



**Ft. Myers P&DC
Security Upgrades**

Ft. Myers, Florida 33913

K65332

March 3, 2022

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FT. MYERS P&DC
SECURITY UPGRADES
FT. MYERS, FLORIDA 33913

000002

PROJECT DIRECTORY

ARCHITECT

Masters Architectural Group 4, Inc.
1000 North Ashley Drive, Suite 505
Tampa, Florida 33602
Telephone: (813) 264-4441

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END OF DOCUMENT

USPS Specifications issued: 10/1/2020
Last revised: 6/17/2013

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FT. MYERS P&DC
SECURITY UPGRADES
FT. MYERS, FLORIDA 33913

DOCUMENT 000007

SEALS PAGE

PROJECT

Name: Ft. Myers P&DC, Security Upgrades
Location: 14080 Jetport Loop, Ft. Myers, Florida 33913
FMS Project Number: K65332

ARCHITECT OF RECORD

1000 North Ashley Drive, Suite 505
Tampa, Florida 33602



Digitally signed by Nicole L. Peterika
DN: cn=Nicole L. Peterika, o=MAG4, Inc., ou, email=admin@mag4inc.com, c=US
Date: 2022.03.03 12:08:43 -05'00'

Architect of Record

Date

MECHANICAL ENGINEER OF RECORD

8365 Gunn Highway
Tampa, Florida 33626

PLEASE REFER TO SEPARATE FILE

Mechanical Engineer of Record

Date

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ELECTRICAL ENGINEER OF RECORD

7759 West Waters Avenue
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PLEASE REFER TO SEPARATE FILE

Electrical Engineer of Record

Date

END OF DOCUMENT

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FT. MYERS P&DC
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FT. MYERS, FLORIDA 33913

PROJECT NO.: 19013 / K65332

SECTION 000010

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DIVISION 27 – COMMUNICATIONS

Section	275117	IP Video Intercom and Exterior Gate Control System	08/27/2021
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DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

Section	281304	Enterprise Physical Access Control System	08/24/2021
Section	281600	Intrusion Detection System	08/24/2021
Section	282305	Integrated Security and Investigative Platform (ISIP) CCTV System	08/31/2021

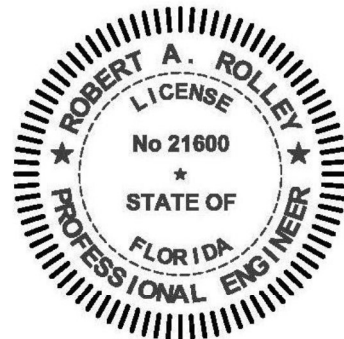
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USPS Mail Processing Facility Specification issued: 10/01/2021
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Electrical Engineer of Record:

Digitally signed by
Robert A Rolley
Date: 2022.03.03
11:05:19 -05'00'

This item has been electronically signed and sealed by Robert A. Rolley, P.E. on the date included in the Certificate using a digital signature. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copy.



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SECTION 000010

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Section	233713**	Diffusers, Registers, and Grilles	04/24/2012

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Specification Index Division 23

Project Name: Ft. Myers P&DC Security Upgrades

Project Address: 14080 Jetport Loop, Ft. Myers, FL 33913

CODES APPLICABLE TO THESE SPECIFICATIONS:

Florida Building Code, Seventh Edition (2020):

Building

Accessibility

Energy Conservation

Mechanical

Florida Fire Prevention Code, Seventh Edition

Specifications written using Microsoft WORD Office 365

END OF SECTION

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SECTION 011000

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor must provide all material, labor, tools, plant, supplies, equipment, transportation, superintendence, temporary construction of every nature, and all other services and facilities necessary to complete the construction of a postal facility for the Postal Service, including all incidental work described in the contract documents.
- B. The scope of work is attached to the Contract.
- 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 MISCELLANEOUS CONTRACT EXPENSES

- A. The Contractor must include all additional fees, as required, in the price proposal.

1.3 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 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

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SECTION 011104

CONTRACT DOCUMENTS

PART 1 – GENERAL

1.1 SUMMARY

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

1.2 DRAWING LIST

A.	Drawing Number	Date	Title
	<u>ARCHITECTURAL</u>		
	a0.00	2022.03.03	COVER SHEET
	a1.00	2022.03.03	SITE PLAN
	a2.00	2022.03.03	OVERALL FLOOR PLAN
	a2.01	2022.03.03	PHASING PLAN
	a4.00	2022.03.03	ENLARGED ZONE "A" PLAN
	a4.01	2022.03.03	ENLARGED ZONE "B" PLAN
	a4.02	2022.03.03	ENLARGED ZONE "C" PLAN
	a4.03	2022.03.03	ENLARGED ZONE "D" PLAN
	a4.04	2022.03.03	ENLARGED EMPLOYEE ENTRANCE PLAN
	a4.05	2022.03.03	ENLARGED EMPLOYEE ENTRANCE CEILING PLAN
	a4.05	2022.03.03	ENLARGED EMPLOYEE ENTRANCE FLOORING PLAN
	a5.00	2022.03.03	SECTION THROUGH NEW EMPLOYEE ENTRANCE
	a7.00	2022.03.03	DOOR SCHEDULE AND DETAILS
	a7.01	2022.03.03	DOOR SCHEDULE AND DETAILS
	a8.00	2022.03.03	DETAILS
	<u>MECHANICAL</u>		
	m0.1	2022.03.03	HVAC LEGEND, NOTES, AND SYMBOLS
	m1.1	2022.03.03	HVAC DEMOLITION AND RENOVATION PLAN
	m1.2	2022.03.03	HVAC DEMOLITION AND RENOVATION PLAN
	m4.1	2022.03.03	HVAC DETAILS
	m5.1	2022.03.03	HVAC SCHEDULES, CONTROLS, AND DIAGRAMS
	<u>ELECTRICAL</u>		
	e0.01	2022.03.03	ELECTRICAL LEGEND, NOTES
	e0.02	2022.03.03	GENERAL DETAILS
	e1.01	2022.03.03	EXISTING FLOOR PLAN - CCTV SYSTEM
	e2.01	2022.03.03	EXISTING FLOOR PLAN 'ZONE A' - ePACS & CCTV SYSTEMS
	e2.02	2022.03.03	EXISTING FLOOR PLAN 'ZONE B' - ePACS & CCTV SYSTEMS
	e2.03	2022.03.03	EXISTING FLOOR PLAN 'ZONE C' - ePACS & CCTV SYSTEMS
	e2.04	2022.03.03	EXISTING FLOOR PLAN 'ZONE D' - ePACS & CCTV SYSTEMS
	e3.01	2022.03.03	PROPOSED SITE PLAN - CCTV (ISIP) SYSTEM & ePACS

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e3.02	2022.03.03	PROPOSED PARTIAL SITE PLAN - CCTV (ISIP) SYSTEM/ ePACS & ELECTRICAL
e3.03	2022.03.03	POLE MOUNTED CAMERA DETAILS
e4.01	2022.03.03	PROPOSED FLOOR PLAN 'ZONE A' - CCTV (ISIP) SYSTEM & ePACS
e4.02	2022.03.03	PROPOSED FLOOR PLAN 'ZONE B' - CCTV (ISIP) SYSTEM & ePACS
e4.03	2022.03.03	PROPOSED FLOOR PLAN 'ZONE C' - CCTV (ISIP) SYSTEM & ePACS
e4.03	2022.03.03	A MAIN EMPLOYEE ENTRY - DEMOLITION/ LIGHTING/ CCTV/ ePACS
e4.04	2022.03.03	PROPOSED FLOOR PLAN 'ZONE D' - CCTV (ISIP) SYSTEM & ePACS
e5.01	2022.03.03	OVERALL BUILDING PLAN - PROPOSED CAMERA POSITIONS
e6.01	2022.03.03	PROPOSED SITE PLAN - UNDERGROUND COUNTERPOISE (AL TERNA TE NO. 1)
e6.02	2022.03.03	PARTIAL ROOF PLAN (SOUTHWEST) - LIGHTNING PROTECTION SYSTEM (ALTERNATE NO. 1)
e6.03	2022.03.03	PARTIAL ROOF PLAN (SOUTHEAST) - LIGHTNING PROTECTION SYSTEM (ALTERNATE NO. 1)
e6.04	2022.03.03	PARTIAL ROOF PLAN (NORTH) - LIGHTNING PROTECTION SYSTEM (ALTERNATE NO. 1)
e6.05	2022.03.03	LIGHTNING PROTECTION - DETAILS (ALTERNATE NO. 1)
e7.01	2022.03.03	PROPOSED ePACS RISER DIAGRAM - CONTROLLERS #1,#2, & #3
e7.02	2022.03.03	PROPOSED ePACS RISER DIAGRAM - CONTROLLERS #4,#5, & #6
e7.03	2022.03.03	PROPOSED ePACS RISER DIAGRAM - CONTROLLER #7
e7.04	2022.03.03	IP VIDEO INTERCOM SYSTEM RISER
e8.01	2022.03.03	CCTV SECURITY SYSTEM BLOCK DIAGRAMS
e8.02	2022.03.03	CCTV SECURITY SYSTEM BLOCK DIAGRAMS
e8.03	2022.03.03	OVERALL CCTV SECURITY SYSTEM BLOCK DIAGRAM
e8.04	2022.03.03	CCTV MOUNTING DETAILS
e9.01	2022.03.03	PROPOSED CCTV CAMERA SCHEDULE (ZONE 'A' & 'B')
e9.02	2022.03.03	PROPOSED CCTV CAMERA SCHEDULE (ZONE 'C', 'D' & SITE)
e10.01	2022.03.03	PANEL BOARD SCHEDULES & ONE LINE DIAGRAMS

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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USPS

Date: 3/3/2022

CONTRACT DOCUMENTS

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SECTION 012100

ALLOWANCES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Administrative and procedural requirements for allowances associated with the project.

1.2 RELATED SECTIONS

- A. Section 011000 – Summary of Work

1.3 DEFINITIONS

- A. Allowance: An amount, established in Article 1.5 of this Section, to be included in the base proposal price by the proposing contractor. The allowance shall be used as a mechanism to pay for costs associated with the work described in the allowance schedule, including those items identified in Section 012200.

1.4 ADMINISTRATIVE AND PROCEDURAL REQUIREMENTS

- A. The allowance amount shall be used for payment of costs associated with work included in the allowance schedule. Upon identification of such an item, inform the COR immediately.
- B. Request for authorization to proceed with work outside of project scope must be submitted to the COR for review and approval. Prepare a written summary of the work to be performed, following the procedures established by the COR. At a minimum, the written summary shall include the following:
 - 1. If proposed work includes unit price work identified in Section 012200, identify the unit price work to be performed, the measured amount to be included, the cost of the work per measured unit, and the total cost of work. If work to be performed is outside of the items identified in Section 012200, provide a written summary of the proposed work, including material, labor, overhead, profit, and other costs necessary to complete the work.
 - 2. Identify the amount of project allowance used to date, and the amount of allowance remaining for the project.
 - 3. Include additional information, if requested by the COR. Such additional information may include quotes or proposals submitted by subcontractors or material suppliers.
- C. Expenditures from the allowance are considered modifications to the original scope of work. The COR shall determine what changes in the work are paid for using the allowance. Do not begin work outside of project scope prior to receipt of authorization from the Contracting Officer.
- D. The COR reserves the right to reject Contractor's measurement of work-in-place that involves use of the allowance, and to have this work measured, at USPS expense, by an independent surveyor acceptable to the Contractor.

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1.5 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Contractor shall include in their proposal price an allowance of \$10,000.00 for door and hardware repair and/or replacement, and/or other unforeseen field conditions associated with the doors.
- B. Allowance No. 2: Contractor shall include in their proposal price an allowance of \$10,000.00 for electrical repair and/or replacement, and/or other unforeseen field conditions associated with the electrical.
- C. Allowance No. 3: Contractor shall include in their proposal price an allowance of \$20,000.00 for CCTV design changes during construction, and/or other unforeseen field conditions associated with the CCTV.
- D. Allowance No. 4: Contractor shall include in their proposal price an allowance of \$20,000.00 for ePACS design changes during construction, and/or other unforeseen field conditions associated with the ePACS.
- E. Allowance No. 5: Contractor shall include in their proposal price an allowance of \$15,000.00 for gate and fencing repair and/or replacement, and/or other unforeseen field conditions associated with the gates and fencing.
- F. Allowance No. 6: Contractor shall include in their proposal price an allowance of \$5,000.00 for HVAC duct and controls repair and/or replacement, and/or other unforeseen field conditions associated with the HVAC system.
- G. Allowance No. 7: Contractor shall include in their proposal price an allowance of \$5,000.00 for roof repair and/or replacement, and/or other unforeseen field conditions associated with the roof.

1.6 RETURN OF UNUSED ALLOWANCE

- A. Upon completion of project work, the Contract Price shall be adjusted by modification to provide the difference, if any, between the approved amount of authorized expenditures and the original amount of the allowance. The Contractor is not entitled to any portion of the allowance not appropriated or used.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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SECTION 012300

ALTERNATES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes: Alternates to be submitted to U.S. Postal Service with Proposal.
 - 1. Submission procedures.
 - 2. Documentation of changes to Contract Sum/Price and Contract Time.
- B. Related Documents: The Contract Documents, as defined in Section 011004 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 DEFINITIONS

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

1.3 SUBMISSION REQUIREMENTS

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

1.4 SELECTION AND AWARD OF ALTERNATES

- A. Acceptance or Rejection: Alternates quoted on Schedule of Alternates and attached to Proposal will be reviewed and accepted or rejected at the USPS's option. None, any, or all Alternates may be accepted or rejected by U.S. Postal Service.

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- B. Accepted Alternates will be identified in the Contract.
- C. Some Alternates and respective pricing will survive the Contract and will remain valid for the period stated in the Schedule of Alternates below.

1.5 SCHEDULE OF ALTERNATES

- A. Alternate Number 1: State the amount to be deducted from the Base Proposal Price for the installation of a Lightning Protection System as described on Drawings sheets a1.00, e6.01, e6.02, e6.03, e6.04, e6.05 and Specifications Section 264100 Facility Lightning Protection and Section 264101 Underground Counterpoise. This Alternate will remain valid until submittal and approval of product data, shop drawings and calculations.

Deduct: _____ dollars.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 – GENERAL

1.1 SCHEDULING WORK

- A. Before any of the work is started, the Contractor must confer with the COR and agree on a sequence of procedures: means of access to premises and building; delivery of materials and use of approaches; use of corridors, stairways, elevators, and similar means of communication; and the location of partitions, eating spaces for Contractor's employees, and the like.
- B. No work can be done during the holiday mailing season between November 15 and January 5 without written permission from the COR.

1.2 CONSTRUCTION PROGRESS CHART

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

1.3 PRE-CONSTRUCTION MEETING

- A. The COR will schedule a pre-construction meeting before any work takes place. The Contractor's Project Manager, superintendent, and a representative of all major subcontractors shall attend this meeting. Additional persons may be required to attend the pre-construction meeting if directed by the COR. At this time, the Contractor shall make pre-construction submissions including following:
 - 1. A typed list of the Contractors, Project Manager, Project Superintendent, and subcontractors (listed by trade) with a telephone number where they can be reached 24 hours/day, 7 days/week.
 - 2. Draft Schedule of Values.
 - 3. Draft Progress Schedule.

1.4 PROJECT PHOTOS

- A. 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 each payment application applies.

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PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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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

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1.2 PROJECT DIRECTORY

- A. Before work is performed on site, 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.

1.3 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 Build" 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. One electronic copy 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 or Acrobat PDF format.
 5. Interim project documentation may be provided to USPS electronically
 6. All final project documentation shall be provided to the USPS on a single CD or DVD media

1.4 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.

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1.5 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.

1.6 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.

1.7 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. No Exceptions Taken: The Contractor is advised that "No Exceptions Taken" means that fabrication, manufacture, or construction may proceed, provided the work complies with the Contract Documents.
 2. Furnish as Corrected: The Contractor is advised that "Furnish as Corrected" means that fabrication, manufacture, or construction may proceed, provided the work complies with the A-E's notations and the Contract Documents.
 3. Rejected: The Contractor is advised that "Rejected" 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 "Rejected" is not permitted on the site.
 4. Revise and Resubmit: The Contractor is advised that "Revise and Resubmit" 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 "Revise and Resubmit" is not permitted on the site.
 5. Submit Specific Item: The Contractor is advised that "Submit Specific Item" means that no work may be fabricated, manufactured, or constructed and that the Contractor must submit the specified item to the A-E. Any submission marked "Submit Specific Item" is not permitted on the site.
- B. The A-E must return reproducibles stamped "No Exceptions Taken" or "Furnish as Corrected" to the Contractor, who is responsible for obtaining prints of them and for distributing them to the field and to subcontractors.

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- C. In the case of shop drawings in the form of manufacturers' descriptive literature, catalog cuts, and brochures stamped "No Exceptions Taken" or "Furnish as Corrected," 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 "Rejected," "Revise and Resubmit," or "Submit Specific Item," 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 "No Exceptions Taken" or "Furnish as Corrected," the A-E must return one of the samples to the Contractor. In the case of samples stamped "Rejected," "Revise and Resubmit," or "Submit Specific Item," the A-E must return all of the submitted samples.

1.8 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*.

1.9 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: 10/1/2020
Last revised: 10/1/2015

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Schedule of Values

Facility: USPS Ft. Myers P&DC
 FSM Project Number: K65332
 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	Allowances			\$ -
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	Cold Form Metal Framing			
5.2	[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	Fire Stopping			\$ -
7.2	Sealant			\$ -
7.3	[other]			\$ -
Division 09	Finishes			
9.1	Painting			\$ -
9.2	Gypsum Board			
9.3	Accoustical Panel Ceilings			
9.4	Security Ceilings			
9.5	Resinous Flooring			\$ -
9.6	[other]			\$ -
Division 11	Equipment			
11.1	Turnstiles			\$ -
11.2	[other]			\$ -
Division 21	Fire Suppression			
21.1	Fire Suppression			\$ -
21.2	[other]			\$ -
Division 23	Heating, Ventilating, and Air Conditioning			
23.1	Misc. HVAC Equipment and Ductwork Work			\$ -
23.2	HVAC Diffusers and Returns			
23.3	[other]			\$ -
Division 26	Electrical			
26.1	Miscellaneous Electrical Work			\$ -
26.2	Low-Voltage Electrical Power Conductors and Cables			
26.3	Raceway and Boxes for Electrical Systems			

Item	Description of Work	Material	Labor	Total
26.4	Commisioning of Electrical Systems			
26.5	Wiring Devices			
26.5	Light Fixtures			
26.6	[other]			\$ -
Division 28	Electronic Safety and Security			
28.1	Fire Alarm System Work			\$ -
28.2	Enterprise Physical Access Control System			
28.3	Integrated Security and Investgative Platform (ISIP) CCTV System			
28.4	[other]			\$ -
	Total	\$ -	\$ -	\$ -

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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

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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.

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- 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: 10/1/2020
Last revised: 9/17/2015

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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.

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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. 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>

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

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Emergency Procedures

Preparations for Emergency	Be prepared for emergency situations. Ensure that emergency telephone numbers are site specific, readily available, easily read, and communicated to all employees. Train and authorize employees to implement emergency procedures.
Medical Emergencies	Have procedures and medical supplies to provide emergency medical services for your own personnel. Determine how to contact emergency medical services before work begins and have on-site capabilities to contact such services immediately.
Fires	See Fire Protection above. In the event of a fire, you must: - 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. Personnel trained in the use and limitations of fire extinguishers may attempt to extinguish the fire if it is safe to do so.
Chemical Releases	See Hazardous Materials above. If the event of a hazardous material release, you must: - 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. Contractor personnel should not respond to the release unless specifically trained and protected to perform hazardous material response.
Power Outages	In the event of a power outage, you must: - 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. 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.
Accident Investigation and Reporting	As soon as is practical after an accident, investigate and document an accident investigation. The documentation must describe the incident and identify the causes and the corrective actions that will prevent future incidents. Report all accidents, whether or not they result in injury. Give the written report to the Postal Service COR within 24 hours of the accident or incident.

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.

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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.

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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.

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- 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

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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 construct and erect a minimum of two hard hat signs at locations designated by the COR. The signs must be erected prior to the commencement of on-site work.

1.3 BULLETIN BOARD

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

1.4 TEMPORARY ELECTRICITY

- A. All temporary electrical work shall be performed under direct supervision of a licensed electrician, who will be present on the project at all times when such work is being performed.
- 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.

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- 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.

1.5 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.

1.6 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.

1.7 POSTAL SERVICE FIELD OFFICE

- A. The Contractor shall maintain on site a complete set of Drawings and Specifications any time work is being done. The COR and his representatives must have free access to the complete set of Drawings and Specifications at all times.
- B. The Contractor must be equipped with a mobile phone.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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Date: 3/3/2022

TEMPORARY FACILITIES
AND CONTROLS

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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.

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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 DUST PROTECTION ENCLOSURE

- A. The Contractor must provide an acceptable plan for preventing the generation of dust due to operations in the construction zones, along haul routes, in equipment parking areas, and in waste areas. Provide labor, material, and equipment required to construct dust-proof barriers to isolate dust and dirt from construction operations; make provisions to keep dust from penetrating into mechanical systems and tape door or window openings and cracks to form a complete dust barrier; and remove all barriers upon completion of the work and clean the work area; and clean to the original state any areas beyond the work area that become dust-laden as a result of the work operation.

1.4 DISPOSAL OF WASTE MATERIALS

- A. The Contractor is responsible for disposing of all waste materials from the site. The Contractor will be required to furnish permits or other documentation to the Owner relieving the Owner of all responsibilities for disposal of materials. Material must be removed daily from the site of all buildings where Postal operations are being conducted while construction is in progress.

1.5 WELDING APPROVAL

- A. A "Hot Work Permit" system must be used for all cutting, welding, or any other open flame operations on the job site. The Contractor must obtain the Owner's and Postal Facility Head's or their representatives' specific approval before proceeding with any cutting, welding, or any other open flame operations.
- B. The Owner's permission will not be granted until:
 - 1. It has been determined that cutting and welding can be safely conducted at the desired location.
 - 2. All combustibles have been moved away or safely covered.

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3. A fire watchman with an approved fire extinguisher is posted at the work, during the work, and for a minimum of 30 minutes after the work is completed, to see that sparks or drops of hot metal do not start fires.

C. All gas operated cutting and welding equipment and operations must be in strict accordance with the approved safety procedures.

1.6 OVERLOADING

A. The Contractor will be responsible for overloading of any part or parts of structures beyond their safe calculated carrying capacities by placing materials, equipment, tools, machinery, or any other item on them. No loads will be placed on floors or roofs before they have attained their permanent and safe strength.

1.7 CUTTING AND PATCHING

A. Where necessary, openings may be cut or drilled in locations designated by the A/E to facilitate installation, these penetrations shall be filled with appropriate materials or covered in a manner approved by the Owner.

B. Dimensions shown at existing construction represent best information available to A/E at time of design. Take field dimensions before factory-fabricating equipment which is required to fit closely into existing construction. No extra will be paid for replacing items which do not fit into existing construction.

C. Where previously installed materials must be cut, use powered core-drills or saws; jack-hammering will not be permitted. Patch and refinish damaged openings to match original materials and workmanship.

D. All exposed conduit and piping passing through walls, floors or ceilings shall have galvanized steel sleeves two sizes larger than the nominal diameter of the pipe. Sleeves for these pipes shall be galvanized. At the sleeves where exposed to view, the piping shall be fitted with a chrome plated brass escutcheon with securing device. Make weather-tight where exposed to outside conditions. All penetrations in fire rated assemblies shall be sealed with an approved fire rated filler material.

1.8 FOR CONTRACT WORK PERFORMED IN AN EXISTING OCCUPIED POSTAL FACILITY

A. The Postal Service will continue to operate the facility during performance of the work. Accordingly, the Contractor must arrange and schedule contract work to facilitate such continued use of the site and building, with minimal disruption to Postal operations. Contract work that cannot be performed during normal Postal operating hours and must be performed after hours or during periods when the facility is normally closed, must be coordinated with the COR.

B. If contract work is being performed on the roof, or above or near electronic equipment or mail processing equipment, Contractor must provide temporary interior protection above and/or around such equipment as appropriate or as indicated in construction documents. Interior protection shall be anti-static 6-mil poly. Remove temporary protection upon completion of the work. Coordinate interior protection with local management.

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1.9 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. 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.
 - d. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - e. Broom clean concrete floors in unoccupied spaces.
 - f. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo if required.
 - g. 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 glass, taking care not to scratch surfaces.
 - h. Remove labels that are not permanent labels.
 - i. 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.
 - j. Wipe surfaces of mechanical and electrical equipment, and other similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
 - k. 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.

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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. Doors and hardware.
 2. Security system.
 3. Mechanical systems.
 4. Electrical systems.
 5. Lightning Protection System.
 6. Access Control System.
 7. CCTV System
- 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

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- 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.) Doors:
 - 1.) Overhead coiling doors.
 - 2.) High Speed Doors
 - 3.) Storefront Doors.
 - 4.) Man Doors
 - 5.) Lift Gates
 - 6.) Specialized hardware.
 - d.) Security Systems:
 - 1.) CCTV system.
 - 2.) Intrusion detection.
 - 3.) Access control.
 - g.) Mechanical Systems:
 - 1.) Space conditioning.
 - 2.) HVAC instrumentation and controls.
 - h.) Electrical Systems:
 - 1.) Electrical power distribution.
 - 2.) Lighting and lighting controls.
 - i.) Miscellaneous Building Equipment:
 - 1.) Gate Operator.
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.

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- 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.
 - 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.

