate at each T/O (telecommunications outlet) as indicated on Drawings.

1. Install faceplate over single duplex outlet box, double duplex outlet box, or raceway knockout, level and in alignment with adjacent faceplates.
2. Provide a minimum of a 20-foot service loop in the ceiling at the end of the conduit/EMT riser before the cable enters the outlet box.
3. Coordinate color with Raleigh IT Service Center POC.

3.3 CAT6/6A COPPER TESTING

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

B. Testing and Certification Overview:

1. The Contractor shall provide Fluke Copper/Fiber equipment and materials for the testing of all installed copper and fiber transmission media. For Category 6 copper, the supplier shall employ Level III compliant test equipment that stores the test results in internal memory and produces test result reports. For Category 6A, the supplier shall employ Level IV compliant test equipment that stores the test results in internal memory and produces test result reports. The supplier shall provide the USPS, test results in test equipment format (raw electronic). Supplier prepared spread

sheets and PDF files are NOT ACCEPTABLE. There is a USPS 10MB attachment limit. There should never be test results over 10MB. USPS cannot access DropBox.

- a. The USPS technical representative may conduct random tests of copper and fiber cable with USPS test equipment as part of the final inspection. The Contractor shall re-terminate and retest any cable found to be defective.
- b. The Contractor shall provide all equipment and services necessary to secure and provide the USPS a system warranty. Inspect installation of cables and equipment during and at completion of installation.
- c. Test results indicating "Pass*(Star)" or "Fail" shall not be accepted and must be repaired/retested with 2nd set of test results submitted to Raleigh IT SME.
- d. Test results must be uploaded to the "Link Ware Live" cloud based repository for USPS RITSC access.

C. Copper Cable Testing:

1. Test parameters include, but are not limited to:
 - a. Wire Map
 - b. Length
 - c. Propagation Delay
 - d. Delay Skew
 - e. DC Loop Resistance
 - f. Insertion Loss (Attenuation)
 - g. Return Loss (RL), RL @ Remote
 - h. NEXT, NEXT @ Remote
 - i. Attenuation-to-crosstalk Ratio (ACR-N), ACR-N @ Remote
 - j. ACR-F (ELFEXT), ACR-F @ Remote
 - k. Power Sum ACR-F (ELFEXT), PS ACR-F @ Remote
 - l. Power Sum NEXT, PS NEXT @ Remote
 - m. Power Sum ACR-N, PS ACR-N @ Remote
 - n. Power Sum Alien Near End Xtalk (PS ANEXT)
 - o. Power Sum Alien Attenuation Xtalk Ratio Far End (PS AACR-F)
 - p. Alien Cross-talk
2. Cable test parameters shall be set to the manufacturer's values for NVP and Test Limit (TIA-568-C, Category 6/6A, Permanent Link). If the NVP is not set correctly, test results will be rejected.
3. Perform end-to-end tests of each 4-pair cable as follows:
 - a. Pair/conductor for proper pinouts and continuity.
 - b. Ground fault.
 - c. Proper termination, shorts, and crossed pairs.
 - d. Channel attenuation per TIA-568-C, including all addendums.
 - e. Channel bi-directional worst case near end cross talk (NEXT) at frequencies up to 250 MHz, per TIA-568-C, including all addendums.
 - f. Measured effective cable run length.

3.4 INSTALLATION - COMPONENTS

- A. Specified in Section 270500 - Common Work Results for Communications.

3.5 CONSTRUCTION

- A. Specified in Section 270500 - Common Work Results for Communications.

3.6 FIELD QUALITY CONTROL

- A. Specified in Section 270500 - Common Work Results for Communications.

END OF SECTION

USPS CSF Specifications issued: 10/1/2018
Last revised: 8/25/2017

SECTION 272133

DATA COMMUNICATIONS - WIRELESS ACCESS POINTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following:
 - 1. This section specifies requirements for the design/layout, and installation of Telecommunications outlets (T/Os) that are to serve IEEE 802.11 wireless access points (WAPs).
- B. Related Documents:
 - 1. The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section.
 - 2. USPS LAN Infrastructure Best Practices, 01 October 2018.
 - 3. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 078400 - Fire Stopping.
 - 2. Section 270500 - Common Work Results for Communications.
 - 3. Section 271100 - Communications Equipment Room Fittings.
 - 4. Section 271300 - Communications Backbone Cabling.
 - 5. Section 271500 - Communications Horizontal Cabling.

1.2 REFERENCES

- A. Specified in Section 270500 - Common Work Results for Communications.

1.3 DESIGN REQUIREMENTS

- A. Coverage Areas:
 - 1. The entire building shall have full area coverage for currently supported Wi-Fi standards. This includes 802.11a/g/n/ac.
 - 2. Coordinate with Raleigh Telecom Service Wireless Team during design for indoor and outdoor locations.
- B. Identification on Drawing Floor Plans:
 - 1. Duplex telecommunications outlets (T/Os) for WAPs shall have a distinct symbol on the drawings; preferably a number 30 orange dot.
- C. Cabling Infrastructure:
 - 1. Each Telecommunications outlet (T/O) for a WAP is to be served by two (2) category 6A cable terminated with an 8P8C connector onto a 24 port Cat6A Copper Patch Panel.
 - 2. Cable locations/mounting will be designed in the Admin areas for below ceiling and flush mounted WAPs. Any exceptions, such as high-density locations, shall be approved by Raleigh IT.
- D. Power Requirements: All USPS WAP's utilize PoE (Power over Ethernet). No power outlets (120 Volt) are required to support wireless access points.