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- 3) Repair and Replacement: Indicate the repair and replacement procedures most likely to be required in the maintenance of the equipment. Information included here must consist of step-by-step instructions for repair and replacement of defective items. Include all information required to accomplish repair or replacement, including information such as torque values. Identify all tools, special equipment, and materials that may be required. Identify uses for maintenance equipment. The paragraphs must contain headings to identify the topics covered.
 - 4) Safety Precautions: This subsection must comprise a listing of safety precautions and instructions to be followed before, during, and after repairs or adjustments are made or routine maintenance is performed.
 - d. Manufacturers' Brochures: Include manufacturers' descriptive literature covering devices used in the system, together with illustrations, exploded views, and renewal parts lists. This section must also include special devices manufactured by the Contractor.
 - e. Special Maintenance: Provide information of a maintenance nature covering warranty items that have not been discussed elsewhere.
 - f. Shop Drawings: Provide a copy of all approved shop drawings covering approval of equipment for the project with the manufacturers' brochures.
 - g. Spare Parts Lists: Include a recommended spare parts list for all equipment furnished for the project. The parts list must include a tabulation of descriptive data for all the electrical-electronic spare parts and all the mechanical spare parts proposed for each type of equipment or system. Each part must be properly identified by part number and manufacturer.
 - h. Warranty: Include a copy of the "special" or extended warranty in the operation and maintenance manual.
- E. Submittal, in both "hard" and electronic DVD or CD-ROM format:
1. Preliminary Submittal: Two draft copies of the completed manuscript for items in this outline must be submitted to the COR for review within 30 days after approval of equipment to be provided. One copy will be returned to the Contractor within 30 days after submittal and, if required, must be revised and resubmitted within 15 days.
 2. Final Submittal: Four complete sets of manuals must be furnished to the COR not later than 30 days before completion of the project.
 3. Final Submittal must be accepted by the COR before training can begin.

1.2 POSTED OPERATING INSTRUCTIONS

- A. General: Operating instructions and diagrams must be prepared for posting near the equipment. Posted operating instructions must be photographic or equal non-fading reproductions framed under glass or encased in non-discoloring plastic and must be mounted in locations as directed. Copies of the posted operating instructions must also be used with the O&M manuals as a basis for training Postal Service personnel in the operation and maintenance of systems and related equipment installed under contract at the facility.

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.

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

1.4 TRAINING PERIOD

Item	Time (Hours)
1. Special Doors	2
2. Security Equipment	16
3. Ventilation Covers air-handling units with heating and cooling coils, fans, and all other air-handling equipment, together with associated operating and limit controls.	2

1.5 TRAINING PARTICIPATION SHEETS

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

1.6 OTHER CLOSEOUT SUBMITTALS

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

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PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

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SECTION 024113

SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Demolition and removal of pavements, curbs and gutters, drainage structures, drainage pipe, utilities, site signs, and landscaping.
 2. Filling voids in subgrade created as a result of removals or demolition.
 3. Disposal of demolished materials.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
1. Section 013543 - Environmental Procedures: Recycling and reuse of waste materials.
 2. Section 015000 - Temporary Facilities and Controls: Temporary protection and barriers. Removal and disposal of demolished materials. Coordination of temporary utilities.

1.2 QUALITY ASSURANCE

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

1.3 PROJECT CONDITIONS

- A. Existing Conditions:
1. Structures indicated for demolition will be discontinued in use and vacated prior to start of Work.
 2. United States Postal Service assumes no responsibility for condition of structures to be demolished.
 3. Unless otherwise indicated in the Contract Documents or specified by the Contracting Officer, remove items of salvageable value to Contractor from project site and structure. Storage or sale of removed items on project site not permitted.
 4. Burning or fires of any nature not permitted.
 5. Do not bring explosives on site without written approval of authorities having jurisdiction. Such written approval will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. Comply with governing regulations for use of explosives. Notify company of procedures and schedule in advance of explosive use.

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PART 2 - PRODUCTS

2.1 FILL MATERIALS

- A. Refer to in Section 312000.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 CONSTRUCTION

- A. Demolition Requirements:
1. Conduct demolition to minimize interference with adjacent structures or pavements.
 2. Stop operations immediately if adjacent structures appear to be in danger. Notify Contracting Officer immediately. Do not resume operations until directed by Contracting Officer.
 3. Conduct operations with minimum interference to public or private access. Maintain access and egress at all times.

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4. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.
 5. Sprinkle soil and demolition work area with water to minimize dust. Provide hoses and water connections for this purpose.
 6. Comply with governing regulations pertaining to environmental protection.
 7. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.
- B. Demolition:
1. Disconnect and remove designated utilities within demolition areas.
 2. Demolish concrete and masonry in small sections. Break up concrete slabs-on-grade that are 2 or more feet below proposed subgrade.
 3. Demolish and remove below grade construction and concrete slabs on grade to a minimum depth
- C. Filling Voids:
1. Completely fill below grade areas and voids existing or resulting from demolition or removal of structures (pits, wells, cisterns, etc.) using approved select fill materials consisting of stone, gravel, and sand free from debris, trash, frozen materials, roots, and other organic matter.
 2. Remove standing water, frost, frozen, or unsuitable material, trash, and debris from areas to be filled before fill placement.
 3. Place fill materials in horizontal layers and compact each layer at optimum moisture content of fill material to proposed density as specified in Section 312000.
 4. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.
- D. Disposal of Demolished Materials:
1. Collect, recycle, reuse, and dispose of demolished materials as specified in Section 013543-Environmental Procedures and as approved by the U.S. Postal Service in the Solid Waste Management and Environmental Protection Plan.

END OF SECTION

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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 or load/deflection ratio.

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2. Operational and Safety Limitations: Do not cut operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in a manner intended or resulting in a decreased operational life, increased maintenance, or decreased safety.
3. Visual Requirements: Do not cut work which is exposed on the exterior or exposed in occupied spaces of the building in a manner resulting in a reduction of visual qualities or resulting in substantial evidence of the demolition work judged by the Architect to be cut and patched in a visually unsatisfactory manner.
4. Loading: Do not superimpose loads at any point upon existing structure beyond design capacity including loads attributable to materials, construction equipment, demolition operations and shoring and bracing.
5. Vibration: Do not use means, methods, techniques, or procedures which would induce vibration into any element of the structure.
6. Fire: Do not use means, methods, techniques, or procedures which would produce any fire hazard unless otherwise approved by Contracting Officer.
7. Water: Do not use means, methods, techniques, or procedures which would produce excessive water run-off, and water pollution.
8. Air Pollution: Do not use means, methods, techniques, or procedures which would produce uncontrolled dust, fumes or other damaging air pollution.

1.4 PROJECT SITE

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

1.5 PROTECTION OF EXISTING CONSTRUCTION

- A. Provide temporary protection of existing construction (floors, roof, and walls) when adjoining new work and in traffic areas.
- B. Provide temporary construction, constructed of framing and plywood, to protect existing construction and surrounding surfaces from damage by movement of materials and personnel.
- C. The contractor is responsible for all damage to existing structure and shall replace or repair all areas of damage.

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- D. Repair, replace, or rebuild existing construction as required or as directed which has been removed, altered, or disrupted to allow for new construction. Existing construction shall be corrected to match adjacent construction, new or existing.
- E. Perform cutting of existing concrete and masonry construction with saws and core drills. Do not use jack-hammers or explosives.

1.6 SHORING AND BRACING

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

PART 2 - PRODUCTS

2.1 SALVAGED ITEMS

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

2.2 SALVAGED ITEMS FOR RE-USE

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 PREPARATION

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

3.3 PROCEDURE

- A. Employ only skilled tradesmen to perform selective demolition.
- B. Cut work by methods least likely to damage work to be retained and work adjoining.
- C. In general, where physical cutting action is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete and masonry work.
- D. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
- E. Where selective demolition terminates at a surface or finish to remain, completely remove all traces of material selectively demolished, including mortar beds. Provide smooth, even, substrate transition.

3.4 POLLUTION CONTROLS

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

3.5 DISPOSAL OF DEMOLISHED MATERIALS

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

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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 all interior floor tile finish material.
- C. Interior Walls and Partitions:
 - 1. All interior wall and partitions shall be removed where indicated on drawings.
 - 2. Remove all top and bottom framing tracks and over head braces.
- D. Mechanical System:
 - 1. Remove all mechanical equipment and related ductwork where indicated on drawings.
 - 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. Electrical Service:
 - 1. Remove all abandoned electrical conduit, boxes, and wiring back to the existing electrical service which is to remain.
- F. Provide additional selective demolition as indicated and required by the Contract Documents and as required for indicated new construction.

END OF SECTION

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SECTION 031000

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
2. Openings for other work.
3. Form accessories.
4. Form stripping.

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

C. Related Sections:

1. Section 032000 - Concrete Reinforcement: Coordination between formwork and reinforcement.
2. Section 033000 - Cast-in-Place Concrete: Supply of concrete accessories for placement by this section.

1.2 REFERENCES

A. American Concrete Institute (ACI) Codes and Standards latest editions:

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.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 347.

B. Where necessary, design formwork, shoring under direct supervision of a Professional Engineer experienced in design of formwork and licensed in State where Project is located.

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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. Tubular Column Type: Metal or fiberglass-reinforced plastic. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.

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.

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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, and 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 EARTH FORMS

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

3.3 FORMWORK INSTALLATION

- A. Install formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 347R.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores upon approval by the Professional Engineer responsible for their design.
- 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.

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- E. Obtain approval from the Engineer or Architect 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.

3.4 FORM RELEASE AGENT APPLICATION

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

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories in accordance with manufacturer's published instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

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

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3.7 CONSTRUCTION

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

3.8 FIELD QUALITY CONTROL

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

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Do not remove shoring without approval from the Professional Engineer responsible for their design.
- C. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- D. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

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SECTION 032000
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel wire mesh.
 - 2. Reinforcement accessories.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 316329 - Drilled Concrete Piers and Shafts: Reinforcement for drilled pier foundations.
 - 2. Section 031000 - Concrete Forming and Accessories: Coordination between formwork and reinforcing.
 - 3. Section 033000 - Cast-in-Place Concrete: Coordination between concrete placement and reinforcing.

1.2 REFERENCES

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

1.3 SUBMITTALS

- A. Section 013300 – Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing device. Include special reinforcement required for openings through concrete structures.

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2. Assurance/Control Submittals:
 - a. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - b. Submit certified copies of mill test report of reinforcement materials analysis.
 - c. Welder's Certificates.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Steel Mesh: ASTM A185; 6X6, w 1.4 X w 1.4.
- B. 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.

2.3 FABRICATION

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 PLACEMENT

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

3.3 FIELD QUALITY CONTROL

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

END OF SECTION

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SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

- A. American Concrete Institute (ACI) Codes and Standards latest editions:
1. ACI 117, "Standard Specification for Tolerances for Concrete Construction and Materials."
 2. ACI 301, "Specification for Structure /Concrete."
 3. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
 4. ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete."
 5. ACI 305, "Hot Weather Concreting."
 6. ACI 306, "Cold Weather Concreting."
 7. ACI 311, "Recommended Practice for Concrete Inspection."
 8. ACI 315, "Details and Detailing of Concrete Reinforcement."
 9. ACI 318, "Building Code Requirements for Structural Concrete."
 10. ACI 347, "Guide to Formwork for Concrete."
- B. American Welding Society (AWS):
1. AWS D1.4, "Structural Welding Code Reinforcing."
- C. American Society for Testing and Materials (ASTM):
1. ASTM A615, "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement."
 2. ASTM C33, "Standard Specification for Concrete Aggregates."
 3. ASTM C94, "Standard Specification for Ready-Mixed Concrete."

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4. ASTM C150, "Standard Specification for Portland Cement."
 5. ASTM C260, "Standard Specification for Air Entraining Admixtures for Concrete."
 6. ASTM C309, "Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete."
 7. ASTM C494, "Standard Specification for Chemical Admixtures for Concrete."
 8. ASTM C618, "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete."
 9. ASTM C989, "Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars"
- D. Concrete Reinforcing Steel Institute (CRSI):
1. CRSI "Manual of Standard Practice."

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
1. Product Data: Provide data technical, testing, and source for mix design materials and additives, steel reinforcement, joint sealant.
 2. Shop Drawings: Provide shop drawings for reinforcement, layout, detailing, and placing prior to fabrication, site delivery, and installation.
 - a. Mix design submittals.
 3. Assurance/Control Submittals:
 - a. Test Reports: Prepare reports in conformance with Section 014000 - Quality Requirements
 - b. Submit laboratory test reports for concrete materials and mix designs for each strength and type of concrete proposed for use.
 - c. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with the Codes and Standards referenced in section 1.2 of this specification.
1. Provide qualification data for manufacturers and installers.

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.

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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: 216-531-9222, 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. Portland Cement: ASTM C150 – Type 2
- B. Liquid Admixtures: 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 for steel hard trowel interior slab finish, do not use air entrainment admixtures.
 3. Water-reducing Admixtures: Conform to ASTM C494, Type A.
 4. Water-reducing/accelerating Admixtures: Conform to ASTM C494, Type C or E.
 5. Water-reducing/retarding Admixtures: Conform to ASTM C494, Type D.
 - a. High-range/water-reducing (HRWR) Admixtures: Conform to ASTM C494, Type F or G super plasticizers. HRWR admixture shall be used in concrete with a maximum water/cement ratio of 0.50 or less.

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C. Aggregates:

1. Normal-weight Concrete: ASTM C33.
2. Light-weight Concrete: ASTM C330.
3. Aggregates shall be from a single source.

D. Water:

1. Clean, potable, and free of injurious amounts of oil, acid, alkali, organic or other deleterious matter not detrimental to concrete; drinkable.

2.3 GROUT/MORTARS

- A. Cement Grout: Conform to ASTM C387 "Dry packaged mixtures".

2.4 JOINTS AND EMBEDDED ITEMS

- A. Construction and Contraction Joints: 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.

2.5 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. Do not begin concrete production until mixes have been reviewed and approved.
- 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.
- D. Durability: Conform to ACI 301.
1. All concrete exposed to potentially destructive weathering, such as freezing and thawing, or to deicer chemicals is to be air-entrained, +1percent.,
 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.
- E. Slump: Conform to ACI 301 and to specific project mix requirements.

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- F. 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.
 3. Prior to adding a high-range water reducer (super plasticizer), slump shall not exceed the working limit.
 4. Ready-mixed and on-site batched concrete shall be batched, mixed, and transported in accordance with ASTM C94.
 - a. 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.
 5. For concrete produced on site with a central batch plant, mixing shall be done in an approved batch mixer concrete shall be batched, mixed, and transported in accordance with ASTM C94.
 6. 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.
 7. All Other Concrete: Conform to ACI 301.
 8. 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.
 9. Ensure air content for slabs with steel trowel finish is less than 3.0 percent.
 10. No water shall be added to concrete except under the direct awareness of the project inspector.
 11. Adjustments to Concrete Mixes: Mix design adjustments may be requested by Contractor for approval by the Engineer 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.

2.6 FORMWORK

- A. Section 031000 - Concrete Forming and Accessories.

2.7 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.

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- 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 specify site preparation requirements and provide recommendations to the Architect/Engineer prior to placing concrete.
- C. Immediately before placing concrete, spaces to be occupied by concrete shall be free from standing water, ice, mud, and debris.
- D. Concrete shall not be deposited under water or where water in motion may injure the surface finish of the concrete.
- E. Forms and the reinforcement shall be thoroughly cleaned of ice and other coatings. Remove surplus form releasing agent from the contact face of forms.
- F. 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.
- G. 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.
- H. Build into construction all items furnished by the Owner and other trades. Provide all offsets, pockets, slabs, chases, and recesses as job conditions require.
- I. Place and properly support reinforcing steel and anchor bolts.
- J. 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.

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.

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3.4 REINFORCEMENT

- A. Placement: Section 032000 - Concrete Reinforcement.

3.5 METHODS OF PLACEMENT AND PLACING CONCRETE

- A. Placement: Conform to ACI 301.
1. 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.
 2. 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.
 3. Cold-Weather Placement: Comply with provisions of ACI 306.1 "Standard Specifications for Cold-Weather Concreting" for placement at temperatures below 40 deg F (4 deg C).
 - a. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
 - b. Concrete shall not be placed on frozen ground or placed when the ambient temperature is 40 deg F or less and dropping.
 - c. 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.
 - d. Concrete temperatures shall be maintained above 50 degrees F for the first 7 days of curing.
 4. 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" for placement at temperatures above 90 deg F (32 deg C).
 - a. Reject any concrete that has a temperature at the point of placement above 90 deg F unless approved otherwise by the Engineer. 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.
 - b. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to the Engineer.
- B. Depositing Concrete:
1. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing.
 2. The number, type, position, and design of joints shall be approved by the Engineer prior to concrete placement.
 3. Place floor slabs-on-grade in alternating strips, waiting a minimum of 3 days before placing any slab adjacent to previously placed slab.
 4. 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
 5. When concreting is started, it shall be carried on as a continuous operation until the placing of the section is completed.
 6. Except as intercepted by joints, concrete shall be placed in continuous layers.
 7. Field records shall be kept of the time and date of the placing of each concrete pour. Locations where concrete test cylinders are made shall also be recorded. Records 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. Joints:
1. Joints shall be vertical in walls and horizontal in slabs.
 2. Dowel bars and tie bars shall be inspected

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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. Joint spacing shall not exceed 15 feet on center each way 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 Architect/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. 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.
7. 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.
8. 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.
9. Corner sections of walls shall not be placed until the adjoining wall sections have cured at least 14 days.

D. 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. Consolidation shall be carried on continuously with the placing of concrete.
3. Slabs shall be placed using vibrating screed.
4. 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.
5. Concrete shall not be placed until the previous layer has been vibrated.
6. 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.

E. Protection of Cast Concrete: Conform to ACI 301.

F. Repair of Surface Defects: Conform to ACI 301.

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.

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- 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. Rough form finish at unfinished areas unexposed to public view. Smooth form finish at surfaces exposed to public view.

B. Slabs: Minimum slab surface tolerance must satisfy ACI 301 and ACI 302.1R.

- 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. Allowable tolerance for slab on grade surfaces, measured in accordance with ACI 117 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. Floor Slabs: Steel trowel finish unless otherwise noted on the plans.
 - b. Exposed concrete slabs sealed or sealed and hardened using a liquid compound compatible with the curing method used.
 - c. 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.
 - d. 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.
 - e. 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.

B. Curing Compound:

- 1. Apply curing compound to all interior and exterior flat slab and vertical surfaces. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
- 2. All curing methods shall be placed within two hours after final finishing. All exposed surfaces of concrete including floor slabs, whether or not they receive a finish flooring, shall be protected from premature drying for a minimum of seven days.
- 3. Apply the specified curing compound in accordance with manufacturer's written instructions.
- 4. When used on an unformed concrete surface, application of the first coat of curing compound shall commence immediately after finishing operations have been completed. When curing compound is used on a formed concrete surface, the surface shall first be moistened with a fine spray of water immediately after the forms have been removed.
 - a. Surfaces shall be sprayed uniformly with 2 coats of curing compound. 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.

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- C. Hardener:
 - 1. Apply liquid densifier/sealer/hardener to all workroom, interior and exterior mail platform, and dock, BMEU, and similar floor surfaces.
 - 2. Apply in accordance with manufacturer instructions.
- D. Exterior Sealer:
 - 1. Apply to all exterior horizontal traffic and pedestrian surfaces that are exposed to salts, deicer chemicals, and moisture, including parking decks.
 - 2. Apply in accordance with manufacturer's instructions.
- E. Protection:
 - 1. Freshly placed concrete shall be protected against wash by rain.
 - 2. Dust control shall be provided in the surrounding areas during placement.
 - 3. During the first 2-day period of curing, no traffic on or loading of the floors will be permitted unless otherwise approved by the Engineer.
 - 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.
 - 5. Self-supporting structures shall not be loaded in such a way to overstress the concrete.
- F. All floor slabs shall be cured using products and methods compatible with selected floor adhesives, toppings, and other finish materials.

3.8 PATCHING AND REPAIR

- A. 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
- B. 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.
- C. Repair or replace concrete with excessive honeycombing due to improper placement.
 - 1. If approved, a bonding admixture, bonding compound, or epoxy adhesive may be used in 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.
 - 2. 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.
 - 3. The patched area shall be kept damp for 7 days.
 - 4. 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
- D. Areas showing excessive defects as determined by the Architect/Engineer shall be removed and replaced.
- E. 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.

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- F. 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.
- G. Interior slab-on-grade hairline cracks allowed to be repaired that are subjected to powered industrial 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, ACI 318-Chapter 5 and ACI 311 for compressive strength, slump, and frequency of testing.
- B. The frequency of testing indicated in the aforementioned codes and standards 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.

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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.
 2. 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.
 - b. 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) Inspect concrete batching, mixing, and delivery operations periodically or as directed by the Contracting Officer.
 - 3) Submit to the Contracting Officer and concrete producer, during construction, the results of concrete tests.
 - c. The Testing Laboratory shall assess and report floor flatness and levelness in accordance with the requirements of this specification.
 - d. 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

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SECTION 055000
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Miscellaneous framing and supports.
 2. Pipe Bollards.
 3. Pipe bollard plastic 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.

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.

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1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
1. Product Data:
 - a. Submit complete descriptive data for all stock items.
 2. Shop Drawings:
 - a. Prepare Shop Drawings under seal of professional structural engineer registered in state where Project is located for products requiring structural engineering.
 - b. Include profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories, erection drawings, elevations, welded connections using standard AWS welding symbol with net weld lengths.
 - c. Take field measurements prior to preparation of shop drawings and fabrication when possible. Allow for trimming and fitting whenever taking of field measurements before fabrication might delay construction.

1.4 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel plates, angles, and other structural shapes shall conform to ASTM A36.
- B. Steel pipe shall conform to ASTM A53, Grade B, Schedule 40.
- C. Galvanized steel pipe and tube shall conform to ASTM A53.
- D. Steel Tubing shall conform to ASTM A500.
- E. Sheet Steel, Galvanized: ASTM A446.
- F. Sheet and Strip Steel, Hot Rolled: ASTM A568.
- G. Extruded Aluminum: ASTM B221.
- H. Anchors and Fasteners for Aluminum: Stainless steel.
- I. Welding Materials: AWS D1.1; type required for materials being welded.
- J. Anchors:
 1. Threaded Type Concrete Inserts: Galvanized malleable iron or cast steel capable of receiving 3/4 inch diameter machine bolts.
 2. Slotted Type Concrete Inserts: Welded box type fabricated with minimum 1/8 inch thick galvanized pressed steel plate with slot to receive 3/4 inch diameter square head bolt and knockout cover.
 3. Expansion Shield for Masonry Anchorage: FS FF-2-325.
 4. Toggle Bolts: FS FF-B-588.

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- K. Fasteners:
1. Bolts, Nuts and Washers for Exterior Locations: ASTM A307, galvanized in accordance with ASTM A153.
 2. Bolts, Nuts and Washers for Interior Locations: ASTM A307, Grade A, regular hexagon head.
 3. Bolts, Round Head: ANSI B-18.5
 4. Wood Screws, Flat Head Carbon Steel: ANSI B-18.6.1.
 5. Plain Washers, Helical Spring Type Carbon Steel: FS FF-W-84.
- L. Primers:
1. Primer for Painting: One of following:
 - a. Tnemec, Kansas City, MO, (816) 474-3400: No. 99 red primer.
 - b. Chessman-Elliott Company: Ceco No. 15 Primox.
 - c. Rowe Products, Inc.: No. 7-C-19.
 - d. Section 016000 – Product Substitutions. Substitutions: Permitted.
 2. Touch-Up Primer for Galvanized Surfaces: FS TT-P-641.

2.2 FABRICATION

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

2.3 ROUGH HARDWARE

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

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2.4 LOOSE STEEL LINTELS

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

2.5 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.
- C. Fabricate support for suspended toilet partitions as follows:
 - 1. Beams: Continuous steel shapes of size required to limit deflection to L/360 between hangers, but use not less than C 8 x 11.5 channels or another shape with equivalent structural properties.
 - 2. Hangers: Steel rods, 1/2 inch in diameter, spaced not more than 36 inches on center. Thread rods to receive anchor and stop nuts. Fit hangers with wedge shape washers for full bearing on sloping flanges of support beam.
 - 3. Braces and Angels: Steel angles of size required for rigid support of beam and for secure anchorage.

2.6 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.

2.7 PIPE BOLLARDS

- A. Fabricate pipe bollards from Schedule 80 steel pipe. Exterior bollards are to be galvanized. Fill bollards with concrete flush at top. Do not paint bollards. Install pipe bollard plastic cover.

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

2.8 PIPE BOLLARD PLASTIC COVERS

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

2.9 FINISHES, GENERAL

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

2.10 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.

2.11 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.

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- 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.

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- 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 - BOLLARDS

- A. 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.
- B. Install pipe bollard plastic covers per manufacturer's recommendation.

3.5 ADJUSTING AND CLEANING

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

END OF SECTION

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SECTION 055213

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel pipe handrails.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 099100 - Painting: Field paint finish.

1.2 REFERENCES

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

1.3 SYSTEM DESCRIPTION

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

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

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2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

2.2 FABRICATION

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

2.3 FINISH

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

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PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Furnish items required to be cast into concrete, embedded in masonry, placed in partitions with setting templates, to appropriate Sections.

3.3 INSTALLATION

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

3.4 CONSTRUCTION

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

3.5 FIELD QUALITY CONTROL

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

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END OF SECTION

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SECTION 078400

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

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

1.3 DEFINITIONS

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

1.4 SYSTEM DESCRIPTION

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

1.5 SUBMITTALS

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

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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.

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- 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.

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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.

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3.5 FIELD QUALITY CONTROL

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

3.6 SCHEDULES

- A. Provide firestopping complying with UL assemblies specified below.

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

END OF SECTION

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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 078400 - Firestopping: Firestopping sealant at fire-rated assemblies.
 - 2. 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.

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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.

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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.

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

2.3 PAVING SEALANTS

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

2.4 COLORS

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

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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.

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- 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

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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

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SECTION 081100

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel doors and frames.
 - 2. Steel door louvers.
 - 3. Steel frames for wood doors.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 081400 - Wood Doors: Doors installed in steel frames.
 - 2. Section 087100 - Door Hardware: Hardware coordination.
 - 3. Section 099100 - Painting: Field painting and finishing of doors and frames.

1.2 REFERENCES

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

1.3 SUBMITTALS

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

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1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE AND PROTECTION

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 MATERIALS

- A. Exterior Doors: SDI-100, Level II - Heavy-Duty - 1-3/4 inch, Model 1 - Full Flush Design, 18 gage cold-rolled steel; galvanized in accordance with ASTM A 653.
- B. Interior Doors: SDI-100, Level II - Heavy-Duty - 1-3/4 inch, Model 1 - Full Flush Design, 18 gage cold-rolled steel.
- C. Exterior Frames: 16 gage, cold-rolled steel, mitered and welded; galvanized in accordance with ASTM A 653.

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- D. Interior Frames: 16 gage, cold-rolled steel, mitered and welded, 2 inch profile, for installation in a metal or wood stud security partition.
- E. Interior Frames: 16 gage, cold-rolled steel, mitered and welded, 2 inch profile, for installation in a metal or wood stud and gypsum board partition.

2.3 CORE CONSTRUCTION

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

2.4 ACCESSORIES

- A. Rubber Silencers: Resilient rubber.
- B. Louvers:
 - 1. Material and Finish: Roll formed 20 gage steel with wipe coat of zinc.
 - 2. Blade: Inverted Y blade, sight proof.
- C. Top Filler Cap on exterior doors: Install cap, weld, grind, fill and finish smooth.

2.5 PROTECTIVE COATINGS

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

2.6 FABRICATION

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

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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.

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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 Manufactures 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.

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- 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 Door Systems, Incorporated, Marshfield, WI (800) 869-3667.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

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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.
 - a. Face Veneer: AWI Premium grade birch for transparent finish.
 - 3. Core Construction:
 - a. Fire-Rated: Type FD 1-1/2 solid stave lumber.
 - 4. Grade: AWI Custom.
- B. Provide fire-rated labeled doors where indicated on Drawings.

2.3 FABRICATION

- A. Fabricate fire-rated doors to AWI 1300 and to Underwriters Laboratories Incorporated requirements. Attach fire rating label to doors.
- B. Furnish and install lock blocks at lock edge, and top of door closer for hardware reinforcement.
- C. Vertical Exposed Edge of Stiles:
 - 1. Same species as veneer facing.
- D. Bond edge banding to cores.
- E. Factory machine door for door hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- F. Factory fit doors for frame opening dimensions identified on approved shop drawings.
- G. 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.

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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 finish doors 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 083313

RAPID ROLL-UP DOORS

PART 1 – GENERAL

1.1 SUMMARY

- A. Interior and Exterior Rapid roll-up doors and operators.

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 RAPID ROLL-UP DOORS

- A. Approved Manufacturers:
 - 1. Rytec.
 - 2. Marathon.
 - 3. Horman.
 - 4. Albany.
 - 5. Dynaco.
 - 6. Rite-Hite.
- B. Interior Doors – Fabric:
 - 1. Basis of Design:
 - a. Rytec: Model PredaDoor PD5500NXT, or approved equal.
 - 2. Materials:
 - a. Material: Minimum 71 oz., 2-ply monofilament curtain, color blue. Material to be laterally stiff and vertically flexible for enhanced wind/pressure resistance. Curtain sections connected by two integral extruded panel connecting ribs. Door curtain to have modular design to allow for easy curtain section replacement.
 - b. Usage: Door and all components to be designed for heavy-duty cycles and operation.

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- c. Bottom Bar: Rigid extruded aluminum with breakaway feature allowing release in either direction upon impact and immediate reset without the use of tools. Wireless with control-reliable 2-way communication, frequency-hopping technology and minimum 3-year battery life. Dual cut-off switches shut off motor when bottom bar is impacted.
- d. Motor: Variable-speed, AC drive, 42-50 inches per second opening and 21 inches per second closing. Adjustable, independent opening and closing speeds.
- e. Controls: Programmable self-diagnostic controller with two-line, 32-character external display for status messaging and diagnostics housed in a UL listed NEMA 4x-rated enclosure.
- f. Activation Devices: Card reader with time-delay closing.
- g. Safety: Full width pneumatic safety reversing edge and (2) two thru-beam photo eyes.
- h. Travel Limits: Absolute rotary encoder to regulate door travel limits. Limits adjusted, without tools at control panel, not motor. Control software to incorporate a self-adjusting limit feature where the software monitors the door position and adjusts the limits, as required, to maintain a proper seal.
- i. Vision Panel: Full width of door, minimum 31" high, replaceable.
- j. Side Frames: Fully bolt-together, anodized aluminum construction.
- k. Weatherseal: Dual, full-height weatherseals to seal against both sides of door panel long with full-width, header seal and full-width seal on bottom bar.
- l. Warranty: 2-year warranty on door with an extended 5-year warranty on door curtain.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. General: Install door, track, and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
- B. Fasten vertical track assembly to framing at not less than 24 inches o.c. Hang horizontal track from structural overhead framing with angle or channel hangers welded and bolt fastened in place. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

3.3 ADJUSTING

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

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3.4 DEMONSTRATION

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

END OF SECTION

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SECTION 083323
OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Overhead coiling security door. (manually and electrically operated)
 - 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. Related Sections:
 - 1. Section 087100 - Door Hardware: Keyed cylinders for door locks.

1.2 REFERENCES

- A. Underwriter's Laboratories (UL):
 - 1. UL #325 - Standard for Door, Drapery, Gate, Louver and Window Operators and Systems.
- B. Door and Access Systems Manufacturing Association (DASMA):
 - 1. DASMA #202-1999 Metal Coiling Slat Door Terminology.
 - 2. DASMA #203-2001 Standards for Non-Fire Rated Rolling Doors.

1.3 DEFINITIONS

- A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural performance to include providing overhead coiling door capable of withstanding the effects of gravity.
- B. Operating Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 20,000 cycles.

1.5 SUBMITTALS

- A. Reference section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Submit all manufacturer's product data.
 - 2. Shop drawings: Include special conditions not detailed in manufacturer's product data and interface with adjacent conditions.

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3. 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. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
 - d. Manufacturer's Installation Instructions.

- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 1. Project Record Documents including Operating and Maintenance Manual.
 2. Certificate stating properly installed materials that comply with this specification.

1.6 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 and approved by manufacturer

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. AlumaTek, Inc., Greenville, RI (800) 949-9950.
 2. Cornell Ironworks, Mountaintop, PA (800) 233-8366.
 3. Cookson Corporation, Phoenix, AZ (800) 294-4358.
 4. Metro Door, Hauppauge, NY, (800) 669-3667.
 5. Overhead Door Corporation, Farmer's Branch, TX (800) 972-1730.

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

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2.2 COILING DOORS

- A. Model:
1. AlumaTek: Solid Slat Clear Anodized Aluminum Model SA, Manual.
 2. Cornell: Rolling Service Door (Manual) Model ESD10W.
 3. Cookson: Service Door (Manual) Model ESD10W Manual.
 4. Metro: Rolling Door Model CFP, Manual.
 5. Overhead: Service Door Series 610, Manual.
- B. Curtain: Constructed of interlocking flat slats of a min. #16 B&S gauge (0.050 inch) (1.25 mm) thick aluminum. Each slat face to be approximately 1 ½ inch high and ½ inch deep. Endlock shall prevent slats from shifting side to side.
- C. Guides: Side guides are to be of extruded aluminum with high density polypile inserts. Finish to match curtain.
- D. Bottom Bar: Heavy duty extruded aluminum with key locking cylinders to exterior. Finish to match curtain. On manual lift type provide a vinyl astragal attached to bottom of bottom bar to prevent tile damage. On motor operated door type provide reversing electric sensing edge. Vinyl astragal or sensing edge shall be solid gray or solid black color. Sensing edge shall be a maximum 2 inches high by 2 inches wide.
- E. Hood: aluminum finish to match curtain.
- F. Counterbalance Assembly:
1. Barrel: Steel pipe capable of supporting curtain and counterbalance weight with maximum deflection of 0.03 inches per foot of width.
 2. Spring Assembly: Oil tempered, heat treated helical torsion spring assembly designed to balance door so maximum effort to operate will not exceed 25 lbs. Provide charge wheel for applying and adjusting spring torque. Design cycle life to be 10,000 cycles.
 3. Viscous speed governor to be installed to prevent free fall of curtain.
- G. Brackets: Fabricate reinforced steel end plates not less than 3/16 inch thick to support curtain and counterbalance assembly and form end closure plates. Provide bearing in rotating shaft bracket. Clear anodized finish.
- H. Structural Supports: Provide all required structural steel tube support columns, angles, anchorage, etc. Anchor to floor and roof structure as required. Coordinate with Contractor.
- I. Operation:
1. Manual hand chain lift or hand crank lift with overhead counterbalance device requiring 25 pounds nominal force to operate.
- J. Finish: Clear anodized.
- K. Locking Device: Locking mechanism at center bottom of bar with lock bars engaging door guides at both jambs. Door is to be shipped with temporary construction cores. Cylinders and keying shall match previous or adjacent doors.

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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. Install door unit assembly in accordance with published manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Sensing edge bottom is to be above the ceiling edge.

3.3 CONSTRUCTION

- A. Site Tolerances:
 - 1. Maintain dimensional tolerances and alignment with adjacent work.
 - 2. Maximum Variation from Plumb: 1/16 inch.
 - 3. Maximum Variation from Level: 1/16 inch.

3.4 ADJUSTING

- A. Following completion of installation, including related work by others; lubricate, test, and adjust doors for ease of operation, free of warp, distortion, or twist.

3.5 CLEANING

- A. Section 017300 - Execution: Cleaning installed work.
- B. Clean surfaces soiled by work as recommended by manufacturer.
- C. Remove labels and visible markings.

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3.6 DEMONSTRATION

- A. Demonstrate proper operation to Owner's Representative.
- B. Instruct Owner's Representative in proper maintenance procedures.

END OF SECTION

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SECTION 084113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum entrance doors.
 - 2. Aluminum storefronts
 - 3. Aluminum windows (fixed and operable)
 - 4. Vision glass and glass infill panels.
 - 5. Door hardware for entrance doors.
 - 6. Perimeter sealant.

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

- C. Related Sections:
 - 1. Section 087100 - Door Hardware: Hardware for same, and coordination.
 - 2. Section 088000 - Glazing: Requirements for glazing.

1.2 REFERENCES

- A. Aluminum Association (AA):
 - 1. AA-M12 C22 A41.

- B. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 605.2.
 - 2. AAMA 701.2.
 - 3. AAMA - Curtain Wall Manual #10.

- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM B209.
 - 2. ASTM B221.
 - 3. ASTM A36/A36M.
 - 4. ASTM A386.

1.3 SYSTEM DESCRIPTION

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

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1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
 - 2. Shop Drawings:
 - a. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Special Warranty: Submit written special warranty with forms completed in United States Postal Service name and registered with manufacturer as specified in this Section.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

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

1.8 ENVIRONMENTAL REQUIREMENTS

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

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1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 MATERIALS

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

2.3 COMPONENTS

- A. Framing System: Trifab 451T, by Kawneer, 2 x 4-1/2 inch (50mm x 113mm) nominal dimension, minimum wall thickness of 0.080 inches, extruded aluminum flush glazed framing system with thermal break.
- B. Column Covers: 0.040 inch aluminum, by Kawneer Company, Inc. Finish to match that of storefront system.
- C. Receptor Channel: Model No. 450-038 and 65-025, by Kawneer Company, Inc. Finish to match that of storefront system.

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2.4 ENTRANCE DOORS

- A. Doors: Series 500 IR swing door, wide stile, by Kawneer Company, Inc. Door sizes indicated on Drawings.
 - 1. Vertical Stile: 5 inch (127mm), single piece.
 - 2. Top Rail: 5 inch (127mm), single piece.
 - 3. Bottom Rail: 6-1/2 inch (165.1mm), single piece.
 - 4. Glazing: 1 inch (25mm) thick units (Type 6) per Section 088000, with standard bevel glass stops.

2.5 GLASS AND GLAZING MATERIALS

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

2.6 SEALANT MATERIALS

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

2.7 HARDWARE

- A. Verify hardware components specified in Section 087100.
- B. Closers: See Section 087100.
- C. Hinges: Door manufacturer's standard three pairs of butt hinges with non-removable pins. Finish: #14 Clear Anodized.
- D. Locking Devices: See Section 087100.
- E. Pulls: Type CO-9 pull, by Kawneer Company, Inc. Finish: #14 Clear Anodized.
- F. Exit Devices: See Section 087100.
- G. Weatherstripping, for Exterior Doors only:
 - 1. Head and Jamb: Replaceable wool, polypropylene, or nylon wool pile with aluminum strip backing, recessed in frame; AAMA 701.2.
 - 2. Sill: Semi-rigid polymeric material on aluminum anodized to match door; EPDM sweep strip; 38-560 by Kawneer or similar by other named manufacturers.
- H. Threshold: See Section 087100.

2.8 FINISHES

- A. Exposed Aluminum Surfaces: Architectural Class I anodic coating, AA-M12 C22 A41, #14 Clear, unless otherwise indicated on Drawings.
- B. Maintain same color range on doors, frames, and other components. Do not mix light and dark shades.

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- C. Concealed Steel Items: Galvanized in accordance with ASTM A386 to 2.0 oz/sq. ft.
- D. Apply two coats of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

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

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3.3 ADJUSTING

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

3.4 CLEANING

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

END OF SECTION

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SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A Section Includes:

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

B Related Sections:

1. Section 083613 - Sectional Doors.
2. Section 084113 - Aluminum-Framed Entrances and Storefronts: Hardware for same, and coordination.
3. Section 084229 - Automatic Entrances.
4. Section 016000 - Product Requirements.
5. Section 281304 - Enterprise Physical Access Control System

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.

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- 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, Enterprise Physical Access Control System, and related work to ensure proper size, thickness, hand, function, door control, 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 USPS Project Manager, 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 USPS Project Manager 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.

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- 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 projects' 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. Bommer, Landrum, SC (800) 334-1654
 - 4. Best Access Systems, Indianapolis, IN (800) 311-1705
 - 5. Corbin Russwin, Berlin, CT (800) 543-3658
 - 6. Detex Corporation, New Brannfels, TX (800) 729-3839
 - 7. Door Controls International, Dexter, MI (800) 742-3634
 - 8. Folger Adam Company, Lemont, IL (800) 260-9001
 - 9. Glynn Johnson, Indianapolis, IN (877) 613-8766
 - 10. Hager Companies, St. Louis, MO (800) 255-3590
 - 11. Hiawatha, Inc., Bloomington, MN (800) 777-1686
 - 12. H. B. Ives, Wallingford, CT (888) 371-7331
 - 13. Knappe & Vogt Manufacturing Co., Grand Rapids, MI (800) 253-1561
 - 14. LCN Closers, Princeton, IL (800) 526-2400
 - 15. McKinney Hinge, Scranton, PA (800) 346-7707
 - 16. National Guard Products, Incorporated, Memphis, TN (800) 647-7874
 - 17. Norton, Charlotte, NC (800) 393-1097
 - 18. Pemko, Ventura, CA (800) 824-3018
 - 19. Precision Hardware, Romulus, MI (317) 849-2250
 - 20. Reese Enterprises, Incorporated, Rosemount, MN (800) 328-0953
 - 21. Rixson-Firemark, Franklin Park, IL (866) 474-9766
 - 22. Rockwood Manufacturing, Rockwood, PA (800) 458-2424
 - 23. Sargent, New Haven, CT (800) 727-5477

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24.	Sargent & Greenleaf, Nicholasville, KY	(800) 826-7652
25.	Schlage, Colorado Springs, CO	(800) 847-1864
26.	Securitech Group Incorporated, Maspeth, NY	(800) 622-5625
27.	Simplex Access Controls	(800) 746-7539
28.	Soss, Pioneer, OH	(800) 922-6957
29.	Stanley, New Britain, CT	(877) 334-6791
30.	Trimco, Los Angeles, CA	(323) 262-4191
31.	Von Duprin, Indianapolis, IN	(317) 613-8302
32.	Wooster Products Incorporated, Wooster, OH	(800) 321-4936
33.	Yale, Charlotte, NC	(800) 438-1951
34.	Zero International, Bronx, NY	(800) 635-5335

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

2.2 HINGES

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

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

- B. Material:

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

- C. Hinges/Pivots by types:

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

a.	Hinge	FBB179	4-1/2 x 4-1/2	652	Stanley
b.	Hinge	BB1279	4-1/2 x 4-1/2	652	Hager
c.	Hinge	TA2714	4-1/2 x 4-1/2	652	McKinney
2. Type H-2: Medium weight door, average frequency, steel, non-removable pins. Hinges on interior doors shall be satin chrome plated finish 652. Hinges on exterior doors shall be completely stainless-steel finish 630.

a.	Hinge	FBB179	4-1/2 x 4-1/2 NRP		Stanley
b.	Hinge	BB1279	4-1/2 x 4-1/2 NRP		Hager
c.	Hinge	TA2714	4-1/2 x 4-1/2 NRP		McKinney
3. Type H-3: Concealed, medium weight door, average frequency, steel.

a.	Hinge	216		626	Soss
b.	Hinge	MK80		626	McKinney
4. Type H-4: Medium weight door, average frequency, steel. (Continuous Piano hinge)

a.	Hinge	STS314 1/4		626	Stanley
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5. Type H-5: Medium weight door, average frequency, steel, 5-inch high, non-removable pins. Hinges on interior doors shall be satin chrome plated finish 652. Hinges on exterior doors shall be completely stainless-steel finish 630.
- | | | | | |
|----|-------|--------|---------------|----------|
| a. | Hinge | FBB179 | 4-1/2 x 5 NRP | Stanley |
| b. | Hinge | BB1279 | 4-1/2 x 5 NRP | Hager |
| c. | Hinge | TA2714 | 4-1/2 x 5 NRP | 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: ANSI/BHMA A156.2 Series 4000, Grade 1. Provide 2 3/4 inch backset. Provide three keys per cylinder.
 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 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 USPS Project Manager upon request.
 - c. Provide permanent cores to Postmaster prior to substantial completion. Postmaster shall store them securely until needed. At substantial completion and at USPS Project Manager direction, remove construction cores and replace with permanent cores in presence of Project Manager. Provide keys to Project Manager 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.

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D. Cylinders and Thumbturns by types:

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

E. Locks and Latches by types:

1.	Type L-1: Hotel Lock (similar to ANSI F15).				
	a. AUR 8832FL w/security collar		626	Yale	
	b. ML2029 NSA w/security collar		626	Corbin Russwin	
	c. L9485P-06 w/security collar		626	Schlage	
2.	Type L-2: Classroom Lock (ANSI F84).				
	a. AU 5408LN		626	Yale	
	b. CL 3555		626	Corbin Russwin	
	c. ND70PD		626	Schlage	
3.	Type L-3: Entrance Lock (ANSI F20).				
	a. AUR 8847FL w/security collar		626	Yale	
	b. ML2067 w/ security collar		626	Corbin Russwin	
	c. L9453P-06A w/ security collar		626	Schlage	
4.	Type L-4: Storeroom Lock (ANSI F86).				
	a. AU 5405LN		626	Yale	
	b. CL3557		626	Corbin Russwin	
	c. ND80PD		626	Schlage	
5.	Type L-5: Privacy Lock (ANSI F76).				
	a. AU 5402LN		626	Yale	
	b. CL3520		626	Corbin Russwin	
	c. ND40S		626	Schlage	
6.	Type L-6: Closet Deadbolt (ANSI E2151).				
	a. 3611B		626	Yale	
	b. 470		626	Sargent	
7.	Type L-7: Passage.				
	a. AU 5401LN (F75)		626	Yale	
	b. CL3510		626	Corbin Russwin	
	c. ND10S		626	Schlage	

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

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

C. Push and Pulls by types:

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

2.5 EXIT DEVICES

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

1. Corbin Russwin.
2. Yale.
3. Von Duprin.
4. Adams Rite.
5. Sargent.
6. Securitech Group Inc.

B. Exit Only Door Alarms:

- | | |
|-----------|------------|
| 1. SDA103 | SECURITECH |
|-----------|------------|

C. Materials:

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

D. Exit Devices by types:

- | | | | |
|----|--|-----|------------|
| 1. | Type E-1: Exit Device (F01) (for wood and metal doors) | | |
| | a. 8700 w/ security interlock nose guard/strike | 628 | Adams Rite |
| 2. | Type E-2: Exit Device (F08) (for aluminum doors) | | |
| | a. 1686 x mortised Cylinder. dogging | 628 | Kawneer |
| 3. | Type E-3: Exit Device (08) (for wood and metal doors). | | |
| | a. 8300 x mortice exit device | | |
| | w/ security interlock nose guard/strike | 630 | Adams Rite |
| 4. | Type E-4: Exit Device (01) (for wood doors). | | |
| | a. 3100 surface mounted vertical rod exit devise | 630 | Adams Rite |
| 5. | Type E-5: Exit Device (14) (for wood and metal doors). | | |
| | a. 8099 | 628 | Adams Rite |
| 6. | Type E-6: Exit Device (08) (for wood and metal doors). | | |
| | a. 3300 x mortice exit device | | |
| | w/ security interlock nose guard/strike | 630 | Adams Rite |
| 7. | Type E-7: Exit Device (F01) (for wood and metal doors) | | |
| | a. 3700 w/ security interlock nose guard/strike | 628 | Adams Rite |

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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.

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.

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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. Stops, Holders and Bumpers by types:

1. Type S-1: Wall Stop - Install with appropriate anchors for substrate encountered.

a.	1270W	630	Trimco
b.	407 1/2C	630	Ives
c.	409	630	Rockwood
2. Type S-2: Floor Stop - Install with appropriate anchors for substrate encountered.

a.	1201	626	Trimco
b.	FS444	626	Ives
c.	471	626	Rockwood
3. Type S-3: Floor Stop - Install with appropriate anchors for substrate encountered.

a.	W1211	630	Trimco
b.	FS436	630	Ives
c.	440/442	626	Rockwood

2.8 THRESHOLDS

- A. Threshold Manufacturers: Subject to compliance with requirements, provide from one of the following manufacturers as specified below.
 1. Pemko.
 2. National Guard.
 3. Reese.
 4. Zero.

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

C. Thresholds by types:

1. Type T-2: Saddle threshold for floor finish at doors (either VCT to VCT or VCT to tile or sealed concrete.)

a. VCT to VCT:			
	271	628	Pemko
	HD5A	628	Reese
	425E	628	National
b. VCT to Tile/Concrete:			
	158	628	Pemko
	S514A	628	Reese
	653	628	National
2. Type T-3 (with weather seal):

a.	S483AV	628	Reese
b.	2005AT	628	Pemko
c.	896V	628	National

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2.9 WEATHERSTRIPPING

- A. Weatherstripping Manufacturers: Subject to compliance with requirements, provide from one of the following manufacturers as specified below.
1. Pemko.
 2. Reese.
 3. Zero.
 4. National Guard.
- B. Weatherstripping by types:
1. Type W-1: Door Gaskets.
 - a. 807A Reese
 - b. 303AS Pemko
 - c. 160VS NGP

2.10 MISCELLANEOUS HARDWARE

- A. Miscellaneous Hardware Manufacturers: Subject to compliance with requirements, provide from the manufacturers specified below.
- B. Provide door silencers for all doors unless indicated otherwise.
1. Type M-1: Acoustical Perimeter Door Seal
 - a. 379 APK 628 Pemko
 2. Type M-2: Dead Lock, (ANSI E0191) - w/ No exposed trim on lobby side.
 - a. 3300 Series 630 Yale
 3. Type M-3: Security Viewer. Mounted/installed, centered at 5'-0" AFF.
 - a. 1756 630 Hager
 - b. 627 626 Rockwood
 4. Type M-4: Astragal
 - a. 184A 628 Reese
 - b. 359A 628 Pemko
 5. Type M-5: Silencers
 - a. 1229A Gray Trimco
 - b. SR64 Ives
 - c. 608 Grey Rockwood
 6. Type M-6: Flushbolts
 - a. 3917 626 Trimco
 - b. 555 626 Rockwood
 7. Type M-7: Astragal
 - a. 276C 628 Reese
 - b. 355CS 628 Pemko
 8. Type M-8: Kick Plates
 - a. K0050 8 x 34 630 Trimco
 - b. KP1050 8 x 34 630 Rockwood
 9. Type M-9: Armor Plate; 40" H x 46" W (both sides of door) 630
 - a. same spec
 10. Type M-10: Not Used:
 11. Type M-11: Reinforcing Pivot Hinges
 - a. 253 652 Hager
 - b. B1923 652 McKinney

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- 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 ¼" x 1 ¾" 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 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. 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 USPS Project Manager.
 - 1. Conform to requirements United States Postal Service "Standards for Facility Accessibility by the Physically Handicapped" Handbook RE-4.

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- 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 readjust 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.