1.4 SUBMITTALS

- A. The following submittals are due at the Pre-Construction Phase, in accordance with submittal requirements in Section 270500 - Common Work Results for Communications.
 - 1. Shop Drawings:
 - a. Provide scaled drawings (not less than 1/8" = 1'-0") indicating location of Cat6A telecommunications outlets (T/O's) for the WAPs and locations of all pull points. These locations shall be coordinated with all other trades.
- B. The following submittals are due Post-Construction, in accordance with the submittal requirements in Section 270500 - Common Work Results for Communications:
 - 1. Record Drawings:
 - a. Provide scaled AutoCAD and PDF drawings (not less than 1/8" = 1'-0") indicating actual location of communications outlets for the WAPs, as well as the actual installed routing of cable, conduits, and locations of all pull points. Design or shop drawings with field notes will not be accepted.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Raleigh Telecom Services Wireless Team will provide the WAPs and related equipment (PoE switches, patch cables, controllers) for the scope of the project, and can provide the architects specifications for aesthetic concerns.
- B. Typically used WAP models are 802.11ac capable and operate on a 5 GHz radio frequency operating mode.
- C. Exposed Structure Mounting:
 - 1. The General Contractor shall provide fire-resistant wooden mounting base, dedicated duplex CAT 6A, telecommunication outlet and satellite arm with "L" shaped adapter.
 - a. The satellite mounting arm shall be provided by the Contractor; "L-com", universal tube mount #HGX-UMOUNT.
 - b. The "L"-shaped bracket adapter shall be provided by the Contractor; "L-com" 60-degree tilt and swivel mount kit #HGX-PMT06.
 - c. The plywood and appropriate mounting channels are to be provided by the Contractor.
 - d. The "WAP" is factory equipped with a low profile, mounting bracket (Cisco #AIR-AP-BRACKET-1).
- D. Acoustic Ceiling Tile Grid Mounting:
 - 1. The mounting bracket and ceiling grid clip assembly for ceiling tile grid mounted WAP's are factory furnished as part of the WAP.
 - a. WAP's to be installed in acoustic ceiling tile grids require a dedicated duplex, CAT 6A, telecommunications outlet.
 - b. The "WAP" is factory equipped with a universal, mounting bracket and ceiling grid clip assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

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

- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

3.2 GENERAL

- A. Exposed Structure Mounting:
 - 1. Contractor shall provide fire-resistant wooden mounting base. Mount duplex telecommunication outlet on wooden base, attach satellite arm and "L" shaped adapter to wooden base, and mount attached WAPs at 12' AFF on the Work Room Floor via uni-strut mounted from the structure above. No column mounts are acceptable with the exception of the mounting for the monitor WAP's. If Satellite arm is mounted in a Vertical orientation, ensure the arm rests against the stop without a need for a securing bolt.
 - a. WAP's are normally mounted at 12 ft. A.F.F. within the workroom, except immediately around FSS machines where the WAP's are mounted no lower than 16 ft. A.F.F.
 - b. WAP shall be secured to its mount using locking key and tie-wrap fastened through the security hasp.
- B. Acoustic Ceiling Tile Grid Mounting:
 - 1. WAP's to be installed in acoustic ceiling tile grids require a duplex, CAT 6A, telecommunications outlet securely mounted above the accessible ceiling located within 2 ft. of the WAP.
 - 2. WAP shall be secured to its mount using locking key and tie-wrap fastened through the security hasp.
- C. Utilize a 3 ft. long white colored, copper patch cord. Patch the WAP into the first port of the duplex T/O and into the ethernet port (not console port) of the WAP. Contractor shall fill out all needed spreadsheet documentation and submit to Raleigh IT POC. This includes MAC address, Workroom floor location, duplex port WAP is patched to, (the first of the two data ports) ER/TR connected to, etc.
- D. All WAP's shall be mounted with the ethernet and console ports oriented as close as possible to the "true north" direction for optimal GPS map reading.
- E. WAP's are furnished by Raleigh Telecom Services Wireless Team and installed by the Contractor. The Contractor shall install and complete the necessary mounting assemblies prior to the attachment of the WAP's.
- F. Wireless Spectrum Survey shall be performed by the Raleigh Wireless Team after installation to validate the wireless design.

END OF SECTION

USPS CSF Specifications issued: 10/01/2018
Last revised: 09/6/2018

SECTION 275123
CALL BELL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Doorbell call system.
 - a. Employee personnel door.
 - b. Retail wicket door.
 - c. Entry into BMEU.
 - 2. Assistance buzzer system.
 - a. Full service counter.
 - b. BMEU workstation.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 – Common Work Results for Electrical.

1.3 SUBMITTALS

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Location of devices and components.
 - b. Actual routing and sizes of conduit, boxes and conductors.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.