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SET 1

Doors #A1, A2, A7, A8

Each set to have:

- 1 ea. (L-3) Entrance Lock (ANSI F20)
- 3 ea. (H-2) Hinges
- 1 ea. (T-3) Threshold
- 1 ea. (C-X) Closer

SET 2

Door #A9

Each set to have:

- 1 ea. (L-3) Entrance Lock (ANSI F20)
- 6 ea. (H-2) Hinges
- 1 ea. (M-7) Astragal
- 1 set (M-6) Flushbolts
- 1 ea. (M-1) Acoustical Perimeter Door Seal
- 1 ea. (T-2) Threshold
- 1 ea. (S-3) Door Stop
- 1 ea. (C-X) Closer

SET 3

Door #A12

Each set to have:

- 1 ea. (E-6) Exit Device 08 (w/ Contacts)
- 1 ea Locknetics 788-18 Door Cord
- 1 ea. (L-3) Entrance Lock (ANSI F20)
- 6 ea. (H-2) Hinges
- 1 ea. (M-4) Astragal
- 1 set (M-6) Flushbolts
- 2 ea. (W-1) Door Gaskets
- 1 ea. (T-3) Threshold
- 1 ea. (S-3) Door Stop
- 2 ea. (M-8) Kick Plate
- 2 ea. (C-X) Closer

SET 4

Doors #A16, A17

Each set to have:

- 1 ea. (L-3) Entrance Lock (ANSI F20)
- 6 ea. (H-2) Hinges
- 1 ea. (M-7) Astragal
- 1 set (M-6) Flushbolts
- 1 ea. (T-2) Threshold
- 1 ea. (S-3) Door Stop
- 2 ea. (M-8) Kick Plate
- 1 ea. (C-X) Closer

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SET 5

Door #A18

Each set to have:

- 1 ea. (E-3) Exit Device 08 (w/ Contacts)
- 1 ea Locknetics 788-18 Door Cord
- 1 ea. (L-3) Entrance Lock (ANSI F20)
- 3 ea. (H-2) Hinges
- 1 ea. (W-1) Door Gaskets
- 1 ea. (T-3) Threshold
- 1 ea. (S-3) Door Stop
- 1 ea. (M-8) Kick Plate
- 1 ea. (C-X) Closer

SET 6

Doors #A25, A26, B4, B8, B12, B15, C15, D12

Each set to have:

- 1 ea. (E-3) Exit Device 08 (w/ Contacts)
- 1 ea Locknetics 788-18 Door Cord
- 1 ea. (L-3) Entrance Lock (ANSI F20)
- 3 ea. (H-2) Hinges
- 1 ea. (W-1) Door Gaskets
- 1 ea. (T-3) Threshold
- 1 ea. (M-8) Kick Plate
- 1 ea. (C-X) Closer

SET 7

Doors #B1, B2

Each set to have:

- 1 ea. (L-3) Entrance Lock (ANSI F20)
- 6 ea. (H-2) Hinges
- 1 ea. (M-7) Astragal
- 1 set (M-6) Flushbolts
- 1 ea. (C-X) Closer

SET 8

Doors #B16, B17, D13, D14

Each set to have:

- 1 ea. (E-1) Exit Device 01

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SET 9

Doors #C3

Each set to have:

- 2 ea. (E-4) Exit Device Similar to 08 but Passage
- 6 ea. (H-2) Hinges
- 2 sets. (M-5) Silencers
- 1 ea. (M-1) Acoustical Perimeter Door Seal
- 2 ea. (M-8) Kick Plate
- 2 ea. (C-X) Closer

SET 10

Doors #C4

Each set to have:

- 1 ea. (E-3) Exit Device 08 (w/ Contacts)
- 1 ea Locknetics 788-18 Door Cord
- 1 ea. (L-1) Entrance Lock (ANSI F15)
- 1 ea. (C-2) Closer

All other hardware is furnished by Gate supplier

SET 11

Doors #C7

Each set to have:

- 2 ea. (E-2) Exit Device 08
- 1 ea. (T-3) Threshold
- 2 ea. (C-2) Closer

All other hardware is furnished by Storefront supplier

SET 12

Doors #C8, C9

Each set to have:

- 2 ea. (E-4) Exit Device 01
- 6 ea. (H-2) Hinges
- 2 sets. (M-5) Silencers
- 2 ea. (M-8) Kick Plate
- 2 ea. (C-X) Closer

SET 13

Doors #C16

Each set to have:

- 1 ea. (L-1) Entrance Lock (ANSI F15)
- 3 ea. (H-2) Hinges
- 1 ea. (T-3) Threshold
- 1 ea. (C-X) Closer

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SET 14

Doors #C19

Each set to have:

- 1 ea. (E-5) Exit Device F14 (w/ Contacts)
- 1 ea Locknetics 788-18 Door Cord
- 1 ea. (C-2) Closer

SET 15

Doors #C20, D1

Each set to have:

- 1 ea. (E-6) Exit Device Similar to 08 but Passage (w/ Contacts)
- 1 ea Locknetics 788-18 Door Cord
- 1 ea. (L-7) Passage (ANSI F75)
- 3 ea. (H-2) Hinges
- 1 sets. (M-5) Silencers
- 1 ea. (M-8) Kick Plate
- 1 ea. (C-X) Closer

SET 16

Doors #D10

Each set to have:

- 1 ea. (L-2) Classroom Lock (ANSI F85)
- 1 ea. (C-X) Closer

SET 17

Door #A11

Each set to have:

- 1 ea. (E-7) Exit Device 01 (w/ Contacts)
- 1 ea Locknetics 788-18 Door Cord
- 3 ea. (H-2) Hinges
- 1 ea. (T-3) Threshold
- 1 ea. (S-3) Door Stop
- 2 ea. (C-X) Closer

SET 18

Door # S4

Each set to have:

- 1 ea. (L-2) Classroom Lock (ANSI F85)
- 1 ea. (C-X) Closer

All other hardware is furnished by Gate supplier

END OF SECTION

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SECTION 088000

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

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

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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.

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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 4 - Wire Glass: Fire Rated Impact Safety Rated Wire Glass with Surface Applied Film.
 - 1. Glass Thickness: 1/4 inch (6 mm)
 - 2. Fire rated surface film as approved by manufacturer.
 - 3. Mesh: Woven stainless steel wire, 1/2 inch (12 mm) grid size.
 - 4. Impact safety resistance: ANSI Z97.1 and CPSC 16CFR1201 (CAT I and II)
 - 5. Fire rating: ASTM E2010-01, NFPA 257, UL9 and UL10C.
- B. 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. Coating on inner side of outer panel. Security film of a minimum 0.007 inch (0.1778 mm) on the inner side of the inner panel. Glazing units shall meet the Large missal Impact requirements of the current Florida Building Code.
 - 1. Glass Thickness, Inner: 1/4 inch (6 mm).
 - 2. Glass Thickness, Outer: 1/4 inch (6 mm).
 - 3. Tint Color: Match existing.
 - 4. Visible Reflectance: Maximum 15 percent.
 - 5. Visible Transmittance: Minimum 65 percent.
 - 6. 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.

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.

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- 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.

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- 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.

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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.

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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

- A. Manufacturers: Subject to compliance with project requirements, alternate manufacturers offering specified items which may be incorporated in the Work include the following:
1. Dale/Incor, Dearborn, MI (800) 882-7883.
 2. National Gypsum Company, Gold Bond Building Products, Charlotte, NC. (800) 628-4662.
 3. 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.

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- 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.

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

3.2 INSTALLATION

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

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- 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.

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END OF SECTION

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SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Gypsum board and joint treatment.
 2. Gypsum sheathing.
 3. Cementitious backer board.
 4. Sound attenuation blankets.
 5. Finishing.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
1. Section 092216 - Non-Structural Metal Framing: Metal framing for attachment of gypsum board.
 2. Section 099100 - Painting: Field paint finish on gypsum board.

1.2 REFERENCES

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

1.3 SUBMITTALS

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

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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.

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5. Consolidated Fabricators Corp., Paramount, CA (800) 635-8335.
6. Steeler, Inc., Seattle, WA (800) 275-2279.
7. Western Metal Lath, Inc., Riverside, CA (909) 360-3500.

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

2.2 MATERIALS

- A. Standard Gypsum Board: ASTM C 36; 1/2 inch and 5/8 inch thick 48 inch width, maximum permissible length; ends square cut, tapered edges.
- B. Type X Gypsum Wallboard (Fire Resistant): ASTM C36; 1/2 inch and 5/8 inch thick, 48 inch width, maximum permissible length; ends square cut, edges tapered, providing at least 1-hour fire-retardant rating for boards 5/8 inch thick or 3/4-hour fire-resistance classification for boards 1/2 inch thick, when tested in accordance with ASTM E119.
- C. Water-Resistant Gypsum Backing Board: ASTM C630; 1/2 and 5/8 inch thick, 48 inch width, maximum permissible length; ends and edges straight and solid, edges tapered. Board consisting of a noncombustible water-resistant gypsum core, surfaced on face and back with water-repellent paper bonded to the core.
- D. Water-Resistant Glass Mat Embedded Gypsum Backing Board: ASTM C1178; 1/4 and 1/2 inch thick, 32 inch or 48 inch width, maximum permissible length; ends and edges straight and solid, edges square. Board consisting of a noncombustible water-resistant gypsum core, with glass mat embedded on front and back with the face surface with a heat cured copolymer water and vapor retardant coating. For janitor and toilet rooms where tile is the finish material.
- E. Type X Water-Resistant Gypsum Backing Board (fire-resistant): ASTM C630; 1/2 and 5/8 inch thick, 48 inch width, maximum permissible length; ends and edges straight and solid, edges tapered. Board consisting of a noncombustible water-resistant gypsum core, surfaced on face and back with water-repellent paper bonded to the core. Providing at least 1-hour fire-retardant rating for boards 5/8 inch thick, or 3/4-hour fire-retardant rating for boards 1/2 inch thick, when tested in accordance with ASTM E119.
- F. Type X Water-Resistant Glass Mat Embedded Gypsum Backing Board (fire-resistant): ASTM C1178; 5/8 inch thick, 48 inch width and 8 foot length; ends and edges straight and solid, edges squared. Board consisting of a noncombustible water-resistant gypsum core, embedded on face and back with water resistant fiberglass mat bonded into the core. Providing at least 1-hour fire-retardant rating for boards 5/8 inch thick, or 3/4-hour fire-retardant rating for boards 1/2 inch thick, when tested in accordance with ASTM E119.
- G. Gypsum Sheathing Board: ASTM C79; moisture resistant type; 1/2 inch (13 mm) thick, maximum available size in place; ends square cut, tongue and grooved edges; water repellent paper faces. Exterior wall sheathing where noted.
- H. Gypsum Sheathing Glass Mat Embedded Board: ASTM C1177; moisture resistant type; 1/2 inch (13 mm) and 5/8 inch thick type X, maximum available size in place; ends and edges straight and solid, edges squared. Water resistant glass mat embossed both sides and edges, treated water resistant gypsum core with alkali resistant coating/primer. Flame spread: 0, smoke developed: 0 when tested in accordance with ASTM E84. Exterior wall sheathing where noted.

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- 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.

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- 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.

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3.5 FINISH

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

3.6 CONSTRUCTION

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

END OF SECTION

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SECTION 095113

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Suspended metal grid ceiling system.
 - 2. Acoustical panels.
 - 3. Perimeter trim.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 210000 - Fire Suppression: Sprinkler heads in ceiling system.
 - 2. Section 233713 - Diffusers Registers and Grilles: Air diffusion devices in ceiling system.
 - 3. Section 265100 - Interior Lighting: Light fixtures attached to ceiling system.

1.2 REFERENCES

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

1.3 SYSTEM DESCRIPTION

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

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

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

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

1.6 DELIVERY, STORAGE AND HANDLING

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

1.7 PROJECT CONDITIONS

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

1.8 MAINTENANCE

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Suspension System: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Armstrong World Industries, Incorporated, Lancaster, PA (800) 448-1405.
 - 2. Chicago Metallic Corporation, Chicago, IL (800) 323-7164.
 - 3. USG Interiors, Chicago, IL (800) 950-3839.
 - 4. Certainteed Ceilings (800) 346-7978.
- B. Acoustical Panels: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Armstrong World Industries Incorporated, Lancaster, PA (800) 448-1405.
 - 2. USG Interiors, Chicago, IL (800) 950-3839.
 - 3. Certainteed Ceilings (800) 346-7978.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

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2.2 SUSPENSION SYSTEM

- A. Products:
1. Armstrong: Prelude 15/16 inch Exposed Tee System.
 2. Chicago Metallic: 1200 System.
 3. USG: Donn DX System.
 4. Certainteed: Classic Stab CS12-12-15.
- B. Description:
1. Grid: ASTM C 635, intermediate duty, steel exposed T; nominal 1 inch width; stab-in connections.
 2. Recycled Content: Minimum 20%.
 3. Accessories: Stabilizer bars, clips, and splices.
 4. Grid Finish: White.
 5. Support System: Hot or cold rolled steel channels; galvanized hanger wire, minimum 12 gage.
 6. Edge Moldings: Metal channel with exposed flange to match suspension system.

2.3 ACOUSTICAL PANELS

- A. Acoustical Panels (Standard Application):
1. Products:
 - a. Armstrong: Fine Fissured #1729.
 - b. Certainteed : HHF – 197
 - c. USG: Auratone, Radar #2310.
 2. Description:
 - a. Size: 24 x 24 x 5/8 inches.
 - b. Texture: Fine Fissured.
 - c. Edge: Square Tegular.
 - d. Weight: Minimum 0.60 pounds per square foot.
 - e. Surface Finish: Factory-applied vinyl latex paint, perforated, and scored.
 - f. Color: White.
 - g. Recycled Content: Minimum 25%.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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3.2 INSTALLATION - SUSPENSION SYSTEM

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

3.3 INSTALLATION - ACOUSTICAL PANELS

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

3.4 CONSTRUCTION

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

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspect acoustical panel placement, ceiling grid suspension system installation and connection to structure.

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3.6 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality:
 - 1. Temporary Ventilation: As specified in Section 013543 - Environmental Procedures.
 - a. Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by USPS Contracting Officer.

3.7 CLEANING

- A. Section 017300 - Execution: Cleaning installed Work.
- B. Clean exposed surfaces of acoustical ceilings including trim, edge moldings, and suspension system members.

END OF SECTION

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SECTION 096500
RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient tile flooring.
 - 2. Resilient base.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections: Related work specified elsewhere includes but may not be limited to:
 - 1. Section 017704 - Closeout Procedures and Training.
 - 2. Section 033000 - Cast-In-Place Concrete.
 - 3. Section 123504 - Postal Casework.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM F710.
 - 2. ASTM F1066.
 - 3. ASTM 1869-98 ASTM F2170-02.
 - 4. ASTM F2170-02.
 - 5. ASTM F2195.
- B. Manufacturer's Guides:
 - 1. Armstrong Installation Systems Guide F-5061.
 - 2. Mannington Guide for Installation/Maintenance 151209.
 - 3. Johnsonite Installation and Maintenance Instructions 050212.

1.3 SUBMITTALS

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

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- 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. Engage installer certified, as a "manufacturer's approved mechanic."
 - 2. Certificate: When requested, submit certificate indicating qualification.
- B. Regulatory Requirements:
 - 1. Critical Radiant Flux in Accordance with ASTM E 684: More than 0.45 Watts per square centimeter.
 - 2. Specific Optical Smoke Density in Accordance with ASTM E 662: Less than 450.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, Handle, Store, and Protect Products.
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Deliver tiles and installation accessories to site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, project identification, and shipping and handling instructions.
- D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - 1. Material should be stored in areas that are fully enclosed, weathertight with the permanent HVAC system set at a uniform temperature of at least 68 degrees F (20 degrees C) for 72 hrs. prior to, and during installation.
 - 2. Store tiles on flat surfaces.

1.6 SEQUENCING AND SCHEDULING

- A. Finishing Operations: Install tile flooring after finishing operations, including painting and ceiling operations, have been completed.
- B. Concrete Curing: Do not install tile flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by resilient flooring manufacturer's recommended bond, moisture test, and pH test.

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1.7 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
1. Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

1.8 MAINTENANCE

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tile: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
1. Armstrong World Industries, Lancaster, PA. Representative Contact: Lien Chu (800) 356-9301, ext. 8274.
- B. Wall Base: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
1. Armstrong World Industries, Lancaster, PA (800) 448-1405. Representative Contact: Lien Chu (800) 356-9301, ext. 8274.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not Permitted.

2.2 MATERIALS

- A. Floor Tile:
1. Armstrong Premium Excelon Stonetex VCT, ASTM F1066 Class 2:
 - a. Size: 12 inch x 12 inch.
 - b. Thickness: 1/8 inch (3.1750 mm).
 - c. Style and Color:
 - 1) VCT-1: #52147 Pumice Stone.
- B. Wall Base:
1. Height: 4 inches.
 2. Thickness: 1/8 inch.
 3. Coved.
 4. Length: Roll.
 5. Material Color: Black.

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2.3 ACCESSORIES

- A. Subfloor Filler: Latex underlayment, mixed with undiluted latex liquid furnished by the selected manufacturer.
 - 1. Underlayment and Patching Compound: Refer to Section 033000 Cast-In-Place Concrete for portland cement based underlayments and patching compounds.
- B. Primers and Adhesives: Waterproof; clear; of types as approved by resilient flooring manufacturer for specific material and substrates encountered. Zero VOC.
- C. Base Accessories: Premolded end stops and internal, and external corners of same material, size, and color as base.
- D. Expansion Joint Covers: Refer to other specification section for expansion joint covers to be used with resilient flooring.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work and are acceptable for product installation in accordance with manufacturer's instructions.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
- E. Material Inspection: In accordance with manufacturer's installation requirements, visually inspect materials prior to installation. Material with visual defects shall not be installed and shall not be considered as a legitimate claim.

3.2 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.
- B. Surface Preparation:
 - 1. General: Prepare floor substrate in accordance with manufacturer's instructions.
 - 2. Floor Substrate: Prepare floor substrate to be smooth, rigid, flat, level, permanently dry, clean, and free of foreign materials such as dust, paint, grease, oils, solvent, curing and hardening compounds, sealers, asphalt, and old adhesive residue.

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3. Concrete Floor Substrate: Concrete floor substrate shall have a minimum compressive strength of 3500 psi. Refer to Division 3 Concrete sections for patching and repairing crack materials, and leveling compounds with Portland cement based compounds. Do not use or install flooring over gypsum based leveling or patching materials
4. Reference Standard: Comply with ASTM F 710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

C. Concrete Moisture Test:

1. ASTM F1869-98 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub floor Using Anhydrous Calcium Chloride: The moisture emission from the concrete shall not exceed 5.0 lbs. per 1000 sq. ft. in 24 hrs (verify using the calcium chloride test as per ASTM F 1869-98). A diagram of the area showing the location and results of each test shall be submitted to the Contracting Officer. If the test results exceed the limitations, the installation shall not proceed until the problem has been corrected.
2. ASTM F2170-02 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes. The relative humidity measured from the center of the concrete slab should not exceed 75%. If the test results exceed the limitations, the installation must not proceed until the problem has been corrected.
3. The test area shall be conditioned with the permanent HVAC system set at a uniform temperature of at least 68 degrees F (20 degrees C) for 72 hrs prior to and during testing.

D. Concrete pH Test: Perform pH tests on concrete floors regardless of the age or grade level. If the pH is greater than 10, it must be neutralized prior to beginning the installation.

E. Prohibit traffic until filler is cured.

F. Vacuum clean substrate.

3.3 INSTALLATION - TILE FLOORING

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

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

3.4 INSTALLATION – WALL BASE

- A. Install wall base in accordance with manufacturer's published instructions.
- B. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- C. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- D. Install wall base on solid backing. Bond tight to wall and floor surfaces.
- E. Apply the base to the cabinet toe kicks. If necessary, use a hot air gun to make the base pliable enough to turn the corners of the toe kick. Minimize or eliminate base seams on the toe kick. If the cabinet butts into a wall, start the base where the wall and cabinet meet and continue around the exposed area of the toe kick.

3.5 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality:
 - 1. Temporary Ventilation: As specified in Section 013543 - Environmental Procedures.
 - a. Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of minimum 60 degrees F to maximum 90 degree F continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by USPS Project Manager.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
 - 1. Manufacturer's Field Services: Upon Owner's request and with at least 2-3 week notice, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.
- B. Inspect resilient flooring and base installation, pattern, layout, and attachment to substrate.

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3.7 CLEANING

- A. Section 017300 - Execution: Cleaning installed Work.
- B. Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
 - 1. Remove visible adhesive and other surface blemishes using cleaning methods recommended by tile floor manufacturer.
 - 2. Sweep and vacuum floor after installation.
 - 3. Do not wash floor until after time period recommended by tile flooring manufacturer.
 - 4. Damp mop tile flooring to remove black marks and soil.

3.8 PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

3.9 INITIAL MAINTENANCE PROCEDURES FOR LINOLEUM

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

END OF SECTION

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SECTION 099100

PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Surface preparation and field application of paints and finishes for interior and exterior surfaces.
 2. Schedule of Items to be painted.
 3. Exterior painting and finishing schedule.
 4. Interior painting and finishing schedule.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
1. Section 055000 - Metal Fabrications.
 2. Section 055213 - Pipe and Tube Railings.
 3. 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 - Submittals: 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 Safety Data Sheets (SDS) 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.

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B. Regulatory Requirements:

1. Surface Burning Characteristics in Accordance with ASTM E-84 for Class I or A finish:
 - a. Flame Spread (Non-Combustible Surfaces): Less than 25.
 - b. Smoke Density (Non-Combustible Surfaces): Less than 450.
2. Provide paint and coating materials that conform to Federal, State, and Local restrictions for Volatile Organic Compounds (VOC) content.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and/or reducing.
- C. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's published instructions.
- D. Prevent fire hazards and spontaneous combustion.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements:

1. Apply paint finishes only when moisture content of surfaces is within manufacturer's acceptable ranges for type of finish being applied.
2. Surface temperatures or surrounding air temperature to be above 40 degrees F before applying alkyd finishes; above 45 degrees F for interior latex, and 50 degrees F for exterior latex work. Minimum for varnish and transparent finishes is 65 degrees F.
3. Provide continuous ventilation and heating facilities to maintain temperatures above 45 degrees F for 24 hours prior to, during and 48 hours after application of finishes.
4. Do not apply paint in areas where dust is being generated.
5. Provide lighting level in areas being painted of 80-foot candles measured mid-height at substrate surface.

1.7 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Materials:
 1. Provide one gallon of each color, type, and sheen to USPS Project Manager.
 2. Label each container with color, type, texture, room locations, in addition to the manufacturer's label.

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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

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- 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.
 - 3. Concrete/Masonry: Semi-Gloss Acrylic Latex MDF 1.5 mil.
 - a. Primer: Perma Crete High Build 100% Acrylic Primer 7.0 mil.
 - b. Each Finish Coat: Perma Crete High Build Acrylic Top Coat 1.5 mil.
- 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.
 - 3. Concrete/Masonry: Semi-Gloss Acrylic Latex MDF 1.5 mil.
 - a. Primer: Promar Exterior Block Filler B25W25 MDF 10.0 mils.
 - b. Each Finish Coat: DMT Acrylic B66 Series MDF 3.0 mils.

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2.4 INTERIOR PAINT SYSTEMS

A. Benjamin Moore:

1. Gypsum Board: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: 284 Moorecraft Superhide Interior Latex Primer/Undercoater; MDF 1.5 mils.
 - b. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
2. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Moorecraft Super Hide Interior/Exterior Latex Blockfiller 285; MDF 11.0 mils.
 - b. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
4. Wood: Satin, Water Base, Acrylic Latex.
 - a. Primer: 253 Moorecraft Latex Enamel Undercoater and Primer Sealer; 2.0 mils.
 - b. Each Finish Coat: Moorecraft Super-Hide Eggshell 286.
5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Moorecraft Super Hide Interior/Exterior Latex Blockfiller 285; MDF 11.0 mils.
 - b. Each Finish Coat: 276 Moorecraft Acrylic Latex; MDF 1.5 mils.
6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: M04 Acrylic Metal Primer; MDF 2.0 mils.
 - b. Each Finish Coat: 276 Moorecraft Acrylic Latex; MDF 1.5 mils.
7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Enamel Undercoater: Moorecraft Acrylic Latex Underbody 269.
 - b. Each Finish Coat: 276 Moorecraft Acrylic Latex; MDF 1.5 mils.

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.
 - a. Primer: Bloxfil 4000 Interior/Exterior Heavy-Duty Acrylic Block Filler 4000-1000; 7.0-14.5 MDF.
 - b. Each Finish Coat: Wonder-Tone Eggshell Latex Enamel DR34XX; MDF 1.5 mil.
3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Mirrolac W/B Semi-Gloss Enamel DP83XX; MDF 1.5 mil.
4. Wood: Satin, Water Base, Acrylic Latex.
 - a. Primer: Wonder-Prime DR51701.
 - b. Each Finish Coat: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
5. Concrete: Semi-Gloss, Water Base, Acrylic Latex; MDF 1.5 mil.
 - a. Primer: Bloxfil 4000 Interior/Exterior Heavy-Duty Acrylic Block Filler 4000-1000; 7.0-14.5 MDF.
 - b. Each Finish Coat: Mirrolac W/B Semi-Gloss Latex Enamel DP83XX; MDF 1.5 mil.
6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex; MDF 1.5 mil.
 - a. Primer: Mirrolac W/B DTM Primer DP85XX; MDF 1.5 mil.
 - b. Each Finish Coat: Mirrolac W/B Semi-Gloss DP83XX; MDF 1.5 mil.
7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex; MDF 1.5 mil.
 - a. Primer/Sealer: Wonder-Prime DR51701.
 - b. Each Finish Coat: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.

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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. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: Bloxfil 4000 Interior/Exterior Heavy Duty Acrylic Block Filler 4000-1000; MDF 11 mil.
 - b. Each Finish Coat: ProMaster Interior Latex Eggshell MP-6800; MDF 1.5 mil.
3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Devflex 4214HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
4. Wood: Satin, Water Base, Acrylic Latex; MDF 1.5 mil.
 - a. Primer: Prime Interior 100% Acrylic Multi-Purpose Latex Stain Killer, PC 1000; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Bloxfil 4000 Interior/Exterior Heavy Duty Acrylic Block Filler 4000-1000; MDF 11 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.
6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Devflex 4020 PF Direct to Metal Primer & Flat Finish; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel.
7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: Prime Interior 100% Acrylic Multi-Purpose Latex Stain Killer, PC 1000; MDF 1.5 mil.
 - b. Each Finish Coat: Devflex 4216 HP High Performance Waterborne Acrylic Semi-Gloss Enamel; MDF 1.5 mil.

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. Masonry: Eggshell, Water Base, Acrylic Latex.
 - a. Primer: 6-7 Speedhide Block Filler; MDF 10.2 mils.
 - b. Each Finish Coat: 6-411 Speedhide Eggshell Latex; MDF 1.5 mils.
3. Metal: Satin, Water Base, Acrylic Latex.
 - a. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
4. Wood: Satin, Water Base, Acrylic Latex.
 - a. Primer: 6-855 Interior Water Base Undercoater; MDF 1.5 mils.
 - b. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: 6-7 Speedhide Block Filler; MDF 10.2 mils.
 - b. Each Finish Coat: 6-500 Speedhide Semi-Gloss Latex; MDF 1.2 mils.
6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Each Finish Coat: 90-474 DTM Acrylic Satin; MDF 1.5 mils.
7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: 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, Egg-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.

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2. Masonry: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: PrepRite Interior/Exterior Block Filler, B25W25; MDF 10.0 mils.
 - b. Two Finish Coats: ProMar 200 Zero VOC Interior Latex Egg Shell: MDF 1.5 mils.
3. Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Each Finish Coat: Pro Industrial DTM Acrylic S-G, B66-1151 Series; MDF 3.0 mils.
4. Wood: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Wall & Wood Primer, B28W08111, MDF 1.6 mils.
 - b. Each Finish Coat: Pro Industrial Waterborne Alkyd Urethane S-G, B53-1150 Series MDF 1.4 mils.
5. Concrete: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Loxon Concrete & Masonry Primer; MDF 10.0 mils.
 - b. Each Finish Coat: Pro Industrial Waterborne Alkyd Urethane S-G B53-1150 Series, MDF 1.4 mils.
6. Ferrous Metal: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer: Pro-Cryl Universal Water Based Primer, B66-1310, MDF 3.0 mils.
 - b. Each Finish Coat: Pro Industrial DTM Acrylic S-G, B66-01151 Series; MDF 3.0 mils.
7. Wood Cabinets and Wood Shelves: Semi-Gloss, Water Base, Acrylic Latex.
 - a. Primer/Sealer: Wall & Wood Primer, B2808111, MDF 1.6 mils.
 - b. Each Finish Coat: Pro Industrial Waterborne Alkyd Urethane S-G B53-1150 Series, MDF 1.4 mils.

2.5 EPOXY CONCRETE FLOORS

- A. Product: Epoxy Flooring System, as manufactured by Sherwin-Williams.
 1. Flooring system consists of GP 3579 Standard Primer / Binder as the primer MDF 1.0 Mil, and GP 3746 Self-Leveling Epoxy MDF 10.0 Mils.
 - a. Option seal coat:
 - 1) Seal Coat: GP 4638 Polyurethane Gloss MDF 3.0 Mils
- B. Product: Epoxy Flooring System, as manufactured by Laticrete
 1. Flooring system consists of Spartacote WB Primer MDF 8, Spartacote Surface Build SL 150 MDG 10. Mils
 - a. Option seal coat:
 - 1) Seal Coat: Spartacote Flex Pure Clinical Plus
- C. Product: Epoxy Flooring System, as manufacture by Dur-A-Flex
 1. Flooring system consists of Dur-a-glaze no 4 WB primer MDF 8.0 Mils, and Dur-a-gard MDG 10.0 Mils
 - a. Option seal coat:
 - 1) Seal Coat: Armor Top

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.

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- 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.

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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 USPS Project Manager 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.

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- D. At Workroom locations, paint red background on wall and columns 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. Match adjacent surface colors.

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 above 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.
 - 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. Metal railings.
 - f. Exposed wood trim.

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- B. Do not paint the following items:
1. Pre-finished items:
 - a. Aluminum, brass, bronze, stainless steel, and chrome plated steel.
 - b. Pre-finished items, such as toilet compartments, acoustical ceiling materials, mechanical, and electrical equipment.
 - c. UL, FM, and other code-required labels.
 - d. Equipment identification, performance rating, and name plates.
 - e. Finish hardware.
 - f. Factory finished metal wall panels, metal wall panel trim, and metal gravel stops.
 2. Exposed items:
 - a. Exposed mechanical ductwork, hangers, and supports.
 - b. Exposed piping and conduit, hangers and supports.
 - c. Exposed fire protection piping, hangers and supports.
 - d. Exposed roof structure.
 - e. Exposed roof deck.

3.10 PAINTING AND FINISHING SCHEDULE

- A. Interior Paint Systems:
1. Interior Gypsum Wallboard:
 - a. 1 coat Latex Wall Primer.
 - b. 1 coat Latex Eggshell Enamel.
 2. Interior 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 – Clear Varnish to match existing:
 - a. 3 coats of Polyurethane.
 5. Ferrous Metals:
 - a. Touch up Prime Coat.
 - b. 2 tinted coats of Alkyd Enamel Semi-Gloss.
- B. Exterior Paint Systems:
1. Galvanized Metal:
 - a. Touch up Prime Coat.
 - b. 2 tinted coats Exterior Alkyd Enamel Semi-Gloss Enamel.
 2. Ferrous Metals:
 - a. Touch up Prime Coat.
 - b. 2 tinted coats Exterior Alkyd Enamel Semi-Gloss Enamel.

END OF SECTION

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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.

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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. Vinyl Emergency Sign:
1. Vinyl signage shall be visible on interior side with door in any position.
 2. Product: As follows:
 - a. 2 mil cast vinyl with semi-gloss white finish
 - b. Gray opaque repositionable adhesive
 - c. Polyethylene coated paper liner
 3. Color:
 - a. Foreground (Characters and/or Graphics): Red
 - b. Background: White.
- B. Aluminum Emergency Sign:
1. Aluminum signage shall be visible on exterior side with door in any position.
 2. Product: As follows:
 - a. Sign face background shall be 0.063 inch aluminum plate, cut to size and fastened with stainless steel screws
 3. Color:
 - a. Foreground (Characters and/or Graphics): Red
 - b. Background: White
- C. 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.

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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.

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- B. Inspect signage locations, attachments, and messages to verify installation conforms to Drawings.

END OF SECTION

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SECTION 104400
FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes.
 - 1. Fire extinguishers.
 - 2. Fire extinguisher cabinets.
 - 3. Mounting brackets.

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

1.2 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 10 - Portable Fire Extinguishers.

- B. Underwriters Laboratories, Inc. (UL):
 - 1. UL 299 - Dry Chemical Fire Extinguishers.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Extinguisher type, operational features, color.
 - b. Cabinet type, materials, construction, features, color, finish, and attachment method.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

2.2 MATERIALS

- A. Extinguisher: Multipurpose dry chemical type, UL 299; UL-rated 4-A:60:B:C. 10 pound nominal capacity in enameled steel container.
- B. Mounting Bracket: Metal designed to prevent accidentally dislodging extinguisher, of size required for type and capacity of extinguisher specified, screw attached to wall. Brite chrome finish.
- C. Cabinet:
 - 1. Models:
 - a. J.L. Industries: JL Cosmopolitan Stainless Steel No. 2035G10-FX2.
 - b. Larsen's: Architectural Fully Recessed No. 2712R.
 - c. Potter-Roemer: Recessed Alta No. 7050-7069.
 - 2. Description:
 - a. Metal: Formed sheet steel.
 - b. Mounting: Recessed.
 - c. Trim: Trimless.
 - d. Door: Clear acrylic.
 - e. Finish: Stainless Steel.
 - f. Lettering: Vertical red 1-inch letters; "Fire Extinguisher."
 - g. Capacity: 10 Pound Extinguisher

PART 3 - EXECUTION

3.1 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.

END OF SECTION

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SECTION 111415

TURNSTILES

PART 1 – GENERAL

1.1 SUMMARY

- A. Full Height Security Turnstiles and matching ABA (Architectural Barriers Act) swing gate.

1.2 RELATED DOCUMENTS

- A. Section 281303 – Enterprise Physical Access Control System.

1.3 SUBMITTALS

- A. Product Data: Required.
- B. Shop Drawings: Required.
- C. Samples: Required.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with USPS Handbook RE-5.
- B. ANSI NFPA 101 Life Safety and IBC Codes.
- C. ABA (Architectural Barriers Act).
- D. Turnstiles and swing gate shall be from the same manufacturer.

1.5 TESTING

- A. All control sequences shall be field tested with successful operation prior to acceptance.

PART 2 – PRODUCTS

2.1 TURNSTILE MANUFACTURERS

- A. Turnstile and ABA swing gate models as manufactured by:
 - 1. Boon Edam Inc., McKinney Parkway, Lillington, NC (910)814-3800, Turnlock100-USPS-ES2-28.
 - 2. Alvarado Manufacturing CO, Chino, CA (800)423-4143, Model no. MST-6X.
 - 3. Hayward Turnstiles, Inc., Milford, CT (203)864-3780, Model no. HT 431ZA.

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2.2 CONTROLS FOR TURNSTILES AND ABA SWING GATES

- A. See Section 281304 – Enterprise Physical Access Control System.
 - 1. Provide all necessary controls components to fully interface with the Access Control System for control of turnstiles and ABA swing gate as described in the Section.
- B. Provide all additional necessary controls components that the Enterprise Physical Access Control System does not address, but that is required by the NFPA Life Safety Code and the IBC Means of Egress requirements for turnstiles and ABA swing gates.
- C. Turnstile and ABA swing gate shall be “fail safe” in the egress direction only (inbound direction must remain secure), that is, automatically switch to free-egress or free spin mode under the following conditions:
 - 1. Loss of power to turnstile or gate.
 - 2. Loss of power to control system.
 - 3. Upon activation of manual release device.
 - 4. Upon activation of fire alarm system.
 - 5. Upon activation of fire or smoke detection system.
 - 6. Upon activation of building automatic sprinkler system.
 - 7. Upon activation of emergency evacuation device push button.

2.3 TURNSTILE REQUIREMENTS

- A. Material and Finishes:
 - 1. Exterior Covered Locations: Galvanized in conformance with ASTM A123.
 - 2. Exterior Exposed Locations: #304 stainless steel frame, 316 Stainless steel arms.
 - 3. Interior Locations: Black powder coat paint
- B. Passage Dimensions: 27” wide minimum by 84” high.
- C. Type: Single or Tandem if allowed.
- D. Arm and Barrier Tubing Sizes: 1-1/2” diameter 14 gauge.
- E. Overall Dimensions: Single 57” deep x 62” wide x 91” high
- F. Required features for each turnstile:
 - 1. Indicator Lights, Red and Green per set, per controlled direction.
 - 2. Card access mounting plate, per reader.
 - 3. Card reader pedestal, per reader.
 - 4. Key override.
 - 5. Heel protectors.

2.4 ABA SWING GATE

- A. Material and Finishes: #304 stainless steel.
- B. Size of Pedestrian Clearance: 36” (914mm) minimum.
- C. Frame and Jamb: 2”x2” (51mmx51mm) 11-gauge box tubing.
- D. Interior Tubing Sizes: 1-1/2” diameter 14 gauge (38mm).

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- E. Exterior Height: 91" (2311mm) interior height 88 1/2" (2248mm).
- F. Keylock Control Direction: Control Direction of travel manually by key to lock or unlock, or to override electronic controls.
- G. Provide outdoor rated electronic strike lock, automatic door closer, and panic device.
- H. Provide heavy gauge tight weave stainless steel mesh infill for full height of swing gate.
- I. Card access mounting plate, per reader.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install all products in accordance with manufacturer's guidelines and printed instructions.

END OF SECTION

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SECTION 230500

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic mechanical methods.
 - 2. Supports and anchors.
 - 3. Motors.
 - 4. Mechanical identification.
 - 5. 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. Institute of Electrical and Electronic Engineers
 - 1. IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.

- D. 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.

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- 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.

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G. Drawings And Specifications:

1. The Drawings indicate the general arrangement of systems and are to be followed insofar as possible. If deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Contracting Officer, for approval before proceeding with the work.
2. This Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. Contractor shall coordinate this work with all other branches in such a manner as to cause a minimum of conflict or delay.
3. Where any work is so placed as to cause or contribute to a conflict it shall be readjusted at the expense of the Contractor causing the conflict. The decision shall be final in regard to the arrangement of ducts, piping, etc., where conflict arises.
4. Where offsets in systems are required to complete the installation, or for the proper operation of the system, these shall be deemed to be included in the Contract.
5. Significant deviations from the Drawings must be approved by the Contracting Officer's Representative (COR).

H. Locations:

1. Mechanical layouts indicated on drawings are diagrammatic. Exact locations of ducts, pipes, and equipment may vary because of conflicts with work of other trades. Work out conflicts where relocations will not affect operation or appearance of systems.
2. Locate equipment requiring periodic servicing so that it is readily accessible. Do not back up service sides to walls, nor place it too close to other equipment to make service impractical.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

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

1. Grinnell, Exeter, NH (603) 778-9200.
2. Other acceptable manufacturers offering equivalent products.
 - a. Elcen
 - b. Fee and Mason
 - c. Kin-Line
 - d. Michigan
 - e. Unistrut
3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

B. 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.

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- 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

- 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.
- H. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
1. GE
 2. Other acceptable manufacturers offering equivalent products.
 - a. Lincoln
 - b. Reliance
 - c. Louis Alis
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- I. Motor Sentinel Switches:
1. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - a. Square D Class 2510
 - b. Siemens SCN or SCF Series.
 - c. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- J. Combination Starter/Disconnect:
1. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - a. Square D Class 8538 or 8539
 - b. Siemens SCN or SCF Series.
 - c. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- K. Motor/Circuit Disconnects:
1. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - a. Square D Class Type HU.
 - b. Siement/I-T-E Enclosed Switch.
 - c. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

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2.3 MECHANICAL IDENTIFICATION

- A. Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.
- B. Tags:
 - 1. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches (38 mm) square.
 - 2. Metal Tags: Brass, Aluminum, or Stainless Steel with stamped letters; tag size minimum 1-1/2 inches (38 mm) diameter or square with smooth edges.
 - 3. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches (83 x 143 mm) with grommet and self-locking nylon ties.
 - 4. Tag Chart: Typewritten letter size list in anodized aluminum frame and plastic laminated.
- C. Pipe Markers:
 - 1. Color and Lettering: Conform to ASME A13.1.
 - 2. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
 - 3. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
 - 4. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches (150 mm) wide by 4 mil (0.10 mm) thick, manufactured for direct burial service.

2.4 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 (25 mm) 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 (13 mm) thick, maximum loading 40 psi (275 kPa). Use neoprene in oily or exterior locations.
- J. Type 10: 1/2 inch (13 mm) thick rubber waffle pads bonded each side of 1/4 inch (6 mm) thick steel plate.

2.5 SLEEVES AND SEALS

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage (1.2 mm thick) galvanized steel.

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- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage (1.2 mm thick) galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed, refer to Section 078400.
- D. Sleeves for Round Ductwork: Galvanized steel.
- E. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- F. Firestopping Insulation: Glass fiber type, non-combustible; refer to Section 078400.
- G. Sealant: Refer to Section 079200.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION - MECHANICAL IDENTIFICATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.3 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

3.4 INSTALLATION - PIPE HANGER AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.
- C. Place hangers within 12 inches (300 mm) of each horizontal elbow.

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- D. Use hangers with 1-1/2 inch (38 mm) minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet (1.5 m) maximum spacing between hangers.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.
- H. Provide [copper plated hangers and supports for copper piping] [sheet lead packing between hanger or support and piping].
- I. Design hangers for pipe movement without disengagement of supported pipe.
- J. Prime coat exposed steel hangers and supports. Hangers and supports located in 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 (150 to 200 mm) below finished grade, directly above buried pipe.
- E. Identify air handling units 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. Tag automatic controls, instruments, and relays. Key to control schematic.

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- I. Identify piping, concealed or exposed, with plastic pipe markers and plastic tape pipe markers. Use tags on piping 3/4 inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- J. 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.
- K. 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. Provide spring isolators on piping connected to isolated equipment as follows: Up to 4 inch (100 mm) diameter, first three 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 (mm)	MAX. HANGER SPACING Feet (m)	HANGER ROD DIAMETER Inches (mm)
1/2 to 1-1/4 (12 to 32)	6.5 (2)	3/8 (9)
1-1/2 to 2 (38 to 50)	10 (3)	3/8 (9)
PVC (All Sizes)	6 (1.8)	3/8 (9)

END OF SECTION

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SECTION 230523

GENERAL DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Ball valves.
 - 2. Gate valves.
 - 3. Globe Valves.

1.2 SUBMITTALS

- A. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.
- B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. ASME Compliance: ASME B31.9 for building services piping valves except domestic hot- and cold-water piping.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Valves: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 1. American Valve, Inc.
 - 2. Bray International, Inc.
 - 3. Crane Co.; Crane Valve Group;
 - 4. Grinnell Corporation.
 - 5. Hammond Valve.
 - 6. Metraflex Co.
 - 7. Milwaukee Valve Company.
 - 8. NIBCO INC.
 - 9. Red-White Valve Corp.
 - 10. Tyco International, Ltd.; Tyco Valves & Controls.
 - 11. Watts Industries, Inc.; Water Products Div.
- B. Refer to valve application paragraphs for applications of valves.

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- C. Bronze Valves: NPS 2 (DN 50) and smaller with threaded ends, unless otherwise indicated.
- D. Ferrous Valves: NPS 2-1/2 (DN 65) and larger with flanged ends, unless otherwise indicated.
- E. Valve Actuators: Handwheel for valves other than quarter-turn types and lever handle for quarter-turn valves.
- F. Copper-Alloy Ball Valves, General: MSS SP-110.
 - 1. Two-Piece, Copper-Alloy Ball Valves: Brass or bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and [600-psig (4140-kPa)] minimum CWP rating and blowout-proof stem. Valve stem shall be stainless steel construction.
- G. Bronze Check Valves, General: MSS SP-80.
 - 1. Class 125, Bronze, Swing Check Valves: Bronze body with aluminum bronze disc and seat.
- H. Spring-Loaded, Lift-Disc Check Valves, General: FCI 74-1, with spring-loaded bronze or alloy disc and bronze or alloy seat.
 - 1. Class 125, Compact-Wafer, Lift-Disc Check Valves: Compact-wafer style with cast-iron shell with diameter made to fit within bolt circle.
- I. Bronze Gate Valves, General: MSS SP-80, with ferrous-alloy handwheel.
 - 1. Class 125, Bronze Gate Valves: Bronze body with non-rising stem and bronze solid wedge.
- J. Cast-Iron Gate Valves, General: MSS SP-70, Type I.
 - 1. Class 125, NRS, Bronze-Mounted, Cast-Iron Gate Valves: Cast-iron body with bronze trim, nonrising stem, and solid-wedge disc.
 - 2. Class 125, OS&Y, Bronze-Mounted, Cast-Iron Gate Valves: Cast-iron body with bronze trim, rising stem, and solid-wedge disc.
 - 3. Class 250, NRS, Bronze-Mounted, Cast-Iron Gate Valves: Cast-iron body with bronze trim, nonrising stem, and solid-wedge disc.
 - 4. Class 250, OS&Y, Bronze-Mounted, Cast-Iron Gate Valves: Cast-iron body with bronze trim, rising stem, and solid-wedge disc.
- K. Bronze Globe Valves, General: MSS SP-80, with ferrous-alloy handwheel.
 - 1. Class 125, Bronze Globe Valves: Bronze body with bronze disc.
- L. Cast-Iron Globe Valves, General: MSS SP-85.
 - 1. Class 125, Cast-Iron Globe Valves: Gray-iron body with bronze seats.

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

- A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball or gate valves.
 - 2. Throttling Service: Ball or globe valves.
 - 3. Pump Discharge: Spring-loaded, lift-disc check valves.
 - 4. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

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3.2 CHILLED-WATER PIPING

- A. Use the following types of valves:
1. Ball Valves, NPS 2 (DN 50) and Smaller: Two-piece, 400-psig (2760-kPa) CWP rating, copper alloy.
 2. Swing Check Valves, NPS 2 (DN 50) and Smaller: Class 125, bronze.
 3. Spring-Loaded, Lift-Disc Check Valves, NPS 2 (DN 50) and Smaller: Type IV, Class 125 minimum.
 4. Gate Valves, NPS 2 (DN 50) and Smaller: Class 125, bronze.
 5. Globe Valves, NPS 2 (DN 50) and Smaller: Class 125, bronze.

3.3 SELECT VALVES

- A. Valves with the following end connections:
1. For Copper Tubing: Solder-joint or threaded ends
 2. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.

3.4 VALVE INSTALLATION

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access and provide separate support where necessary.
- D. Install valves in horizontal piping with stem at or above center of pipe.
- E. Install valves in position to allow full stem movement.
- F. Install check valves for proper direction of flow and swing check valves in horizontal position with hinge pin level.
- G. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
1. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION

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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.

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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. Hydronic Components: Adjust to within plus 5 percent of design.
- D. 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

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SECTION 230713

DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Piping insulation.
- B. Ductwork insulation.
- C. Duct liner.
- D. Insulation jacket.
- E. Equipment insulation.

1.2 SUBMITTALS

- A. Product Data: Required.
- B. Shop Drawings: Required.

1.3 QUALITY ASSURANCE

- A. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
- B. Mechanical insulation shall be as per ASHRAE-90.1.

PART 2 - PRODUCTS

2.1 MANUFACTURERS/PRODUCTS

- A. Pipe Insulation:
 - 1. Glass Fiber: Rigid molded, noncombustible with vapor barrier jacket, as manufactured by Certainteed, Manville, Owens-Corning, Knauf.
 - 2. Cellular Foam: Flexible, cellular elastomeric, molded, as manufactured by Armstrong, Halstead, Rubatex.
 - 3. Cellular Glass: Rigid molded cellular glass as manufactured by Pittsburgh Corning.
 - 4. Jackets: PVC Plastic: One-piece molded type fitting covers, off white color.
- B. Ductwork Insulation:
 - 1. Flexible Glass Fiber: Flexible, noncombustible blanket with vapor barrier jacket.
 - 2. Rigid Glass Fiber board with vapor barrier jacket.
 - 3. Duct Liner: Flexible, noncombustible blanket, with facing on air side, 1" thick. Unfaced insulation material shall not be used.

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4. Ductwork insulation shall be as manufactured by Certainteed, Owens-Corning, Manville, Knauf.

C. Equipment Insulation:

1. Foam glass insulation for cold equipment.
2. Insulation shall be as manufactured by Certainteed, Owens-Corning, Manville, Knauf.
3. Insulation shall be removable to provide maintenance access to equipment.

PART 3 - INSTALLATION

3.1 PIPING INSULATION

A. Provide cold pipes with vapor barrier jackets. Insulate complete system.

3.2 DUCTWORK INSULATION

- A. For ductwork conveying air below ambient temperature provide vapor barrier jacket.
- B. For ductwork exposed and below 10 feet above finished floor, provide aluminum jacket.
- C. Provide insulation for concealed ductwork in non-return air ceiling spaces.

3.3 DUCT LINER

- A. Install per SMACNA standards and NAIMA Duct liner Installation Standard.
- B. All transverse edges to be coated with adhesives to protect against airstream erosion.
- C. Duct dimensions indicated are net inside dimensions: increase duct size to allow for insulation thickness.

3.4 SCHEDULES

A. Piping Insulation:

1. Cellular Glass	PIPE SIZE	THICKNESS
Chilled Water Piping	All	2"

B. Ductwork Insulation:

1. Flexible Glass Fiber Duct Wrap Insulation	THICKNESS	FINISH
	<u>Inch</u>	<u> </u>
Supply Ducts- Concealed	1- 1/2"	Aluminized Film
Return Ducts- Concealed	1- 1/2"	Aluminized Film
Outdoor Air Intake Ducts- Concealed	1- 1/2"	Aluminized Film
2. Rigid Glass Fiber Board Insulation		
Supply Ducts-exposed non-conditioned space	1 1/2"	
Return Ducts- exposed non-conditioned space	1	Fabric

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- C. Equipment Insulation:
1. Similar to piping insulation.
 2. Follow manufacturer's installation instructions.

END OF SECTION

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SECTION 230719

HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Piping insulation.
 2. Insulation jackets.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
 2. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 3. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
 4. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 5. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 6. ASTM C547 - Mineral Fiber Pipe Insulation.
 7. ASTM C553 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 8. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
 9. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 10. ASTM E84 - Surface Burning Characteristics of Building Materials.
 11. ASTM E96 - Water Vapor Transmission of Materials.
- B. National Fire Protection Association (NFPA):
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
1. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- D. Underwriters Laboratories, Inc. (UL):
1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
1. Product Data:
 - a. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

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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 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.

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- 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.

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

3.2 INSTALLATION - PIPING INSULATION

- A. Install materials in accordance with manufacturer's instructions and ASHRAE 90.1.
- B. On exposed piping, locate insulation and cover seams in least visible locations.
- C. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory applied or field applied.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
 - 3. PVC fitting covers may be used.
 - 4. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
 - 5. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. For insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.
 - 3. Finish with glass cloth and adhesive.
 - 4. PVC fitting covers may be used.
 - 5. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
 - 6. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- E. Finish insulation at supports, protrusions, and interruptions.
- F. For pipe exposed in mechanical equipment rooms or in finished spaces finish with manufacturer's standard all-service jacket for fiberglass pipe. No jacket required for elastomeric foam insulation.

3.3 CONSTRUCTION

- A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

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3.4 PIPING INSULATION SCHEDULE

A. Cellular Foam Insulation Schedule:

PIPING SYSTEMS	PIPE SIZE Inch	THICKNESS Inch
Plumbing Systems: Moisture Condensate Drains - Above Grade	All	3/4"

END OF SECTION

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SECTION 232113

HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Water piping to connect HVAC equipment, including the following:
1. Chilled water, condenser water, and drain piping.

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
- B1.20.1-2013..... Pipe Threads, General Purpose (Inch)
 - B16.3-2011..... Malleable Iron Threaded Fittings: Classes 150 and 300
 - B16.4-2011..... Gray Iron Threaded Fittings: (Classes 125 and 250)
 - B16.5-2013..... Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard
 - B16.9-2012..... Factory Made Wrought Butt welding Fittings
 - B16.11-2011..... Forged Fittings, Socket-Welding and Threaded
 - B16.18-2012..... Cast Copper Alloy Solder Joint Pressure Fittings
 - B16.22-2013..... Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
 - B16.24-2011..... Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 600, 900, 1500, and 2500
 - B16.39-2014..... Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300
 - B16.42-06..... Ductile Iron Pipe Flanges and Flanged Fittings
 - B31.9-2014..... Building Services Piping
 - B40.100-2013..... Pressure Gauges and Gauge Attachments
- B. American Society for Testing and Materials (ASTM):
- A47/A47M-1999 (R2014)..... Standard Specification for Ferritic Malleable Iron Castings
 - A53/A53M-2012..... Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - A106/A106M-2015..... Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
 - A126-2004 (R2014)..... Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - A183-2014..... Standard Specification for Carbon Steel Track Bolts and Nuts
 - A216/A216M-2014e1..... Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service
 - A307-2014..... Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
 - A536-1984 (R2014)..... Standard Specification for Ductile Iron Castings
 - B62-2015..... Standard Specification for Composition Bronze or Ounce Metal Castings
 - B88-2014..... Standard Specification for Seamless Copper Water Tube
 - F439-2013..... Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
 - F441/F441M-2015..... Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

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- C. All couplings, fittings, valves, and specialties shall be the products of a single manufacturer.
 - 1. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

PART 2 - PRODUCTS

2.1 PIPE AND EQUIPMENT SUPPORTS, PIPE SLEEVES, AND WALL AND CEILING PLATES

- A. Provide in accordance with Section 230500, COMMON WORK RESULTS FOR HVAC.