2. Products: Listed and classified by Underwriter's Laboratories Incorporated as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with Project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Broan – Nutone, LLC. Hartford WI (800) 558-1711
 2. Carlon/Thomas & Betts, Cleveland OH (216) 464-3400
 3. Edwards Signaling and Security Systems, Plainville, CT (800) 336-4206.
 4. EZ Tone, Hermitage TN (800) 366-7235
 5. Federal Signal Corp., University Park, IL (800) 548-7229.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 DOORBELL CALL SYSTEM

- A. Description: Commercial two tone chime type door bell, pushbuttons, power transformer, conduits, chimes, and wiring as required for complete system.
- B. Materials:
 1. System with pushbutton, power transformer, conduits, and wiring as required for complete system.
 2. Provide chimes with audibly different and distinct sound from sound made by assistance buzzer.
 3. Color/finishes of pushbutton and faceplate to match other electrical devices.
- C. Transformer: 12 volts AC rated.
- D. Location:
 1. Wicket Door (set to two tone chime).
 2. Personnel Door (set to single chime).
 3. BMEU.

2.3 ASSISTANCE BUZZER

- A. Description: Commercial buzzer type doorbell, pushbuttons, power transformer, conduits, buzzer, and wiring as required for complete system.
- B. Materials:
 1. System with pushbutton, power transformer, conduits, and wiring.
 2. Provide buzzer with audibly different and distinct sound from sound made by doorbell chimes.
 3. Color/finishes of pushbutton and faceplate to match other electrical devices.
- C. Transformer: 12 volts AC rated.
- D. Location:
 1. Full service counter.
 2. BMEU workstation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.

3.2 INSTALLATION

- A. The call bell system(s) shall be installed and wired completely as shown on the plans by the contractor, who shall make all necessary wiring connections to devices and equipment.
- B. Install system transformer at outlet box locate above within accessible ceiling.
- C. Install low voltage wiring in conduit.
- D. Flush mount wall outlets for buzzers at 6 inches below ceiling unless otherwise noted on Drawings.

3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Perform operational testing on call bell system(s) to verify proper operation and field wiring connections.

END OF SECTION

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SECTION 281600
INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Intrusion detection devices.
 - 2. Alarm control panel.
 - 3. Control stations (keypads).
 - 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 a dedicated, voice grade, incoming copper "Plain Old Telephone System" (POTS) telephone 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, incoming copper "POTS", dial-up telephone line dedicated to intrusion detection, alarm service, and control of security related functions. Provide "RJ31X" telecommunications outlet for final connection.
 - a. The Contractor shall coordinate the provisions for this incoming copper "POTS" telephone line with the local telephone service provider.
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 USPIS 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.
 - 2) Ceiling-Mounted Units: Full 360 degree conical spot-detection pattern. With device mounted at 8 feet above floor the pattern at floor level is minimum diameter of 7 feet. With device mounted at 25 feet above floor the pattern at floor level is minimum diameter of 18 feet.
 - 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 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 USPS 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.
- 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. Seal openings between floors, existing or created, for cable pass through fire rated and smoke walls. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the Contractor. Any openings created and left unused, shall also be sealed.
- 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 to 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 feet A.F.F. in the workroom shall be contained in conduit. Provide flush boxes within finished areas and surface mounted, factory boxes in unfinished areas. Provide 3/4-inch conduit risers with 90 degree bend and bushing for all wall mounted devices.

2.11 POWER REQUIREMENTS

- A. Normal System Power Supply: 120 V 60 Hz from locked disconnect device. System components are supplied with power through system control panel.
- B. Power Source Transfer: When normal power is interrupted, system is automatically switched to backup supply without degradation of critical system function or loss of signals or status data.
 - 1. Backup Source: Batteries in power supplies of individual system components. Such batteries are an integral part of power supplies of components. When system is in "Alarm" mode, power source shall provide a minimum of 4 hours of battery backup, with 8 to 12 hours in "Normal" mode.
 - 2. Annunciation: Switching of system or any system component to backup power is indicated on system control panel as a change in system condition.
- 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 USPIS Alarm Technician.
 - 3. Provide descriptive text for each point (zone) covered, and the point it was landed to on the Alarm Panel.
 - 4. Advise USPIS which points need a delay for Entry/Exit.

5. All keypads shall be addressed individually. (USPIS can provide support for this).
 6. Advise USPIS if any special code is needed to dial out on the Alarm Panel's phone line (9, 8, etc).
 7. Provide USPIS with all system information necessary for the completion of the programming template by USPIS. Upon completion of the template, USPIS will transmit program to the panel for final testing.
 8. 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 - Common Work Results for Electrical.
 - 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 US 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 US 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 one 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 Specification Last Revised: 10/1/2022

SECTION 283100

FIRE EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM (EVACS)

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification provides the minimum requirements for the Fire Emergency Voice/Alarm Communication System. The system shall include, but not limited to all equipment, materials, labor, documentation and services necessary to furnish and install a complete, operational system to include but not limited to the following functions:
 - 1. Initiating Devices.
- B. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.
 - 2. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 260533 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

- A. All work and materials shall conform to all applicable federal, state and local codes and regulations governing the installation. If there is a conflict between the referenced standards, federal, state or local codes, and this specification, it is the bidder's responsibility to immediately bring the conflict to the attention of the engineer for resolution. National standards shall prevail unless local codes are more stringent. The equipment and installation shall comply with the current provisions of the following codes and standards.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code.
 - 2. NFPA 72, National Fire Alarm Code.
 - 3. NFPA 101, Life Safety Code.
- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL 521 - Heat Detectors for Fire Protective Signaling Systems.

NOTE: Control equipment shall be listed to comply with both UL864 and UL2572 standards.
- D. Federal Codes and Regulations:
 - 1. Americans with Disabilities Act (ADA).
- E. International Standards Organization (ISO):
 - 1. ISO-9000
 - 2. ISO-9001
- F. Factory Mutual (FM):
 - 1. Provide factory mutual approval.
- G. International Code Council:
 - 1. International Building Code.
 - 2. International Fire Code.
 - 3. International Mechanical Code.

1.3 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): See Public Authorities.
- B. Engineer of Record: A Professional Engineer Registered in the State where the project is located who undertakes design of the fire protection system.
- C. Owner: Building/facility owner, landlord/lessor, tenant/lessee, Insurance Carrier or any designated representative of these entities.
- D. Public Authorities: Local, State or Federal government body having jurisdiction over any portion of the project. This includes, but is not limited to: Fire Departments, Fire Marshal Offices, Aviation Authorities, Insurance Regulatory Boards, etc.
- E. Approved: Unless otherwise stated, materials, equipment or submittals approved by the Authority or AHJ.
- F. Circuit: Wire path from a group of devices or appliances to a control panel or transponder.
- G. Central Station: A remote supervising station (facility) that is listed for central station remote monitoring in accordance with NFPA 72. The central station serves as the constantly attended location that receives alarm, supervisory or trouble signals from the protected premises fire alarm system.
- H. CPU: The central computer of a multiplex fire alarm or voice command control system.
- I. EVACS: Dedicated in building "Emergency Voice/Alarm Communication System" utilized for originating and distributing voice instructions and evacuation signals pertaining to a fire emergency to the occupants of a building.
- J. FAAP: Fire Alarm Annunciator Panel.
- K. FACP: Fire Alarm Control Panel.
- L. FM: FM Global (Factory Mutual).
- M. MPSA: Medium Power Speaker Array.
- N. IDC: Initiating Device Circuit.
- O. LCD: Liquid Crystal Display.
- P. NAC: Notification Appliance Circuit.
- Q. NICET: National Institute for Certification in Engineering Technologies.
- R. NRTL: Nationally Recognized Testing Laboratory.
- S. SLC: Signaling Line Circuit.
- T. Style 1: As defined by NFPA 72, Class B.
- U. Style 4: As defined by NFPA 72, Class B.
- V. Style 6: As defined by NFPA 72, Class A.
- W. Style 7: As defined by NFPA 72, Class A.
- X. Style B: As defined in NFPA 72, Class B.
- Y. Style D: As defined in NFPA 72, Class A.

- Z. Style Y: As defined in NFPA 72, Class B.
- AA. UL Listed: Materials or equipment listed and included in the most recent edition of the UL Fire Protection Equipment Directory.
- BB. Zone: Combination of one or more circuits or devices in a defined building area.

1.4 SYSTEM DESCRIPTION

- A. Summary:
 - 1. Provide all permits, labor, equipment, materials and services to furnish and install a fully tested functional, UL Listed, code compliant, intelligent addressable networked, Fire Emergency Voice/Alarm Communication System (EVACS) including duct initiation, all raceways and wiring connected to an existing system.
 - 2. All equipment shall be new and the current products of a single manufacturer, actively engaged in the manufacturing and sale of digital fire detection devices for over ten years.
 - 3. Also included are system wiring, fiber optic cable, raceways, pull boxes, terminal cabinets, mounting boxes, and any accessories and miscellaneous items required for a code compliant system.
 - 4. The system drawings show the intended coverage and suggested device locations. Final device quantity, location, and AHJ approval are the responsibility of the contractor.
 - 5. The final system shall be complete, tested, and ready for operation as described elsewhere in this specification, before owner acceptance.
 - 6. Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed, is compatible with other systems, and will accommodate the future requirements and operations of the building owner. All specified operational features must be met without exception.
 - 7. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional protected premises fire alarm system (System). The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.
 - 8. Certification that the entire system(s) has/have been inspected and tested, is/are installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and ULI listings, and is/are in proper working order. Contractor shall use "Fire Alarm System Certification and Description" as required by NFPA 72.
- B. Related Work:
 - 1. Work and/or equipment provided in other sections and related to the fire alarm system shall include, but not be limited to:
 - a. Duct smoke detectors shall be furnished, wired and connected by the electrical contractor.
- C. General:
 - 1. Furnish and install a complete UL list/certified, modular, non-coded, independently point addressable, intelligent Fire Alarm System as described herein and as shown on the plans.
 - 2. System shall be dedicated to fire service.
 - 3. The system shall provide a one-way multi-channel emergency communication sub-system for the distribution of emergency messages to facility occupants.
- D. System Components:
 - 1. Provide and install a new fire detection and alarm system that shall consist of:
 - a. Duct smoke detectors.