2.2 PIPE AND TUBING

- A. Chilled Water:
 - 1. Steel: ASTM A53/A53M Grade B, seamless or ERW, Schedule 40.
 - 2. Copper Water Tube Option: ASTM B88, Type K or L, hard drawn.
- B. Cooling Coil Condensate Drain Piping:
 - 1. From Air Handling Units: Copper water tube, ASTM B88, Type M, or Schedule 40 PVC plastic piping.
 - 2. From Fan Coil or Other Terminal Units: Copper water tube, ASTM B88, Type M for runouts and Type L for mains.

2.3 FITTINGS FOR STEEL PIPE

- A. 2 inches and Smaller: Screwed or welded joints.
 - 1. Butt Welding: ASME B16.9 with same wall thickness as connecting piping.
 - 2. Forged Steel, Socket Welding or Threaded: ASME B16.11.
 - 3. Screwed: 150-pound malleable iron, ASME B16.3. 125-pound cast iron, ASME B16.4, may be used in lieu of malleable iron. Bushing reduction of a single pipe size, or use of close nipples, is not acceptable.
 - 4. Unions: ASME B16.39.
 - 5. Water Hose Connection Adapter: Brass, pipe thread to 3/4 inch garden hose thread, with hose cap nut.
- B. 2-1/2 inches and Larger: Welded or flanged joints.
 - 1. Butt Welding Fittings: ASME B16.9 with same wall thickness as connecting piping. Elbows shall be long radius type, unless otherwise noted.
 - 2. Welding Flanges and Bolting: ASME B16.5:
 - a. Water Service: Weld neck or slip-on, plain face, with 1/8 inch thick full-face neoprene gasket suitable for 220 degrees F.
 - 1) Contractor's Option: Convoluted, cold formed 150-pound steel flanges, with Teflon gaskets, may be used for water service.
 - b. Flange Bolting: Carbon steel machine bolts or studs and nuts, ASTM A307, Grade B.
- C. Welded Branch and Tap Connections: Forged steel weldolets, or branchlets and threadolets may be used for branch connections up to one pipe size smaller than the main. Forged steel half-couplings, ASME B16.11 may be used for drain, vent and gauge connections.

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2.4 FITTINGS FOR COPPER TUBING

- A. Joints:
1. Solder Joints: Joints shall be made up in accordance with recommended practices of the materials applied. Apply 95/5 tin and antimony on all copper piping.
 2. Mechanically Formed Tee Connection in Water and Drain Piping: Form mechanically extracted collars in a continuous operation by drilling pilot hole and drawing out tube surface to form collar, having a height of not less than three times the thickness of tube wall. Adjustable collaring device shall ensure proper tolerance and complete uniformity of the joint. Notch and dimple joining branch tube in a single process to provide free flow where the branch tube penetrates the fitting.
 3. Piping Under 4" Diameter: Press-connect: Ensure the piping reveals no surface imperfection. Select the proper size and type of pressing jaw depending on the piping application.
- B. Bronze Flanges and Flanged Fittings: ASME B16.24.
- C. Fittings: ASME B16.18 cast copper or ASME B16.22 solder wrought copper.

2.5 FITTINGS FOR PLASTIC PIPING

- A. Schedule 40, socket type for solvent welding.
- B. Schedule 40 PVC drain piping: Drainage pattern.
- C. Chemical feed piping for condenser water treatment: CPVC, Schedule 80, ASTM F439.

2.6 DIELECTRIC FITTINGS

- A. Provide where copper tubing and ferrous metal pipe are joined.
- B. 2 inches and Smaller: Threaded dielectric union, ASME B16.39.
- C. 2-1/2 inches and Larger: Flange union with dielectric gasket and bolt sleeves, ASME B16.42. Dielectric gasket material shall be compatible with hydronic medium.
- D. Temperature Rating: 210 degrees F.

2.7 SCREWED JOINTS

- A. Pipe Thread: ASME B1.20.1.
- B. Lubricant or Sealant: Oil and graphite or other compound approved for the intended service.

2.8 VALVES

- A. Asbestos packing is not acceptable.
- B. All valves of the same type shall be products of a single manufacturer.

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- C. Provide chain operators for valves 6 inches and larger when the centerline is located 8 feet or more above the floor or operating platform.
- D. Shut-Off Valves:
1. Ball Valves (Pipe sizes 2 inch and smaller): MSS SP-110, screwed or solder connections, brass or bronze body with chrome-plated ball with full port and Teflon seat. Provide stem extension to allow operation without interfering with pipe insulation.
 2. Butterfly Valves (Pipe Sizes 2-1/2 inch and larger): Provide stem extension to allow 2 inches of pipe insulation without interfering with valve operation. MSS SP-67, flange lug type rated 175 psig working pressure at 200 degrees F. Valves shall be ANSI Leakage Class VI and rated for bubble tight shut-off to full valve pressure rating. Valve shall be rated for dead end service and bi-directional flow capability to full rated pressure. Butterfly valves are prohibited for direct buried pipe applications.
 - a. Body: Cast iron, ASTM A126, Class B. Malleable iron, ASTM A47/A47M electro-plated, or ductile iron, ASTM A536, Grade 65-45-12 electro-plated.
 - b. Trim: Bronze, aluminum bronze, or 300 series stainless steel disc, bronze bearings, 316 stainless steel shaft and manufacturer's recommended resilient seat. Resilient seat shall be field replaceable, and fully line the body to completely isolate the body from the product. A phosphate coated steel shaft or stem is acceptable, if the stem is completely isolated from the product.
 - c. Actuators: Field interchangeable. Valves for balancing service shall have adjustable memory stop to limit open position.
 - 1) Valves 6 inches and smaller: Lever actuator with minimum of seven locking positions, except where chain wheel is required.
 - 2) Gate Valves:
 - a) 2 inches and smaller: MSS SP-80, Bronze, 150 psig, wedge disc, rising stem, union bonnet.
 - b) 2-1/2 inches and larger: Flanged, outside screw and yoke. MSS SP-70, iron body, bronze mounted, 125 psig wedge disc.
- E. Globe and Angle Valves:
1. Globe Valves:
 - a. 2 inches and smaller: MSS SP-80, bronze, 150 psig. Globe valves shall be union bonnet with metal plug type disc.
 - b. 2-1/2 inches and larger: 125 psig, flanged, iron body, bronze trim, MSS SP-85 for globe valves.
 2. Angle Valves:
 - a. 2 inches and smaller: MSS SP-80, bronze, 150 psig. Angle valves shall be union bonnet with metal plug type disc.
 - b. 2-1/2 inches and larger: 125 psig, flanged, iron body, bronze trim, MSS SP-85 for angle.
- F. Check Valves:
1. Swing Check Valves:
 - a. 2 inches and smaller: MSS SP-80, bronze, 150 psig, 45-degree swing disc.
 - b. 2-1/2 inches and larger: 125 psig, flanged, iron body, bronze trim, MSS SP-71 for check valves.
 2. Non-Slam or Silent Check Valve: Spring loaded double disc swing check or internally guided flat disc lift type check for bubble tight shut-off. Provide where check valves are shown in chilled water and hot water piping. Check valves incorporating a balancing feature may be used.
 - a. Body: MSS SP-125 cast iron, ASTM A126, Class B, or steel, ASTM A216/A216M, Class WCB, or ductile iron, ASTM 536, flanged or wafer type.
 - b. Seat, Disc and Spring: 18-8 stainless steel, or bronze, ASTM B62. Seats may be elastomer material.

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- G. Water Flow Balancing Valves: For flow regulation and shut-off. Valves shall be line size rather than reduced to control valve size.
 - 1. A dual-purpose flow balancing valve and adjustable flow meter, with bronze or cast-iron body, calibrated position pointer, valved pressure taps or quick disconnects with integral check valves and preformed polyurethane insulating enclosure.
 - 2. Provide a readout kit including flow meter, readout probes, hoses, flow charts or calculator, and carrying case.

- H. Automatic Balancing Control Valves: Factory calibrated to maintain constant flow (plus or minus five percent) over system pressure fluctuations of 4 to 57 psig. Provide standard pressure taps and four sets of capacity charts. Valves shall be line size and be one of the following designs:
 - 1. Gray iron ASTM A126 or brass body rated 175 psig at 200 degrees F, with stainless steel piston and spring.
 - 2. Brass or ferrous body designed for 300 psig service at 250 degrees F, with corrosion resistant, tamper proof, self-cleaning piston/spring assembly that is easily removable for inspection or replacement.
 - 3. Combination assemblies containing ball type shut-off valves, unions, flow regulators, strainers with blowdown valves and pressure temperature ports shall be acceptable.
 - 4. Provide a readout kit including flow meter, probes, hoses, flow charts and carrying case.

- I. Manual Radiator/Convactor Valves: Brass, packless, with position indicator.

2.9 WATER FLOW MEASURING DEVICES

- A. Minimum overall accuracy plus or minus three percent over a range of 70 to 110 percent of design flow. Select devices for not less than 110 percent of design flow rate.

- B. Venturi Type: Bronze, steel, or cast iron with bronze throat, with valved pressure sensing taps upstream and at the throat.

- C. Wafer Type Circuit Sensor: Cast iron wafer-type flow meter equipped with readout valves to facilitate the connecting of a differential pressure meter. Each readout valve shall be fitted with an integral check valve designed to minimize system fluid loss during the monitoring process.

- D. Self-Averaging Annular Sensor Type: Brass or stainless-steel metering tube, shutoff valves and quick-coupling pressure connections. Metering tube shall be rotatable, so all sensing ports may be pointed down-stream when unit is not in use.

- E. Flow Measuring Device Identification:
 - 1. Metal tag attached by chain to the device.
 - 2. Include meter or equipment number, manufacturer's name, meter model, flow rate factor and design flow rate.

- F. Portable Water Flow Indicating Meters:
 - 1. Minimum 6 inch diameter dial, forged brass body, beryllium-copper bellows, designed for 175 psig working pressure at 250 degrees F.
 - 2. Bleed and equalizing valves.
 - 3. Vent and drain hose and two 10 feet lengths of hose with quick disconnect connections.
 - 4. Factory-fabricated carrying case with hose compartment and a bound set of capacity curves showing flow rate versus pressure differential.
 - 5. Provide one portable meter for each range of differential pressure required for the installed flow devices.

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- G. Permanently Mounted Water Flow Indicating Meters: Minimum 6 inch diameter, or 18 inch long scale, for 120 percent of design flow rate, direct reading, with three valve manifold and two shut-off valves.

2.10 STRAINERS

- A. Screens: Bronze, Monel metal or 18-8 stainless steel, free area not less than 2-1/2 times pipe area, with perforations as follows: 0.045 inch diameter perforations for 4 inches and larger: 1/8 inch diameter perforations.

2.11 FLEXIBLE CONNECTORS FOR WATER SERVICE

- A. Flanged Spool Connector:
 - 1. Single arch or multiple arch type. Tube and cover shall be constructed of chlorobutyl elastomer with full faced integral flanges to provide a tight seal without gaskets. Connectors shall be internally reinforced with high strength synthetic fibers impregnated with rubber or synthetic compounds as recommended by connector manufacturer, and steel reinforcing rings.
 - 2. Working pressures and temperatures shall be as follows:
 - a. Connector sizes 2 inches to 4 inches: 165 psig at 250 degrees F.

2.12 GAUGES, PRESSURE AND COMPOUND

- A. ASME B40.100, Accuracy Grade 1A, (pressure, vacuum, or compound for air, oil or water), initial mid-scale accuracy 1 percent of scale (Qualify grade), metal or phenolic case, 4-1/2 inches in diameter, 1/4 inch NPT bottom connection, white dial with black graduations and pointer, clear glass or acrylic plastic window, suitable for board mounting. Provide red "set hand" to indicate normal working pressure.
- B. Provide brass lever handle union cock. Provide brass/bronze pressure snubber for gauges in water service.
- C. Range of Gauges: Provide range equal to at least 130 percent of normal operating range.
 - 1. For condenser water suction (compound): 30 inches Hg to 100 psig.

2.13 PRESSURE/TEMPERATURE TEST PROVISIONS

- A. Pete's Plug: 1/4 inch MPT by 3 inches long, brass body and cap, with retained safety cap, nordel self-closing valve cores, permanently installed in piping where shown, or in lieu of pressure gauge test connections shown on the drawings.
- B. Provide one each of the following test items:
 - 1. 1/4 inch FPT by 1/8 inch diameter stainless steel pressure gauge adapter probe for extra-long test plug.
 - 2. 3-1/2 inch diameter, one percent accuracy, compound gauge, 30 inches Hg to 100 psig range.
 - 3. 32 to 220 degrees F pocket thermometer one-half degree accuracy, 1 inch dial, 5 inch long stainless-steel stem, plastic case.

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2.14 THERMOMETERS

- A. Mercury or organic liquid filled type, red or blue column, clear plastic window, with 6 inch brass stem, straight, fixed or adjustable angle as required for each in reading.
- B. Case: Chrome plated brass or aluminum with enamel finish.
- C. Scale: Not less than 9 inches, range as described below, two-degree graduations.
- D. Separable Socket (Well): Brass, extension neck type to clear pipe insulation.
- E. Scale Ranges:
 - 1. Chilled Water and Glycol-Water: 32 to 100 degrees F.
 - 2. Hot Water and Glycol-Water: 100 to 200 degrees F.

PART 3 - EXECUTION

3.1 GENERAL

- A. The drawings show the general arrangement of pipe and equipment but do not show all required fittings and offsets that may be necessary to connect pipes to equipment, fan-coils, coils, etc., and to coordinate with other trades. Provide all necessary fittings, offsets and pipe runs based on field measurements and at no additional cost or time to USPS. Coordinate with other trades for space available and relative location of HVAC equipment and accessories to be connected on ceiling grid. Pipe location on the drawings shall be altered by contractor where necessary to avoid interferences and clearance difficulties.
- B. Store materials to avoid excessive exposure to weather or foreign materials. Keep inside of piping relatively clean during installation and protect open ends when work is not in progress.
- C. Support piping securely.
- D. Install piping generally parallel to walls and column center lines, unless shown otherwise on the drawings. Space piping, including insulation, to provide 1-inch minimum clearance between adjacent piping or other surface. Unless shown otherwise, slope drain piping down in the direction of flow not less than 1 inch in 40 feet. Provide eccentric reducers to keep bottom of sloped piping flat.
- E. Locate and orient valves to permit proper operation and access for maintenance of packing, seat and disc. Generally, locate valve stems in overhead piping in horizontal position. Provide a union adjacent to one end of all threaded end valves. Control valves usually require reducers to connect to pipe sizes shown on the drawing.
- F. Offset equipment connections to allow valving off for maintenance and repair with minimal removal of piping. Provide flexibility in equipment connections and branch line take-offs with 3-elbow swing joints where noted on the drawings.
- G. Tee water piping runouts or branches into the side of mains or other branches. Avoid bull-head tees, which are two return lines entering opposite ends of a tee and exiting out the common side.
- H. Provide manual or automatic air vent at all piping system high points and drain valves at all low points. Install piping to floor drains from all automatic air vents.

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- I. Connect piping to equipment as shown on the drawings.
- J. Thermometer Wells: In pipes 2-1/2 inches and smaller increase the pipe size to provide free area equal to the upstream pipe area.
- K. Firestopping: Fill openings around uninsulated piping penetrating floors or fire walls, with firestop material.
- L. Where copper piping is connected to steel piping, provide dielectric connections.

3.2 PIPE JOINTS

- A. Welded: Beveling, spacing and other details shall conform to ASME B31.9 and AWS B2.1/B2.1M.
- B. Screwed: Threads shall conform to ASME B1.20.1; joint compound shall be applied to male threads only and joints made up so no more than three threads show. Coat exposed threads on steel pipe with joint compound, or red lead paint for corrosion protection.
- C. 125 Pound Cast Iron Flange (Plain Face): Mating flange shall have raised face, if any, removed to avoid overstressing the cast iron flange.
- D. Solvent Welded Joints: As recommended by the manufacturer.

3.3 LEAK TESTING ABOVEGROUND PIPING

- A. Inspect all joints and connections for leaks and workmanship and make corrections as necessary.
- B. An operating test at design pressure, and for hot systems, design maximum temperature.
- C. A hydrostatic test at 1.5 times design pressure. For water systems, the design maximum pressure would usually be the static head, or expansion tank maximum pressure, plus pump head. Factory tested equipment (convertors, exchangers, coils, etc.) need not be field tested. Isolate equipment where necessary to avoid excessive pressure on mechanical seals and safety devices.

3.4 DEMONSTRATION AND TRAINING

- A. Provide services of manufacturer's technical representative to instruct each USPS personnel responsible in operation and maintenance of the system.

END OF SECTION

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SECTION 233100

HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal ductwork.
2. Air turning devices.
3. Duct access doors.
4. Duct test holes.
5. Fire dampers.
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.

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- 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.

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1.7 PROJECT CONDITIONS OR SITE CONDITIONS

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

1.8 ENVIRONMENTAL REQUIREMENTS

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

PART 2 - PRODUCTS

2.1 DUCTS

- 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.
 - d. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
 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
 - d. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
 2. Black polymer film supported by helically wound spring steel wire; fiberglass insulation; aluminized vapor barrier film.
 3. Pressure Rating: 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.

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- 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.
 - d. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
 2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.
- 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.
 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

2.3 DUCT ACCESS DOORS

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

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- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.5 FIRE DAMPERS

- A. Manufacturers:
 - 1. Prefco Products, Inc, Buckingham, PA (800) 437-6653.
 - 2. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
 - 3. Vent Products Co., Inc.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- C. Ceiling Dampers: Galvanized steel, 22 gage frame and 16 gage flap, two layers 0.125 inch ceramic fiber on top side, and one layer on bottom side for round flaps, with locking clip.
- D. Horizontal Dampers: Galvanized steel, 22 gage frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.
- E. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.
- F. Multiple Blade Dampers: 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless-steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.
- G. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.6 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.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- 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.

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2.7 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.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- 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, and 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.

2.8 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.

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PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION - DUCTWORK

- A. Install in accordance with manufacturer's instructions.
- B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Duct Sizes are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- D. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- G. Use double nuts and lock washers on threaded rod supports.
- H. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp and tape.
- I. Connect flexible ducts to metal ducts with draw bands plus tape.
- J. Provide residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out. Use stainless steel for ductwork exposed to view and stainless steel or carbon steel for ducts where concealed.
- K. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

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- 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 duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. 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.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. 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.
- E. Demonstrate re-setting of fire dampers to Owner.
- F. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
- G. 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.
- H. Use splitter dampers only where indicated.
- I. 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

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SECTION 233300
AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Manual volume dampers.
 2. Control dampers.
 3. Fire dampers.
 4. Flange connectors.
 5. Turning vanes.
 6. Duct-mounted access doors.
 7. Flexible connectors.
 8. Flexible ducts.
 9. Duct accessory hardware.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control damper installations.
 - d. Fire-damper installations, including sleeves; and duct-mounted access doors.
 - e. Wiring Diagrams: For power, signal, and control wiring.
- C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.

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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.

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- 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. 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.
- C. 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. METALAIRE, 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.

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- 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 FIRE 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. Air Balance Inc.; a division of Mestek, Inc.
 - 2. Arrow United Industries; a division of Mestek, Inc.
 - 3. Greenheck Fan Corporation.
 - 4. McGill AirFlow LLC.
 - 5. METALAIRE, Inc.
 - 6. Nailor Industries Inc.
 - 7. Prefco; Perfect Air Control, Inc.
 - 8. Ruskin Company.
 - 9. Vent Products Company, Inc.
 - 10. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Type: Dynamic; rated and labeled according to UL 555 by an NRTL.
- C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 4000-fpm velocity.
- D. Fire Rating: 1-1/2 and 3 hours, as indicated.
- E. Frame: Curtain type with blades inside airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
- F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
 - 1. Minimum Thickness: 0.052 or 0.138 inch thick, as indicated, and of length to suit application.
 - 2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.
- G. Mounting Orientation: Vertical or horizontal as indicated.
- H. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized-steel blade connectors.
- I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
- J. Heat-Responsive Device: Replaceable, temperature rated, fusible links.

2.5 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.

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- B. Material: Galvanized steel.
- C. Gage and Shape: Match connecting ductwork.

2.6 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. METALAIRE, Inc.
 - 4. SEMCO Incorporated.
 - 5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- 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.

2.7 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.

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2.8 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.

2.9 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.

2.10 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.

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- 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: Nylon strap] in sizes 3 through 18 inches, to suit duct size.
 - 2. Non-Clamp Connectors: Adhesive plus sheet metal screws.

2.11 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.

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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 233713

DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Rectangular and square ceiling diffusers.
 2. Louver face diffusers.
 3. Adjustable bar registers and grilles.
 4. Fixed face registers and grilles.
- B. Related Sections:
1. Division 10 Section "Louvers and Vents" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
 2. Division 15 Section "Duct Accessories" for fire and smoke dampers and 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.

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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 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 and fire dampers.

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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

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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. Hangers and supports.
 3. Electrical identification.
 4. 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 078400 - Firestopping
 2. Section 260519 - Low-Voltage Electrical Power Conductors and Cables
 3. Section 260533 - Raceway and Boxes for Electrical Systems
 4. Section 262416 - Panelboards
 5. Section 262726 - Wiring Devices
 6. Section 262816 - Enclosed Switches and Circuit Breakers
 7. Section 264100 - Facility Lightning Protection
 8. Section 264101 - Underground Counterpoise
 9. Section 264128 - Surge Protective Devices (SPD's)
 10. Section 275117 - IP Video Intercom and Exterior Gate Control System
 11. Section 281304 - Enterprise Physical Access Control System (ePACS)
 12. Section 281600 - Intrusion Detection System
 13. 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.

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1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: As required by other sections.
 - 2. Assurance/Control Submittals:
 - a. Electrical System Test Reports: Submit report including the following directly to the USPS Project Manager from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.
 - b. Summary of project.
 - c. Description of equipment tested.
 - d. Description of test.
 - e. Test results.
 - f. Conclusions and recommendations.
 - g. Appendix, including appropriate test forms.
 - h. List of test equipment used and calibration date.
 - i. Certificates: Manufacturer's certificate that each Product specified meet or exceed specified requirements.
 - j. 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 locations of components, equipment, cameras and cable routings.

1.4 QUALITY ASSURANCE

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

- B. Regulatory Requirements:
 - 1. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for the purpose specified and indicated.
 - 2. Work herein shall conform to all applicable laws, ordinances and regulations in accordance with the latest applicable requirements of:
 - a. The National Electrical Code (NFPA 70).
 - b. National Electrical Manufacturer's Associates.
 - c. Standards of National Fire Protection Association (NFPA 72, 90A and 101).
 - d. Underwriter's Laboratories.
 - e. Occupational Safety and Health Agency Standards.

1.5 BASIC ELECTRICAL METHODS

- A. Drawings are schematic and diagrammatic. Use judgment and care to install electrical Work to function properly and fit within building construction and finishes. Electrical conductors, conduit, components, not shown or specified, which are required for any device or system to produce a complete and operative system are required to be furnished and installed.

- B. Exact location of outlets is determined from dimension on Drawings, manufacturer's shop drawings, or as may be determined at Project Site. Do not scale Drawings for exact location of any item. Verify item mounting heights as required by project conditions prior to rough-in.

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- 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 Contracting Officer 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 devices, equipment, cameras and components 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.

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PART 2 - PRODUCTS

2.1 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.

2.2 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. Terminal Cabinets.
 - c. Separately enclosed circuit breakers.
 - d. Panelboards
 - e. Pull boxes.
 - f. Relays.
 - g. 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. 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 inches 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.

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- D. Arc Flash Warning Signs: Furnish signs in accordance with NEC Article 110.16, warning of potential arc flash hazard and requiring suitable Personal protective equipment. Locate and install signs per INSTALLATION Section of this specification.
- E. Receptacles: All coverplates for receptacles and devices shall be labeled with the branch circuit number. Label shall be machine generated and permanently affixed to the outside of the coverplate.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION - GROUNDING AND BONDING

- A. Install rod electrodes at locations indicated.
- B. Provide bonding and grounding in conformance with NFPA 70.
- C. Equipment Grounding Conductor: Provide separate, insulated conductor within all lighting and power raceways. Terminate each end on suitable lug, bus, or bushing.
- D. 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.

3.3 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.

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- 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.

3.4 INSTALLATION - ELECTRICAL IDENTIFICATION

- A. Install nameplate parallel to equipment lines.
- B. Secure nameplate to equipment front using stainless steel screws. Use minimum two screws at each end of nameplate.
- C. Secure nameplate to outside surface of door on panelboards and switchboards.
- D. Install Arc Flash Warning Signs on panelboards and disconnect enclosures 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 FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. 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.
- C. Provide a complete written record of operational values to be used as a baseline for future operational testing.
- D. 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:
 - b. Analog - 6 months maximum.
 - c. Digital - 12 months maximum.
 - d. 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.

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- E. 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. Power Circuits: Conductors shorted to ground by a hot line grounded device approved for the purpose.
- F. Tests and inspections include, but are not limited to the following:
1. Proper operation of equipment.
 2. Continuity of raceway system.
 3. Elimination of reverse rotation and single-phasing of motors.
 4. Sub-system tests indicated in other Sections.
 5. Proper operation of IP video intercom systems specified in Section 275117.
 6. Proper operation of intrusion detection systems specified in Section 281600.
 7. Proper operation of video surveillance system specified in Section 282305.
- G. Load balance all electrical phases, at device, panels, and switchboards.
- H. Perform electrical system testing and inspection as specified in each related Section and as specified in this Section.