1.5 SEQUENCE OF OPERATIONS

- A. Duct Smoke Operation:
 - 1. The Alarm activation of any duct smoke detector, the following functions shall automatically occur:

- a. The internal audible device shall sound at the control panel and remote annunciator.
- b. The LCD display shall indicate all applicable information associated with the alarm condition including; device type, device location and time/date.
- c. All system activity/events shall be recorded on the system printer and system history file.
- d. Any remote or local annunciator LED's associated with the alarm shall be illuminated.
- e. Shutdown the local air handling unit.
- f. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.

1.6 SYSTEM CONFIGURATION

A. General:

1. The existing Life Safety System equipment is arranged and programmed to provide a system for the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department (when required), the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building occupants.
2. The existing System utilizes independently addressed, smoke detectors, heat detectors and input/output modules as described elsewhere in this specification.

B. Initiating Device Circuits:

1. The Initiating device circuits (IDC) used to monitor manual fire alarm stations, smoke and heat detectors, waterflow switches, valve supervisory switches, fire pump functions, and air pressure supervisory switches shall be Class B.

C. 24 VDC Notification Appliance Circuits:

1. 24 VDC Notification appliance circuits (NAC) shall be Class B. All notification appliance circuits shall have a minimum circuit output rating of 2 amp @ 24 VDC. The notification circuits shall be power limited. Non-power limited circuits are not acceptable.

D. Signaling Line Circuits (SLC-Data Circuits):

1. The signaling line circuit shall communicate from a panel/node to analog/addressable detectors, input modules, output modules, isolation modules and notification appliance circuits.
2. Each signaling circuit connected to addressable/analog devices shall provide a minimum of 20 spare addresses.
3. The signaling line circuit (SLC) connecting all components Class B (style 4).

1.7 SUBMITTALS

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

1. Product Data: For each type of Product required.
2. It shall be the contractor's responsibility to inspect the job site and become familiar with the conditions under which the work will be performed. These conditions should be used to adjust the submittals.
3. Shop Drawings: Include plans, elevations, sections, details, and attachments necessary:
 - a. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
 - b. Include voltage drop calculations for notification appliance circuits.
 - c. Include 25 percent spare capacity on each signal circuit so that additional devices can be added.
 - d. Include substantiating emergency (battery) and normal power supply calculations for supervisory and alarm power requirements and calculations of notification device circuit loading (end of circuit voltage drop) to ensure proper operation of all devices.
 - e. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.

- f. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits. Drawing scale shall match engineers design drawings.
 - g. Include complete schematic circuit diagrams for system, including all equipment. Wiring diagram shall show point to point connections between all system components.
 - h. Include descriptions of system operation, annunciator schedule showing titles for each zone, and manufacturer's literature marked to show model and catalog number for all equipment.
 - i. Include complete riser diagrams for system indicating wiring sequence of all added alarm devices and control equipment shall be included with submittal data.
 - j. Include requirements of the Integrated Automation, Security, and Clean-Agent System and data sharing details.
- B. General Submittal Requirements:
 - 1. Submit for approval four 4 sets of shop drawings and submittal documentation to the consulting engineer for review and comment. Drawing and submittal documentation sets shall be bound. Additional copies may be required at no additional cost to the project.
 - 2. Contained in the title block of each drawing shall be symbol legends with device counts, wire tag legends, circuit schedules for all addressable appliance circuits, the project name/address, and a drawing description which corresponds to that indicated in the drawing index on the coversheet drawing. A section of each drawing title block shall be reserved for revision numbers and notes.
 - 3. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified fire-alarm technician, Level III minimum.
- C. Construction Drawings:
 - 1. The System's Contractor shall prepare fire alarm system installation drawings for permitting in accordance with Florida Administrative Code Rule 61G15. Drawings shall incorporate all required information per Rule 61G15 and be signed and sealed by a registered professional engineer meeting the requirements of Rule 61G15. The System's Contractor furnishing and installing the fire alarm system is responsible for preparation of these drawings and getting drawings approved by the Authority Having Jurisdiction (AHJ).
- D. Systems Contractor Qualifications:
 - 1. The contractor directly responsible for this work shall be a systems contractor, who is and who has been regularly engaged in the furnishing and installation of commercial and industrial fire alarm systems of this type and size for at least the immediate past 5 years. All equipment shall be installed by a technician with experience installing the manufactured system or a recognized training school or course for the installations of this type system. The contractor shall, if requested by the engineer; show proof of a specific individual's training. The system's contractor shall directly employ a suitable number of skilled systems installers whose normal work is systems installation and who shall install and make the wire and cable connections thereto.
 - 2. As part of the project submittal, it shall be demonstrated to the satisfaction of the engineer that the systems contractor has adequate plant and equipment to do the work properly and expeditiously, adequate staff and technical experience.
- E. Test Reports: Submit the following reports directly to USPS Project Manager from Manufacturer's Quality Control Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
 - 1. Pre-test.
 - 2. Acceptance test.
- F. Certificates: Manufacturer's certificate certifying that components and Products meet or exceed specified requirements.
- G. Qualification Documentation:

1. Submit documentation of manufacturer and installer experience indicating compliance with specified qualification requirements. Include lists of completed projects with project names and addresses, and names of Engineers and Owners.
 2. Fire alarm contractor license issued by State or local authority having jurisdiction.
- H. Manufacturer's Field Reports: Submit the following reports directly to USPS Project Manager from Manufacturer's Quality Control Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.
1. Preparatory inspection.
 2. Initial inspection.
 3. Follow-up inspection.
 4. Final inspection.
- I. A copy of the installing technician's NICET certification shall be provided.
- J. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
1. Operation and Maintenance Data: Project specific operating manuals covering the installed Life Safety System. A generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement. Include user's software data and recommendations for spare parts to be stocked at the site. Provide names, addresses, and telephone numbers of service organizations that stock repair parts for the system.
 2. Operations and maintenance data for fire-alarm system and components shall include the following:
 - a. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - b. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
 - c. Record copy of site-specific software.
 - d. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
 - 1) Frequency of testing of installed components.
 - 2) Frequency of inspection of installed components.
 - 3) Requirements and recommendations related to results of maintenance.
 - 4) Manufacturer's user training manuals.
 - e. Manufacturer's required maintenance related to system warranty requirements.
 - f. Abbreviated operating instructions for mounting at fire-alarm control unit.
 - g. Copy of NFPA 25.
 3. Project Record Documents: As-Built drawings consisting of a scaled plan of each building showing the placement of each individual item of the Life Safety System equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway. All drawings must reflect point to point wiring, device address and programmed characteristics. All drawings shall be provided in AutoCAD format. A hard copy plot of each sheet shall also be provided. Provide the application program listing for the system (to the facility) as installed at the time of acceptance (disk, hard copy printout, and all required passwords).
 - a. The Contractor shall provide three bound copies of the following, to be forwarded to the Owner at completion of project:
 - 1) As-built wiring and conduit layout diagrams showing all fire alarm devices on floor plans, including wire color code and terminal numbers, and showing all interconnections in the system.
 - 2) Electronic circuit diagrams of all new notification devices.
 - 3) Technical literature on all major parts of the system, including, smoke detectors.
 4. Record of Completion: Figure 4.5.2.1 NFPA 72.
- K. Maintenance Material Submittals:
1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. Smoke Detectors: Quantity equal to 10 percent of amount of each type installed.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm experienced in manufacturing equipment of the types and capacities indicated that have record of successful in-service performance with minimum 10 years documented experience. Prime system manufacturer and manufacturers of major system components required to qualify separately.
1. Service Center: The System Supplier shall maintain a service organization with adequate spare parts stock within 75 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor.
 2. System equipment shall be from a single manufacturer and shall be supported by a manufacturer authorized, established service organization that shall stock parts for the equipment supplied.
 3. Equipment shall be manufactured by a firm that has been actively manufacturing fire alarm systems for a minimum of 7 years and that offers a 3 year warranty on all control equipment.
 4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 5. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.
- B. Installer Qualifications: Experience with systems of the type and scope indicated and certified as authorized service representative of the prime system manufacturer with minimum 5 years documented experience.
1. System shall be installed by a single contractor that assumes responsibility for system components and their compatibility.
 2. Only manufacturer's certified installers with NICET Level III or higher shall be utilized.
 3. The addressable fire alarm system shall be connected, programmed, and tested only by the manufacturer or by an authorized distributor who stocks a full complement of spare parts for the system. Technicians performing this service shall be trained and individually certified by the manufacturer for the model of system being installed and NICET Level II or greater. Copies of their certifications must be included with the contractor's submittal to the engineer, prior to installation. The submittal cannot be approved without this information.
- C. Regulatory Requirements:
1. Calculations, Product Data, Shop Drawings: Provide stamp of approval from Public Authorities.
 2. Comply with requirements of Public Authorities for submittals, approvals, materials, installation, inspections, and testing.
 3. Comply with requirements of USPS Project Manager and Owner's insurance underwriter for submittals, approvals, materials, installation, inspections, and testing.
 4. Provide certificate of compliance from Public Authorities indicating approval of field acceptance tests.
 5. Conform to applicable code for submission of design and calculations, reviewed shop and erection drawings and as required for acquiring permits.
 6. Cooperate with regulatory agency or authority and provide data as requested.
- D. Pre-Installation Meetings:
1. Convene a pre-installation meeting one week prior to commencing Work of this Section. Final device and equipment locations shall be coordinated with the Plant and Engineer during this meeting.
 2. Require attendance of parties directly affecting Work of this Section.
 3. Review conditions of operations, procedures and coordination with related Work.
 4. Agenda:
 - a. Tour, inspect, and discuss conditions of building and building structure.
 - b. Review system design and requirements.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review system Drawings and data.
 - e. Review and finalize construction schedule related to system and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - f. Review required inspections, testing, certifying, and material usage accounting procedures.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall be responsible for all receiving, handling, and storage of his materials at the job site.
- B. Overnight storage of materials is limited to the assigned storage area. Materials brought to the work area shall be installed the same day or returned to the assigned storage area unless previously approved by the Owner. Store equipment in a clean, dry space and protect from dirt, fumes, water, construction debris, and physical damage.
- C. The Contractor shall remove rubbish and debris resulting from his work on a daily basis. Rubbish not removed by the Contractor will be removed by the Owner and back-charged to the Contractor.
- D. Handle equipment to prevent internal components damage, breakage, denting, and scoring enclosure and finish.
- E. Do not install damaged equipment.
- F. Do not install or connect any smoke detectors (spot or duct) before areas where detectors are installed are cleaned and ready for occupants as indicated in NFPA-72. If detectors are installed before areas are cleaned, and found to be contaminated at time of final commission or soon after. The installing contractor shall replace detectors with new at no cost to the owner.
- G. After installation, protect from damage by work of other trades.