END OF SECTION

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SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY:

- A. Section Includes:
 - 1. Building wire and cable.
 - 2. Branch-circuit cable.
 - 3. Wiring connectors and connections.
- 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: Basic electrical methods.

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.

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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 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 not be permitted.

2.2 WIRING CONNECTORS

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

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 - CONDUCTORS

- A. Wiring Methods:
1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway.
 2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway.
 3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway.
 4. Wet or Damp Interior Locations: Use only building wire, Type THW or THWN or Type XHHW-2 insulation in raceway.

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- 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, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
 - 1. Splicing of copper feeder conductors #3 AWG and larger is prohibited.
 - 2. Splices within branch circuit or feeder conductors located underground or below grade shall not be provided. All splices shall be terminated above grade.
- P. Use solderless pressure compression connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- Q. Conductor Sizes #8 and Larger: Class B stranding.
- R. 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.

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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. 480Y/277 Volt System:
 - 1. Phase A - Brown.
 - 2. Phase A Switch Leg - Brown with "S" Tag.
 - 3. Phase B - Orange.
 - 4. Phase B Switch Leg - Orange with "S" Tag.
 - 5. Phase C - Yellow.
 - 6. Phase C Switch -Leg- Yellow with "S" Tag.
 - 7. Travelers - Yellow with "T" Tag.
 - 8. Neutral - Grey.
 - 9. Equipment Ground - Green with Yellow stripe.
- D. Use same color for same phase throughout. Use same colors for switch legs. Phase rotation shall be same in all panels. Identify large cables with colored tape.
- E. 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.

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.

- 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 281304 – Enterprise Physical Access Control System (ePACS).
2. Section 281600 – Intrusion Detection.
3. Section 282305 – Integrated Security and Investigative Platform (ISIP) CCTV System.
4. Section 260500 – Common Work Results for Electrical.
5. Section 262726 – Wiring Devices.
6. Section 275117 – IP Video Intercom and Exterior Gate Control System.

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.

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

1.3 SYSTEM DESCRIPTION

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

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

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

2.2 METAL CONDUIT

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

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- 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. 0-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.

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2.6 NONMETALLIC CONDUIT

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Carlon, Cleveland, OH (800) 322-7566.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: NEMA TC 2; Schedule 40 PVC.
- C. Fittings and Conduit Bodies: NEMA TC 3.

2.7 FITTINGS

- A. Manufacturer: Raco, Inc., South Bend, IN (219) 234-7151.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Steel City.
 - b. 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: Raco 1222, 1223, 1224.
 - 2. Flexible Metal Conduit: Raco 3302, 3303, 3304, 3305, 3306, 3308.
 - 3. Liquidtight Flexible Metal Conduit: Raco 3511, 3512, 3513, 3541, 3542, 3543.
- C. Conduits 1-1/4 inch and larger entering junction boxes, pull boxes, panels, cabinets, and gutters, provide Insulated throat type bushings; Raco 1225, 1226, 1228, 1230, 1232, 1234, 1236.
- D. Provide threaded joint connectors and malleable iron no thread compression box connectors on rigid conduit. Do not provide fittings requiring set screws or indenter type applications including BM connectors.
- E. Provide only steel set-screw couplings and connectors on EMT conduit.

2.8 CONDUIT STRAPS AND HANGERS

- A. Strap Manufacturer: Raco, Inc., South Bend, IN (219) 234-7151
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Steel City.
 - b. Unistrut.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Hanger Manufacturer: Steel City/Thomas & Betts, Memphis, TN (800) 888-0211.
 - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
 - a. Unistrut.
 - b. Raco.

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2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Straps: Two-hole push on stamped steel straps on surface areas such as concrete, masonry, wide flange beams, columns, and wood.
1. Rigid Conduit: Raco 2232, 2233, 2234, 2235, 2336, 2238.
 2. Electrical Metallic Tubing: Raco 2092, 2093, 2094.
- D. Hangers: Lay-in pipe hanger.
1. Conduits 1-1/4 Inch and Larger: Steel-City C-149.
- E. Trapeze Hangers for Conduits Grouped Together: Hangers consisting of all thread rods sized as required and Kingdorff channel.
1. Steel City B-909, 1/2 inch x 1-7/8 inch (12 gauge) with single bolt channel pipe straps.
 2. Steel City C-105, C-105-AL, or C-106, (no wire permitted for anchoring conduit).

2.9 SEAL-OFF AND EXPANSION FITTINGS

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

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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. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION - RACEWAYS

- A. Install in accordance with the following schedule, unless indicated otherwise on Drawings: Plastic flexible PVC conduit shall not be permitted. Flexible metal conduit shall be permitted for electrical power and security wiring only and not permitted for fire alarm cables.
 - 1. Above suspended ceilings: Galvanized or sherardised thick wall rigid steel (GRC) or electrical metallic tubing (EMT).
 - 2. Metal stud walls: Galvanized or sherardised thick wall rigid steel (GRC) or electrical metallic tubing (EMT).
 - 3. Exposed interior areas: Galvanized or sherardised thick wall rigid steel (GRC) or electrical metallic tubing (EMT).
 - 4. Exposed exterior areas: Galvanized or sherardised thick wall rigid steel (GRC).
 - 5. Underground or below slab areas: Rigid polyvinyl chloride conduit (PVC-Sched. 40).

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- 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. 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.

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- 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 dock area above bottom chord of structural joist. Pullboxes sized in excess of 12 inches shall be equipped with hinged and hasped covers.

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- 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. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- I. 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.
- J. 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.
- K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- L. Use approved adjustable steel channel fasteners spanning joist for hung ceiling outlet box.

3.4 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.

3.5 ADJUSTING

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

3.6 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 262416

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This 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. Section 260500 – Common Work Results for Electrical.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA AB 1 – Molded Case Circuit Breakers.
 - 2. NEMA ICS 2 – Industrial Control Devices, Controllers, and Assemblies.
 - 3. NEMA KS 1 – Enclosed Switches.
 - 4. NEMA PB 1 – Panelboards.
 - 5. NEMA PB 1.1 – Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- C. Underwriters Laboratories (UL):
 - 1. UL 486 – Molded Case Circuit Breakers.
 - 2. UL 67 – Heat Rise Test for Panelboards.
 - 3. UL 50 – Steel Gauge Requirements for Cabinets and Enclosures.
 - 4. UL 1449 4th Edition – Standard for Transient Voltage Surge Suppressors.

1.3 SUBMITTALS

- A. As specified in Section 260500 – Common Work Results for Electrical.
 - 1. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
 - 2. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
 - 3. Shall include UL 1449 Listing documentation verifying the following:
 - a. Short Circuit Current Rating (SCCR)
 - b. Voltage Protection Ratings (VPRs) for all modes
 - c. Maximum Continuous Operating Voltage Rating (MCOV)
 - d. I-nominal rating (I-n)

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- B. Section 017704 – Closeout Procedures and Training: Procedures for closeout submittals:
 - 1. Project Record Documents: Record actual locations of Products; indicate actual branch circuit arrangement.
 - 2. Operation and Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.
 - 3. Submit data showing compliance with UL 1449.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical
- B. Panelboards shall be UL Listed and labeled and shall be designed in accordance with the applicable standards of ANSI and NEMA.
- C. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

PART 2 - PRODUCTS

2.1 GENERAL CLASSIFICATION

- A. Manufacturers: General Electric Company (G.E.) Catalog numbers are used to identify type of equipment specified. Equivalent products by the following manufacturers are acceptable:
 - 1. Siemens
 - 2. Square-D
 - 3. Eaton/Cutler Hammer
 - a. Branch Circuit Panels:
 - 1) 120/208V: G.E. Type AQ
 - b. Distribution Panels:
 - 1) Circuit breaker: G.E. Type CS or A
 - 4. No substitutions permitted.

2.2 BRANCH CIRCUIT PANELS

- 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. (Tee 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.

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- 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. 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.
- 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 circuit directory on inside of inner door, with plastic protector.

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.

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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 CONTROL

- A. Section 014000 – Quality Requirements: Field Testing and Inspection.
- B. Perform inspections and tests listed in NETA ATS, Section 7.6.
- 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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SECTION 262726

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Receptacles.
 - 2. Device plates and box covers.
 - 3. TelePower Poles.
- 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. National Electrical Contractors Association (NECA):
 - 1. NECA "Standard of Installation."
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA WD 1 – General Requirements for Wiring Devices.
 - 2. NEMA WD 6 – Wiring Devices – Dimensional Requirements.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.
- B. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Provide Products listed and classified by Underwriters Laboratories, Incorporated.

1.4 SUBMITTALS

- A. Product data required.

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PART 2 - PRODUCTS

2.1 WALL SWITCHES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Inc, Milford, CT (203) 882-4800.
 - 2. Leviton Manufacturing, Company, Inc., Little Neck, NY (800) 824-3005.
 - 3. Pass & Seymour, Syracuse, NY (800) 776-4035.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

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, 20Amp, 125Volt, 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. Color: Receptacles shall be white unless indicated otherwise.

2.3 WALL PLATES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. P&S Sierra.
 - 2. Hubbell.
 - 3. Leviton.
 - 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Coverplate: Coverplates shall be white smooth thermoplastic unless otherwise noted.
 - 1. Sierra TP8-W.

2.4 TELE/POWER POLE

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Legrand/Wiremold, West Hartford, CT (800) 621-0049.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

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- B. Raceway Material: Anodized aluminum with manufacturer's standard hardware and fittings. Length as indicated on drawings.
- C. Wire: Factory pre-wired with No. 12 AWG minimum. Provide equipment grounding conductor.
- D. Wiring Devices: NEMA5-20R duplex receptacles and/or telecommunication outlets. Quantity as indicated on drawings.
- E. Basis of Design: Wiremold NP620 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that outlet boxes are installed at proper height.
 - 2. Verify that wall openings are neatly cut and will be completely covered by wall plates.
 - 3. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install wiring devices as indicated, in accordance with manufacturer's written instruction, applicable requirements of the NEC and NECA "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.
- B. Install devices plumb and level.
- C. Install receptacles with grounding pole on bottom.
- D. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- E. 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.
- F. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- G. Provide coverplates on receptacle and blank outlets.

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3.4 LABELING

- A. All coverplates for receptacles and devices shall be labeled with the branch circuit number. Label shall be machine generated and permanently affixed to the outside of the coverplate.

3.5 CONSTRUCTION

- A. Interface with other work:
 - 1. Coordinate locations of outlet boxes provided under Section 260533 to obtain mounting heights indicated on Drawings.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Prior to energizing circuitry, test wiring for electrical continuity, and for short circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements.
- C. Inspect each wiring device for defects.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.

3.7 ADJUSTING

- A. Adjust devices and wall plates to be flush, level and plumb with wall.

3.8 CLEANING

- A. Section 017300 - Execution: Cleaning installed work.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

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SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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. Section 260500 - Common Work Results for Electrical: Basic electrical methods.

1.2 REFERENCES

- A. National Electrical Testing Association (NETA):
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Electrical Contractors Association (NECA):
 - 1. NECA SI - Standard of Installation.
- C. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA KS 1 - Enclosed Switches.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Switch ratings and enclosure dimensions.
 - b. Fuse data sheets showing electrical characteristics including time-current curves.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

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- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Record actual locations of enclosed switches and actual fuse sizes.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with NECA SI.
- B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years documented experience.
- C. Regulatory Requirements:
 - 1. Conform to requirements of NFPA 70.
 - 2. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for purpose specified and indicated.

1.5 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to USPS Project Manager.
 - 1. Three of each size and type fuse installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Switches: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - 1. General Electric Company (800) 626-2000.
 - 2. Siemens Energy & Automation, Alpharetta, GA (800) 964-4114.
 - 3. Square D Company, Palatine, IL (800) 392-8781.
 - 4. Eaton Corporation, Cutler-Hammer Products, Pittsburg, PA (800) 525-2000.
- B. Fuses: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Cooper Industries Incorporated, Waukesha, WI (414) 524-3300.
 - 2. General Electric Company (800) 626-2000.
 - 3. Gould Shawmut, Newburyport, MA (508) 462-6662.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions not permitted.

2.2 FUSIBLE ENCLOSED SWITCH ASSEMBLIES

- A. NEMA KS 1, Type HD heavy duty, 100,000 AIC load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Cover shall be equipped with a manual defeat to allow opening while energized by authorized personnel. Handle shall be lockable in ON or OFF position.

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- 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 ground 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 while energized by authorized personnel. 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 ground lug and neutral block if required.

2.4 FUSES

- A. NEMA FU 1, Class RK1, 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.

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- B. Fuses:
 - 1. Install fuses in fusible switches in accordance with manufacturer's published instructions, as indicated on Drawings, or as required by loading per NFPA 70.
 - 2. Install fuse with label oriented with manufacturer, type, and size easily read.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.

END OF SECTION

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SECTION 264100

FACILITY LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. The work covered by this section of the specifications consists of furnishing all labor, materials and items of service required for the completion of a functional and unobtrusive, UL 96A master labeled, lightning protection and grounding system as approved by the Engineer and in strict accordance with this section of the specifications.
 - 1. If any departure from these specifications or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted as soon as practicable to the Engineer for approval. No such departures shall be made without the prior written approval of the Engineer.
- B. Section includes:
 - 1. Air Terminals and Bases.
 - 2. Grounding Electrodes.
 - 3. Lightning Protection Conductors.
 - 4. Grounding and Bonding for Lightning Protection.
- C. Substitutions:
 - 1. Section 016000 – Product Requirements: Product options and substitutions. Substitutions permitted.
- D. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- E. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical: Basic electrical methods.
 - 2. Section 264101 - Underground Counterpoise.
 - 3. Section 264128 – Surge Protective Devices (SPDs).

1.2 REFERENCES

- A. Lightning Protection Institute (LPI):
 - 1. LPI-175 - Lightning Protection Installation Standard.
 - 2. LPI-176 - Lightning Protection System Material and Components Standard.
 - 3. LPI-177 - Inspection Guide for LPI Certified Systems.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 780 – Lightning Protection Code (2020).
- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL 96 - Lightning Protection Components.
 - 2. UL 96A - Installation Requirements for Lightning Protection Systems.

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1.3 SUBMITTALS

- A. Submit shop drawings showing layout of air terminals, grounding electrodes, and bonding connections to structure and other metal objects. Include terminal, electrode, and conductor sizes, and connection and termination details. Drawings shall include full layout of cabling and points, and connections.
- B. Submit product data showing dimensions and materials of each component and include indication of listing in accordance with ANSI/UL 96.
- C. Submit manufacturer's installation instructions.
- D. Submittal shall include ground test wells.

1.4 PROJECT AS-BUILT DOCUMENTS

- A. Submit project as-built documents.
- B. Accurately record actual locations of air terminals, grounding electrodes, bonding connections and routing of system conductors.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in lightning protection equipment with minimum five (5) years documented experience and member of the Lightning Protection Institute.
- B. Installer: Authorized installer of manufacturer with minimum five (5) years documented experience and member of the Lightning Protection Institute.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Harger Lightning Protection, Inc.
 - 2. Thompson Lightning Protection, Inc.
 - 3. Heary Brothers Lightning Protection, Inc.
 - 4. Independent Lightning Protection, Inc.
 - 5. Robbins Lightning, Inc.
- B. The design is based on a lightning protection system utilizing products manufactured by Harger Lightning and Grounding Company. The design has been coordinated with All South Lightning Protection located at 4759 N.W. 103rd Ave., Sunrise, Florida 33351.
 - 1. South Florida Branch Manager: Roger Harney; Tel: (954) 742-4164; e-mail: roger@aslp.net.

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2.2 STANDARDS

- A. All equipment used in this installation shall be UL approved and labeled in accordance with UL procedures, with each air terminal bearing an "A" label and all main conductors bearing a "B" label at 10'-0" intervals.
- B. All equipment shall be new, the product of a single manufacturer as outlined above, and of a design and construction to suit the application where it is used in accordance with accepted industry standards and L.P.I. and UL code requirements.

2.3 EQUIPMENT

- A. All materials shall be copper, aluminum or bronze as indicated on the drawings. All materials shall be UL approved and labeled and of the size, weight, and construction for use on building in accordance with L.P.I. and UL Code requirements for Class I structures and as per manufacturer's recommendations.
- B. Air terminal bases shall be of cast construction with bolted pressure cable connections and shall be securely mounted with stainless steel screws or bolts. Crimp type connectors are not acceptable. Bases shall have a minimum surface contact area of 8.5 square inches.
- C. Cable fasteners shall be of cast construction with pressure cable connectors, electrolytically compatible with the conductor and mounting surface and shall be spaced according to UL, L.P.I. and NFPA Code requirements.
- D. Bonding devices, cable splicers and miscellaneous connectors shall be of cast bronze with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable.
- E. Ground rods shall be 3/4" diameter, 10 feet long sectional copperweld steel. Obtain 5-OHMS maximum resistance as read with a clamp-on ground reading megger.
- F. All miscellaneous bolts, nuts and screws shall be brass, bronze or stainless steel. Crimp fittings are not acceptable. Stamped bronze materials are not acceptable.
- G. Equipment enclosures less than 3/16" thick shall be provided with individual air terminals bonded to the main coursing conductors.
- H. Equipment on ventilators, etc. shall be protected from corrosion in accordance with L.P.I. and UL requirements.
- I. All miscellaneous bolts, nuts and screws shall be stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with UL 96A, ANSI/NFPA 780 and LPI.

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- C. Installation shall be made in an inconspicuous manner with conductors coursed to conceal equipment as much as possible. Down conductors shall be exposed on the exterior of the structure, unless indicated otherwise.
- D. Where fasteners are to be mounted in masonry or structural work, they shall be furnished to the Masonry or Structural Contractor so they may be installed during construction of the project.
- E. Provide proper connections of lightning protection system to all grounded media in and around the protected structure per NFPA 780 4.15 "Potential Equalization".
- F. Provide proper grounding of all grounding media in, on and around structure to provide common ground potential per NFPA 780 4-14 including electric service, telephone and antenna system grounds as well as underground metallic piping systems, underground metal conduits, etc.
- G. Underground counterpoise: Items required to be bonded/connected in paragraphs "F" and "G" above shall be bonded/connected via underground ring counterpoise system.
- H. All exposed conductors located 6 ft. or less above finished grade and those conductors subject to mechanical damage shall be suitably protected/shielded utilizing "half pipe" protective sleeves.
- I. Coordinate and receive approval of all penetrations of roofing system and mounting to roofing system with Engineer prior to submittal of shop drawings.
- J. Locate air terminals as required. Take care to insure that all points are within 2 ft. – 0 in. of outside building edge, outside corners and ridge ends, and that maximum spacing does not exceed 20 ft.-0 in., and that minimum projection above object protected is 10 inches.
- K. Maintain horizontal or downward coursing of main conductor and insure that all bends have at least an 8 inch radius and do not exceed 90'.
- L. Support all roof coursing conductors, down leads and bonding cables at 3 ft.- 0 in. on center maximum.
- M. Ground electrodes shall be installed within 12 inch dia. x 12 inch long PVC access wells equipped with cast iron covers; Harger #362PS12CILS80. Install access wells in unpaved, accessible areas, but in no instance less 2 ft. from foundation wall. Access wells shall be set within a 6 inch deep, gravel bed, 3 inches wide all round the PVC sleeve. Driven rods shall penetrate earth at least 10 ft. - 0 in. All down conductors and below grade connections shall be bonded utilizing exothermic welds.
- N. Bond to all metal bodies of conductance on roof with main size conductors as shown and as required by UL codes. These bonds include, but are not limited to, exhaust fans, vents, handrails, metal screens and panels, HVAC units, hatches, skylights, cooling towers, flag poles, antennas, etc., or any large metal body subject to direct stroke or exceeds the height of adjacent air terminals.
- O. Bond to metal bodies of conductance located within 6 ft.- 0 in. of main conductor or other bonded object with approved secondary bonding conductor as shown and as required by UL codes. Such objects include, but are not limited to, flashings, metal coping caps, gravel guards, fascias, roof drains, down-spouts, interior ducts, machinery or piping, etc., or, in general, any isolated body at or below the roof subject to inductance and within 6'-0" of system.

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3.2 FIELD QUALITY CONTROL

- A. The resistance of the lightning protection system shall not exceed 5 ohms. Where tests show resistance to ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms, or less, by driving additional ground rods, lengthening ground rods or installing ground enhancement materials; then retest to demonstrate compliance. Furnish written report of all tests.
- B. Obtain the service of Underwriters Laboratories, Inc. to provide inspection and certification of the lightning protection system under provisions of UL 96A. Submit certification and submit in O&M Manual.
- C. Obtain UL Master Label per UL 96A. Submit copy of paperwork to the USPS Project Manager and submit in O&M Manual.
- D. Submit test results at each ground location including final length of each ground rod.

END OF SECTION

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SECTION 264101

UNDERGROUND COUNTERPOISE

PART 1 - GENERAL

1.1 SUMMARY

- A. The work covered by this section of the specifications consists of furnishing all labor, materials and items of service required for the completion of an underground counterpoise grounding system as approved by the Engineer and in strict accordance with this section of the specifications.
 - 1. If any departure from these specifications or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted as soon as practicable to the Engineer for approval. No such departures shall be made without the prior written approval of the Engineer.
- B. Section Includes:
 - 1. Pre-Construction Testing.
 - 2. Grounding Electrodes.
 - 3. Ground Loop Conductors.
 - 4. Grounding and Bonding.
- C. Substitutions:
 - 1. Section 016000 – Product Requirements: Product options and substitutions. Substitutions permitted.
- D. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- E. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical: Basic electrical methods.

1.2 SCOPE OF WORK

- A. Install a counterpoise system around the building to ensure equal ground potential throughout the facility. The counterpoise system must consist of a buried loop of copper wire, not smaller than #4/0 AWG, stranded copper cable which encircles the building and is buried a minimum of 24 inch below final grade (BFG). Ground rods must be driven along this loop at 100 foot intervals and connect building steel and equipment to the ground grid such that each existing main switchboard, main water supply and structure, have common ground paths.
- B. All connections and joints shall be the exothermic welded, unless otherwise indicated. Connect building steel and conductive enclosures of electrical equipment to the ground system.
- C. The perimeter fencing within 10 ft. of the counterpoise shall be bonded using #2/AWG/Copper electrode conductors.

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1.3 PRE-CONSTRUCTION TESTING

- A. Prior to the start of any work, a soil resistivity test shall be performed by an independent third-party testing agency to pre-determine the soil resistivity at the site location. The data collected shall then be utilized to provide a computer-generated soil model showing the soil resistivity in “ohm-meters” at various layer depths. This information shall be utilized to verify the burial depth of the counterpoise conductor, the length of the ground rods and the need for ground enhancement material or chemical rods to attain a maximum counterpoise resistance of 5 ohms.
- B. Soil resistivity testing shall utilize the “Wenner 4-Pin” test method and the AEMC Instruments Model #6472 Ground Test Meter.
 - 1. Testing shall be performed during warm, dry weather conditions when the soil is not frozen or wet.
 - 2. The soil resistivity testing shall be performed in the presence of the Raleigh IT SME.

1.4 REFERENCES

- A. UL 96 - Lightning Protection Components.
- B. UL96A - Installation Requirements for Lightning Protection Systems.
- C. ANSI/NFPA 780 - Lightning Protection Code (2020).
- D. LPI-175 - Lightning Protection Institute.

1.5 SUBMITTALS

- A. Submit shop drawings showing layout of ground loop conductors, grounding electrodes, and bonding connections. Include electrode, and conductor sizes, and connection and termination details. Drawings shall include full layout of cabling and points, and connections.
- B. Submit product data showing dimensions and materials of each component.
- C. Submit manufacturer's installation instructions.
- D. Submittal shall include ground test wells.

1.6 PROJECT AS-BUILT DOCUMENTS

- A. Submit project as-built documents.
- B. Accurately record actual locations of grounding electrodes, bonding connections and routing of system conductors.

1.7 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in lightning protection equipment with minimum five (5) years documented experience and member of the Lightning Protection Institute.

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- B. Installer: Authorized installer of manufacturer with minimum five (5) years documented experience and member of the Lightning Protection Institute.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Harger Lightning Protection, Inc.
 - 2. Thompson Lightning Protection, Inc.
 - 3. Heary Brothers Lightning Protection, Inc.
 - 4. Independent Lightning Protection, Inc.
 - 5. Robbins Lightning, Inc.
- B. The design is based on a counterpoise system utilizing products manufactured by Harger Lightning and Grounding Company. The design has been coordinated with All South Lightning Protection located at 4759 N.W. 103rd Ave., Sunrise, Florida 33351.
 - 1. South Florida Branch Manager: Roger Harney; Tel: (954) 742-4164; e-mail: roger@aslp.net.

2.2 STANDARDS

- A. All equipment used in this installation shall be UL approved and labeled in accordance with UL procedures.
- B. All equipment shall be new, the product of a single manufacturer as outlined above, and of a design and construction to suit the application where it is used in accordance with accepted industry standards and LPI and UL code requirements.

2.3 EQUIPMENT

- A. All materials shall be copper or bronze as indicated on the drawings. All materials shall be UL approved and labeled and of the size, weight, and construction for use on building in accordance with LPI and UL Code requirements and as per manufacturer's recommendations.
- B. Bonding devices, bonding plates and miscellaneous connectors shall be of cast bronze with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable.
- C. Ground rods shall be 3/4 inch diameter, 10 feet long sectional copperweld steel (minimum).
- D. All miscellaneous bolts, nuts and screws shall be brass, bronze or stainless steel. Crimp fittings are not acceptable. Stamped bronze materials are not acceptable.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with UL 96A, ANSI/NFPA 780 and LPI.
- C. Provide proper grounding of all grounding media in, on and around structure to provide common ground potential per NFPA 780 4.14 and 4.15 including existing electric service, telephone and antenna system grounds.
- D. All exposed conductors located 6 ft. or less above finished floor or finished grade are to be suitably protected/shielded from mechanical damage.
- E. Ground electrodes shall be installed within 12 inch dia. x 12 inch long PVC access wells equipped with cast iron covers; Harger #362PS12CILS80. Install access wells in unpaved, accessible areas, but in no instance less 2 ft. from foundation wall. Access wells shall be set within a 6 inch deep, gravel bed, 3 inches wide all round the PVC sleeve. Driven rods shall penetrate earth at least 10 ft. - 0 in. All down conductors and below grade connections shall be bonded utilizing exothermic welds.