1.10 COORDINATION

- A. Coordinate conduit and cable runs with other contractors. Include fire proofing and fire stopping at penetrations.
- B. Coordinate locations of devices with reflected ceiling plans and wall elevations.
- C. Pre-installation Conference: Conduct conference at Project site. Conference should discuss all necessary coordination and outline specific interface details to be coordinated with the existing mail processing equipment and access control systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approval agency for use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment shall be responsible for the satisfactory installation of the system.
- B. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Edwards, (800) 655-4497.
 - 2. Siemens, (800) 262-7976.
 - 3. Honeywell/Notifier, (800) 289-3473.
 - 4. Simplex/Grinnell, (978) 731-2500.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted subject to approval of USPS Project Manager.

1. Conflicts, deviations, or change requests shall be submitted in writing to USPS Project Manager with supporting documentation. Include written justification, designs, manufacturer's specifications, cost benefits, and any special circumstances dictated by local conditions. Documentation package shall be submitted in sufficient time to minimize any adverse effects of the proposed changes to the project construction schedule. USPS Project Manager reserves the right to reject substitute and other systems.

2.2 FIELD-MOUNTED SYSTEM COMPONENTS

A. Smoke Detectors and Accessories:

1. Smoke Detector - Photoelectric (Duct Mounted):
 - a. Provide analog/addressable photoelectric smoke detectors at all duct applications. The system shall have the ability to set the sensitivity and alarm verification of each of the individual detectors on the circuit. It shall be possible to automatically change the sensitivity of individual analog/addressable detectors for the day and night periods. Each smoke detector shall be capable of transmitting alarm signals as well as normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds approximately six times an hour. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 80 percent and 100 percent of the allowable environmental compensation value.
 - b. Provide key operated "normal-reset-test" switch at each duct smoke detector.
 - c. Basis of Design: Edwards model SIGA-PD.
2. Duct Detector Housing:
 - a. Provide smoke detector duct housing assemblies to mount an analog/addressable detector along with a standard, relay or isolator detector mounting base. The housing shall also protect the measuring chamber from damage and insects. The housing shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. Drilling templates and gaskets to facilitate locating and mounting the housing shall also be provided. The housing shall be finished in baked red enamel. Remote alarm LED indicators and remote test stations shall be provided.
 - b. Basis of Design: Edwards model SIGA-DH.

2.3 CONDUCTORS

- A. The requirement of this section apply to all system conductors, including all signaling line, initiating device, notification appliance, auxiliary function, remote signaling, AC and DC power and grounding/shield drain circuits, and any other wiring installed by the Contractor pursuant to the requirements of these Specifications.
- B. All circuits shall be rated power limited in accordance with NEC Article 760.
- C. All new system conductors shall be of the type(s) specified herein.
 1. All initiating circuit, signaling line circuit, AC power conductors, shield drain conductors and grounding conductors, shall be solid copper, stranded or bunch tinned (bonded) stranded copper.
 2. All signaling line circuits, including all addressable initiating device circuits shall be 18 AWG minimum multi-conductor jacketed twisted cable or twisted shielded or as per manufacturer's requirements.
 3. All non-addressable initiating device circuits, 24 VDC auxiliary function circuits shall be 18 AWG minimum or per manufacturer's requirements.
 4. Color code fire alarm conductors as follows:

ITEM

Initiating Device

COLOR

Orange/Brown

283100 - 9

5. All conductors shall be terminated with crimp type, open end, space lugs using tool approved by lug manufacturer. Terminal cabinets shall be provided with screw type terminal strips and plywood backboards.

2.4 CONDUCTORS AND RACEWAY

- A. Except as otherwise required by Code and/or these Specifications, the installation of all system circuits shall conform to the requirements of Article 760 and raceway installation to the applicable sections of NFPA 70, National Electrical Code. Fire alarm circuit wiring shall include all circuits described in Section 760.1 including Fine Print Note No. 1 (FPN No. 1), and as defined by the manufacturer's UL listing.
- B. The system shall be installed in a skillful manner in accordance with approved manufacturer's installation manuals, shop drawings and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type required by the NEC and approved by local authorities having jurisdiction for the purpose.
- C. Any shorts, opens, or grounds found on new or existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.
- D. The contractor shall neatly tie-wrap all field-wiring conductors in the gutter spaces of the control panels and secure the wiring away from all circuit boards and control equipment components. All field-wiring circuits shall be neatly and legibly labeled in the control panel. No wiring except home runs from life safety system circuits and system power supply circuits shall be permitted in the control panel enclosures. No wiring splices shall be permitted in a control panel enclosure.
- E. All penetration of floor slabs and firewalls shall be fire stopped in accordance with all local fire codes.

2.5 CONDUIT RACEWAY

- A. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems maybe installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.
- B. The requirements of this section apply to all system conduits, raceways, electrical enclosures, junction boxes, pull boxes and device back boxes.
- C. All system conduits shall be EMT, 3/4 -inch minimum, except for flexible metallic conduit used for whips to devices only, maximum length 6 feet, 3/4-inch diameter, minimum.
- D. All system conduits, which are installed in areas, which may be subject to physical damage or weather, shall be IMC or rigid steel, 3/4 -inch minimum.
- E. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40 percent.
- F. All fire alarm conduit systems shall be routed and installed to minimize the potential for physical, mechanical or by fire damage, and so as not to interfere with existing building systems, facilities or equipment, and to facilitate service and minimize maintenance.
- G. All conduits, except flexible conduit whips to devices, shall be solidly attached to building structural members, ceiling slabs or permanent walls. Conduits shall not be attached to existing conduit, duct work, cable trays, other ceiling equipment, drop ceiling hangers/grids or partition walls, except where necessary to connect to initiating, notification, or auxiliary function devices.

- H. All system conduits, junction boxes, pull boxes, terminal cabinets, electrical enclosures and device back boxes shall be readily accessible for inspection, testing, service and maintenance.
- I. All electrical junction boxes shall be labeled "Fire Alarm System" with decal or other approved markings and shall be painted "red".

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. General:
 - 1. All equipment shall be attached to walls and ceiling/floor assemblies and shall be mounted firmly in place. Detectors shall not be supported solely by suspended ceilings. Fasteners and supports shall be sized to support the required load.
- B. Installation Sequence:
 - 1. Installation of the systems shall be conducted in stages and phased such that circuits and equipment are installed in the following order:
 - a. Install all new detection devices.
 - b. Terminate between field devices and the associated control equipment.
 - c. Complete contractor pre-test of system.
- C. Detectors:
 - 1. A unique identification number shall be assigned to each detector. (Identification shall be by zone number and device number within the zone.) This number shall be noted on the submittals and as built plans, and also be permanently mounted adjacent to the detector or affixed to its base.
 - 2. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
- D. Install products in accordance with NFPA standards and manufacturer's published instructions.
- E. End-of-line resistor device at the last easily accessible mount device or separate box adjacent to last device.
- F. Flush mount outlet box for electric door holder to withstand 80 pounds pulling force.

3.3 PREPARATION

- A. Coordinate work of this Section with other affected work and construction schedule.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Manufacturer's Field Services: Provide services of NICET certified Level III technician to supervise installation, adjustments, final connections, and system testing. Submit written certification on manufacturers letterhead to USPS Project Manager that system has been installed in accordance with applicable codes and is functioning properly. Provide copy of "Certificate of Completion" and place inside plastic envelope at Fire Alarm Control Panel.
- C. Tests and Inspections: The contractor shall perform all testing in occupied facilities at times of day that present the lowest impact and disruption to business and activities. Coordinate all testing in occupied buildings with the building owner's representative to assure that fire alarm system testing does not interrupt operations. This may require extensive after hours work to perform such testing.
- D. Visual Inspection:
 - 1. Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72. The systems operation matrix created by the equipment supplier shall be used to identify each alarm input and verify all associated output functions.
- E. Prepare test and inspection reports.
- F. Advise Plant, Engineer and authorities having jurisdiction in advance of dates and times that tests are to be performed on fire alarm systems.
- G. Preliminary Testing: Conduct preliminary tests to ensure that all devices and circuits are functioning properly. Tests shall meet the requirements of the written test plan. Correct any deficiencies, omissions or anomalies and retest the affected devices to assure proper function per the specification.
- H. Acceptance Testing:
 - 1. A final acceptance test shall not be scheduled until the system manuals are provided to and approved by the owner and the following are provided at the job site:
 - a. "As Built" Record drawings of the system as actually installed.
 - b. A copy of the system operation matrix.
 - 2. The acceptance inspector shall use the system "As Built" record drawings in combination with the system operation matrix and the written acceptance test plan during the testing to verify system operation.
 - 3. Should the system not perform to the above criteria it shall not be accepted and the Contractor shall correct all deficiencies and shall re-test the system at Contractor's expense in the presence of the Architect using the same test criteria.
 - 4. The building owner's representative shall witness the final tests.

5. Operate every installed device to verify proper operation and correct annunciation at control panel.
6. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.

3.5 WARRANTY AND MAINTENANCE

- A. Warranty: The contractor shall warranty all materials, installation and workmanship for 24 months from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with close-out documentation and included with the operation and installation manuals. The full cost of maintenance labor and materials required to correct any defect during the warranty period shall be included in the submitted bid.

END OF SECTION