3.2 FIELD QUALITY CONTROL

- A. The resistance of the counterpoise grounding system shall not exceed 5 ohms. Where tests show resistance to ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms, or less, by driving additional ground rods, lengthening ground rods or installing ground enhancement materials; then retest to demonstrate compliance. Furnish written report of all tests. Refer to section 1.3 Pre-Construction Testing.
- B. Obtain the service of an LPI certified installer to provide inspection and certification of the counterpoise grounding system under provisions of UL 96A. Submit certification and submit in O&M Manual.
- C. Submit test results on each ground location including final length of each ground rod and final distance between each installed ground rod at each ground rod location.

END OF SECTION

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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 existing main electrical service switchboard as indicated for on drawings.
 - b. Branch panels as indicated on the drawings.
 - c. All electronic communications equipment installed including but not limited to: intercom, intrusion, ePACS and CCTV systems.
 2. Provide surge suppression protection on all exterior communications systems wiring.
- B. Related documents: The contract documents, as defined in Section 011000-Summary of Work, apply to work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- C. Related sections:
1. Section 260500 – Common Work Results for Electrical.
 2. Section 264100 – Facility Lightning Protection.
 3. Section 275117 – Video Intercom and Exterior Gate Control System.
 4. Section 281304 – Enterprise Physical Access Control System.
 5. Section 281600 – Intrusion Detection System.
 6. Section 282305 – Integrated Security and Investigative Platform (ISIP) CCTV System.

1.2 REFERENCES

- A. IEEE C62.41.1, IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits,
- B. IEEE C62.41.2, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits,
- C. IEEE C62.45, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits.
- D. National Electrical Code: Article 285.
- E. UL 1283 - Electromagnetic Interference Filters.
- F. UL 1449, 4th Edition, effective December 30, 2014 – Surge Protective Devices.

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1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
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. Certification submitted SPDs are manufactured in the United States.
 4. 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)
 - 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.
- 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 4th edition.

1.4 QUALITY ASSURANCE

- A. SPDs must be manufactured in the United States.
- B. Manufacturer Qualifications: Engage a firm with at least ten (10) years experience in manufacturing transient voltage surge suppressors.
- C. Manufacturer shall be ISO 9001 or 9002 certified.
- D. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- E. The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Handle and store equipment in accordance with manufacturer's Installation and Maintenance Manuals. One (1) copy of this document to be provided with the equipment at time of shipment.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following.
 - 1. ASCO/Advanced Protection Technologies, Incorporated, Clearwater, FL (800) 237-4567
 - 2. Emerson/Liebert Corporation, Columbus, OH, (800) 877-9222
 - 3. Atlantic Scientific Corporation, Melbourne, FL, (800) 544-4737
 - 4. Current Technology Inc., Irving, TX, (800) 238-5000
 - 5. Ditek Surge Protection, Largo, FL, (800) 753-2345
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 SERVICE ENTRANCE SURGE PROTECTIVE DEVICES (SPDS)

- A. Models:
 - 1. Basis of Design: Advanced Protection Technologies: "TEXAS" Series.
- B. Surge Protective Device Description: Replaceable module type complying with UL 1283 and UL 1449 4th Edition Listed. Provide unit with the following features and accessories:
 - 1. LED indicator lights for power and protection status.
 - 2. Audible alarm, with silencing switch, to indicate when protection has failed.
- C. Short Circuit Current Rating: SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
- D. SPD Type: SPD shall be UL labeled as Type 1 (verifiable at UL.com), intended for use without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- E. In Rating: SPD shall be UL labeled with 20kA Inominal (I-n) (verifiable at UL.com) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.
- F. SPD shall provide surge current diversion paths for all modes of protection; L-N, L-G, N-G, and L-L in WYE systems, and L-L, L-G in DELTA Systems.
- G. Minimum Single Impulse Surge Current Capability (single pulse rated) per phase shall be.
 - 1. Single Impulse Surge Current Capacity is to be 300 kA.
- H. Connection Means: Permanently wired via internal disconnect. The device shall have a NEMA designed and certified safety interlocked integral disconnect switch. The switch shall be located within the unit with an externally mounted metal manual operator.
- I. Protection modes and UL 1449 4th Edition Voltage Protection Rating for grounded WYE circuits with voltages of 480Y/277, 3-phase, 4-wire shall be as follows:

VOLTAGE	L-N	L-G	N-G
480Y/277V	1500V	1500V	1500V

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- J. Install devices at service entrance at load side, with ground lead bonded to service entrance ground.
- K. Test unit in accordance with manufacturer's written instructions.

2.3 DISTRIBUTION SURGE PROTECTIVE DEVICES (SPDS)

- A. Models:
 - 1. Basis of Design: Advanced Protection Technologies: "TEXDS" Series.
- B. Surge Protective Device Description: Non-modular type complying with UL 1283 and UL 1449 4th Edition Listed. Provide unit with the following features and accessories:
 - 1. LED indicator lights for power and protection status.
- C. Short Circuit Current Rating: SPD shall be UL labeled with 100kA 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 disconnect. The device shall have a NEMA designed and certified safety interlocked integral disconnect switch. The switch shall be located within the unit with an externally mounted metal manual operator.
- I. Protection modes and UL 1449 4th Edition Voltage Protection Rating for grounded WYE circuits with voltages of 208Y/120, 3-phase, 4-wire shall be as follows:

<u>VOLTAGE</u>	<u>L-N</u>	<u>L-G</u>	<u>N-G</u>
208Y/120V	700V	700V	700V

- J. Install devices as close as possible to distribution or branch panelboards.
- K. Test unit in accordance with manufacturer's written instructions.

2.4 SECURITY SYSTEM SURGE PROTECTIVE DEVICES (SPDS)

- A. Power Surge Protection
 - 1. SPD shall be listed or recognized in accordance with UL 1449 4th Edition verifiable by visiting UL.com.
 - 2. SPD shall provide surge current L-N or L-G mode of protection.
 - 3. Every mode of protection shall be protected by internal overcurrent and thermal overtemperature controls.

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4. SPD shall meet or exceed the following criteria:
- a. Minimum surge current capability (single pulse rated) per phase shall be:
 - 1) 120/240 Panel Application 50kA per phase
 - b. UL 1449 4th Edition listed Voltage Protection Ratings for shall not exceed the following:

<u>VOLTAGE</u>	<u>L-N/L-G</u>	<u>MCOV</u>
120V or 240/120V	600V	150V

5. SPD shall have a warranty for a period of five years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

B. Signal line protection

- 1. SPD shall be solid state, silicon avalanche diode circuitry for protection from overvoltages on 2 or 4 wire signal lines such as balanced pair telephone, metallic pair telephone, buried and overhead field cable, remote radio equipment, and control systems. Unit shall have an external ground lug or wire. Connect ground lug or wire to protected equipment grounding system with a No. 12 green insulated stranded ground wire as short as possible.
 - a. Pins Protected: Pins 4, 5 on the RJ- 45 Interface; Pins 3, 4 on the RJ- 11 Interface
 - b. Clamping Voltage: 310 Volts in 500 nsec
 - c. Surge Capacity: 1500 Watts for 1 msec;
 - d. Protection Mode:
 - 1) Common Mode Pins 4, 5 to shielding braid
 - 2) Differential Mode Pins 4,5
 - e. Shall be listed to UL497A Telco Specification

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. Service Entrance SPD shall be installed on the load side of each existing main service disconnect.
 - 4. Service Entrance SPD ground shall be bonded to the service entrance ground.
 - 5. At Service Entrance, a UL approved disconnect switch shall be provided as a means of servicing if a 60A breaker is not available.
 - 6. One SPD shall be installed external to each designated branch panelboard.
 - 7. At branch, SPD shall have an independent means of disconnect such that the protected panel remains energized. A 40A breaker (or larger) may serve this function.
 - 8. SPD shall be installed per manufacturer's installation instructions with lead lengths as short and straight as possible. Gently twist conductors together.
 - 9. Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers per NEC.

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3.3 ADJUSTMENTS AND CLEANING

- A. Remove debris from SPD and wipe dust and dirt from all components.
- B. Repaint marred and scratched surfaces with touch up paint to match original finish.

3.4 TESTING

- A. Check tightness of all accessible mechanical and electrical connections to assure they are torqued to the minimum acceptable manufacture's recommendations.
- B. Check all installed panels for proper grounding, fastening and alignment.

END OF SECTION

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SECTION 275117

IP VIDEO INTERCOM AND EXTERIOR GATE CONTROL SYSTEM

PART 1 - GENERAL

1.1 SCOPE

- A. Provide an IP video intercom system complete with door and gate controls for the exterior motorized gates and employee entrances. Provide multiple master control units and video door stations as shown on the drawings.

1.2 SUMMARY

- A. Section Includes:
 - 1. Video master control station.
 - 2. High power PoE+ switch.
 - 3. Video door stations.
 - 4. CAT-6 and fiber cabling.
 - 5. Fiber distribution patch panels.
 - 6. Fiber media converters.
 - 7. UPS unit.
 - 8. Spare parts.
- B. Related Sections:
 - 1. Section 260500 - Common Work Results for Electrical.
 - 2. Section 264128 - Surge Protective Devices (SPDs).
 - 3. Section 281304 - Enterprise Physical Access Control System.

1.3 REFERENCES

- A. Electronic Industries Association (EIA):
 - 1. ANSI/TIA/EIA-568 - Commercial Building Telecommunications Cabling Standard.
 - 2. ISO 9001:2015 – Quality Management Systems – Requirements.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

- A. Procedures for submittals.
 - 1. Product Data: Manufacturer's data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods.
 - 2. Shop Drawings: Submit the following:
 - a. Wiring Diagrams: Indicate wiring for each item of equipment and interconnections between items of equipment.
 - b. Include manufacturer's names, model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

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3. Installation and Operation Manuals:
 - a. Submit manufacturer's installation and operation manual, including operation instructions and component wiring diagrams.
 - b. Provide detailed information required for the Postal Service to properly operate equipment
- B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- C. Maintenance Data: For equipment to include in maintenance manuals specified in Division 1.
- D. Assurance/Control Submittals:
 1. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 2. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- E. 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.
- F. Warranty: Submit manufacturer's and installer's 2-year warranty for full parts and labor.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer: ISO 9001.2015 Certified Company specializing in manufacturing products specified with minimum 5 years documented experience.
 2. Installer: Factory trained and experienced Company specializing in performing the work of this section with minimum 5 years documented experience and an authorized representative of equipment manufacturer for both installation and maintenance of equipment.
- B. Regulatory Requirements:
 1. Conform to requirements of NFPA 70 and UL 50.
 2. Products: Listed and classified by Underwriter's Laboratories Incorporated as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials during handling and installation to prevent damage.

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1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Aiphone Corp., which is located at: 6670 185th Ave. NE; Redmond, WA 98052; Toll Free Tel: 800-692-0200; Tel: 425-455-0510; Fax: 425-455-0071; Web: www.aiphone.com.
 - 1. Regional Sales Manager: Robert Hilt; Tel: 813-365-4403; e-mail: robert.hilt@aiphone.com.
 - 2. Director of Sales – South: Spencer Britenstine; Tel: 614-286-8925; e-mail: spencer.britenstine@aiphone.com.
- B. IP Video Intercom System: IX Series Intercom System as manufactured by Aiphone Corporation.
- C. Substitutions: Not permitted.
- D. On-Site Assistance: Engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, video images and controls to meet occupancy conditions. Provide up to three on-site assistance visits within one year of Substantial Completion.

2.2 SYSTEM DESCRIPTION

- A. IP Network Compatible Video Intercom System: A network-based communication and security system featuring video entry security and internal communication. All master units in the systems shall be able to unlock doors remotely, assist onsite visitors and communicate using a PoE network.
 - 1. Power Source: Power over Ethernet (802.3af).
 - 2. Network Interface: 10 BASE-T / 100 BASE-TX Ethernet (RJ-45).
 - 3. Network Protocols: IPv4, IPv6, TCP, UDP, SIP, HTTP, HTTPS, MJPEG, RTSP, RTP, RTCP, IGMP, MLD, SMTP, DHCP, NTP, DNS.
 - 4. Bandwidth Usage:
 - a. G.711: 64Kbps x 2 per video call.
 - b. 64Kbps per monitor.
 - c. H.264: 24Kbps ~ 2,048Kbps.
 - 5. Communication: Hands-free (VOX/PTT) or handset (full-duplex).
 - 6. Video Display: 7-inch color LCD.
 - 7. Camera: Type:
 - a. 1/3-inch color CMOS. 1.23 Megapixels.
 - b. View Area at 0-degree camera angle mounted at 4 feet 11 inches (1500 mm) AFF: 2 feet 3 inches (700 mm) vertical x 3 feet 9 inch (1150 mm) horizontal at 19 inches (500 mm).
 - 8. Video Stream: ONVIF Profile S.
 - 9. Door Release: Programmable Form C dry contact, 24V AC/ DC, 1.0A.
 - 10. Wiring: The audio/video master units and door stations shall be connected to the network node via homerun CAT-6 wiring and RJ45 jacks.
 - a. Maximum distance:
 - 1) Master station to network node: 330 feet.
 - 2) Door station to network node: 330 feet.
 - 3) Utilize fiber optic cable for master and door stations located more than 330 feet from the network node.

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2.3 EQUIPMENT

- A. Coordinate features to form an integrated system. Match components and interconnections for optimum performance of specified functions.
- B. Equipment: Modular type, using solid-state components, fully rated for continuous duty, unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.
- C. Waterproof Equipment: Listed and labeled for duty outdoors or in damp locations.

2.4 AUDIO VIDEO MASTER CONTROL STATION(S)

- A. Master station(s) shall initiate and answer calls from up to (500) additional master or door substations. Master station(s) shall be wall or desk mounted and shall have the following features:
 - 1. 7 inch color LCD touchscreen
 - 2. PoE power source
 - 3. Camera for 2-way video calls
 - 4. 8 speed dial buttons
 - 5. Hands-free VOX/PTT communication and privacy handset (duplex)
 - 6. All call to other master stations
 - 7. Selective calling to any station in the system
 - 8. Privacy prevents other masters from listening in
 - 9. Door release button activates door strike or magnetic lock (selectable N/O or N/C contacts from door station)
 - 10. Tone and volume adjustments for audio communication
 - 11. Brightness and contrast adjustments for video.
- B. Basis of Design:
 - 1. Aiphone #IX-MV7-HW (Master Station) – white finish.

2.5 HIGH POWER PoE+ SWITCH

- A. The PoE+ switch shall be 24 port gigabit, ethernet, unmanaged, high power PoE+ with 380 Watt PoE budget. Unit shall be expandable and shall have the following features:
 - 1. Wiring hub for system using CAT-6 cable
 - 2. Controls all functionality of "IX" system
 - 3. Speed: Gigabit
 - 4. 24 ethernet ports (RJ45)
 - 5. PoE ports/max. power per port: 24 Watts
 - 6. Programmable functionality via supplied software
 - 7. USB to serial adaptor and gender changer, software program and Installation and Operation Manual on CD, and QuikStart Guide.
- B. Operation: The PoE+ switch handles the calling and communication signals for the "IX" system, as well as providing selective door release outputs, video outputs, DVR trigger outputs and CO line transfer output. System set-up and a variety of functions are programmed in the PoE+ switch with the use of the supplied software. The serial connection is for uploading the system programming, for raw RS232 data output, or for system monitoring via supplied program.
- C. Mounting: The unit shall be mounted in a standard 19 inch EIA rack within the intercom network node cabinet.
- D. Basis of Design: Netgear #GS244PP.

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2.6 AUDIO/VIDEO DOOR STATIONS

- A. The remote audio/video door stations shall include a color camera, microphone, speaker and call button with the following features:
 - 1. PoE with pass-through port.
 - 2. Color video camera with audio intercom
 - 3. 2-way hands-free voice communication with master station
 - 4. Call button to initiate call to master(s)
 - 5. White LED illuminator for low light conditions
 - 6. RJ45 jack for CAT-6 connection
 - 7. (2) Form C, dry contacts for door/gate release
- B. Operation: When the call button on the door station is pushed, the master station(s) ring and the video screen comes on with the image from the door station's camera. The master station user then initiates communication and the person at the door station speaks hands-free.
- C. Basis of Design: Aiphone #IX-DV (surface mounted); Aiphone #IX-DVF (surface or flush wall mounted).
 - 1. Exterior audio/video door stations to be pedestal or surface wall mounted and containing surge protection devices shall be Aiphone #IX-DVF equipped with stainless steel, surface mount backbox (10 7/16 inch H x 5 15/16 inch W), Aiphone #SBX-IDVF.

2.7 FIBER OPTIC MEDIA CONVERTER MODULES

- A. Fiber optic transmission equipment shall be used when CAT-6 cable lengths (including horizontal and vertical distances) exceed 330 linear feet.
- B. Fiber transmitter modules located at field devices shall be low profile totally enclosed type and shall be mounted within individual enclosures or nearby ePACS terminal cabinets containing the long range, card reader power supplies and reader interface modules.
 - 1. Transmitter requires 60 Watt, 48VDC power supply and 120Volt power feed.
 - 2. Basis of design: AFI #50SL-PoE+ with #PS-4860 power supply.
 - 3. Alternate U.S. manufacturers permitted.
- C. Fiber receiver modules located at the node location shall be rack mounted.
 - 1. Basis of design: AFI #RX-50 Series.
 - 2. Alternate U.S. manufacturers permitted.
- D. Fiber optic modules shall conform to the following minimum specifications:
 - 1. 10/100 MBps RJ45 Ethernet port, SC Fiber Ports.
 - 2. 62.5/125, OM1, tight-buffered, multimode fiber.
 - 3. PoE+ device.
 - 4. Protocol independent.
 - 5. -31 to 158 deg operating Temperature.
 - 6. IEEE 802.3, IEEE 803.2u and IEEE 803.2af Complaint.

2.8 CABLING

- A. Cabling Requirements:
 - 1. Cable runs from master or call-in stations to the network node that do not exceed 330 feet shall be category 6; utilize plenum or outdoor rated where required.

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2. Cable runs exceeding 330 feet from master or call-in stations to the network node shall be (2) count 62.5/125, OM1, multimode, indoor fiber cable; utilize plenum or outdoor rated where required.
3. All exterior cable runs shall be contained in conduit.
4. CAT-6 cable shall be terminated utilizing 8 pin, male RJ45 jacks at the device and to 8 pin, modular connectors at the patch panels within the network node cabinet to facilitate cable testing prior to installation of the network node. All testing shall be performed only after the cables have been terminated with the male RJ45 jacks.
5. When fiber optic modules are required, provide fiber optic cable appropriate for the application. Cable shall conform to the following specifications:
 - a. "SC" type connectors shall be used on all cable terminations.
 - b. Performance characteristics (including optical attenuation) shall be such that the fiber optic modules deliver signals end-to-end with sufficient bandwidth and quality to meet the specified application.
 - c. At no time shall fiber optic cable have loose ends terminated and left loose. All fiber optic cable shall be looped, stored, connected and permanently mounted in appropriate LIU cabinets/devices prior to testing. Fiber distribution, patch boxes (interconnect centers) shall be provided for termination of the fiber cabling.
 - 1) Fiber patch box shall be (6) port complete with adapter plate, appropriate number of "SC" connectors, splice tray, protection sleeves and enclosure.
 - i. Basis of Design: RLH Industries #PWSN-A-1 (Slimline patch panel: 4 inch W x 5 1/2 inch H x 2 inch D.
 - ii. Alternate U.S. manufacturers permitted.
 - 2) Fiber patch boxes shall be equipped with covers, so the fiber strands are not exposed.
6. Fiber cabling not routed within conduit shall be encased within appropriately sized inner ducts; utilize plenum rated where required.
7. The Contractor shall terminate and test the fiber optic cable and connectors.

2.9 CATEGORY-6, (12) or (24) PORT MODULAR SURFACE-MOUNTED "110"-STYLE PATCH PANELS

- 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. Ortronics (Legrand)
 3. Panduit
 4. Product options and substitutions. Alternate U.S. manufacturers permitted.
- B. Boxes/Panels:
 1. Capable of terminating (12) or (24) Category 6 cables.
 2. Equipped with an 89D surface mounting bracket.
 3. Complies with TIA-568-C "T568A" pinning configuration.
- C. Connector:
 1. Rack mounted, 8-pin modular, Category 6, non-keyed.
 2. Complies with TIA-568-C "T568A" pinning configuration.

2.10 CATEGORY 6 CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the work include the following:
 1. Belden
 2. Berk-Tek

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3. CommScope Uniprise
 4. General Cable - Preferred
 5. Leviton
 6. Ortronics (Legrand)
 7. Panduit
 8. Product options and substitutions. Alternate U.S. manufacturers permitted.
- B. Conductors: 4 twisted pair, minimum 23 AWG, solid copper.
1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire area where cable is installed is not considered a return air plenum according to any applicable codes. Provide outdoor, "OSP" rated cable and patch cords for exterior applications.
 2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6 cable performance specification.
 3. Nominal Impedance: 100 ohms plus or minus 15 percent.
 4. Certified and capable of performing to a minimum of 250 MHz.
 5. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify or add to manufacturer's twisting of cable. Do not untwist more than ½ inch of the stripped cable.
 6. Provide footage markings and "yellow" colored insulation.
- C. Basis of Design:
1. Indoor riser rated (yellow): General Cable #7133802 or approved equal.
 2. Indoor plenum rated (yellow): General Cable #7131802 or approved equal.
 3. Outdoor "OSP" rated (black): General Cable #7136100 or approved equal.

2.11 CATEGORY 6, COPPER PATCH CORDS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Belden
 2. Berk-Tek
 3. CommScope Uniprise
 4. General Cable
 5. Hitachi (Drybit)
 6. Leviton
 7. Ortronics (Legrand)
 8. Panduit
 9. Product options and substitutions. Alternate U.S. manufacturers permitted.
- B. Conductors: Straight through type 4 twisted pair minimum 23 AWG, stranded copper.
1. Terminated with male 8-pin modular plugs.
 2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6 cable performance specification.
 3. Nominal Impedance: 100 ohms plus or minus 15 per cent. Certified and capable of performing to a minimum of 250 MHz.
 4. Match performance and impedance characteristics of the installed horizontal unshielded twisted pair cable. Utilize plenum or outdoor, "OSP" rated where required.
 5. Each patch cord shall have a plastic arch for ease of removal of the connector (rubber boots are not acceptable). Preferred Copper Patch type: Ortronics (Legrand) #OR-MC615-XX.
 6. Patch cords shall be factory made, tested and individually factory wrapped within non-clear plastic bags.
 7. All Category 6 patch cords shall be yellow in color.

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- C. Connector:
1. 8-pin modular, Category 6, non-keyed.
 2. Complies with TIA-568-C "T568A" pinning configuration.
 3. Color: Clear.

2.12 OM1 FIBER CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Belden
 2. Berk-Tek
 3. CommScope Uniprise
 4. Corning Cable Systems
 5. General Cable - Preferred
 6. Leviton
 7. Optical Cable Corp.
 8. Ortronics (Legrand)
 9. Superior Essex
 10. Product options and substitutions: Alternate U.S. manufacturers permitted.
- B. Conductors: 2 / 6 strand
1. Provide multi-strand, 62.5/125 micron, tight-buffered, multimode, OM1 fiber cabling rated as follows:
 - a. $1 \text{ Gb/s} \leq 150\text{m} @ 850 \text{ nm}$.
 - b. $1 \text{ Gb/s} \leq 1000\text{m} @ 1300 \text{ nm}$.
 2. The fiber cabling shall meet the following specifications:
 - a. EIA/TIA-492AAAA-A-1997, "Detail Specification for 62.5 micron Core Diameter/125 micron Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers."
 - b. IEC 60793-2-10, "Product specifications – Sectional specification for category A1 multimode fibers", Type A1b 62.5/125 micron graded index fiber.
 3. Provide individually insulated plenum rated strands under common plenum rated sheath, unless entire area where cable is installed is not considered a return air plenum according to any applicable codes.
 4. Fiber cabling shall comply with individual characteristics established in TIA-568-C including all addendums for fiber optic cable performance specification.
 5. All exterior or underground fiber cable shall be indoor/outdoor rated.
 6. Provide footage markings to easily identify the cable lengths.
- C. Basis of Design:
1. Indoor riser rated: General Cable #CG0021PNR or approved equal.
 2. Indoor plenum rated: General Cable #CG0021PNU or approved equal.
 3. Indoor/Outdoor rated: General Cable #CG002ANR.BK or approved equal.

2.13 OM1 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

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5. General Cable
6. Leviton
7. Optical Cable Corp.
8. Ortronics (Legrand)
9. Superior Essex
10. Product options and substitutions. Alternate U.S. manufacturers permitted.

- B. Fiber optic duplex patch cords.
1. Fiber connectors shall be SC/SC type.
 2. Complies with individual characteristics established in TIA-568-C including all addendums for fiber optic patch cable performance specification. Utilize plenum or outdoor, "OSP" rated where required.
 3. Patch cords shall be factory made and factory tested individually, and factory wrapped within non-clear plastic bags.

2.14 WIRE MANAGEMENT PANELS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Panduit: Preferred
 2. Chatsworth Products
 3. CommScope Uniprise
 4. Leviton
 5. Ortronics (Legrand)
 6. Product options and substitutions: Alternate U.S. manufacturers permitted.
- B. Cable management panels shall be "2RU" high, horizontally rack mounted and equipped with opaque covers to conceal the patch cords.

2.15 ACCESSORIES

- A. Lightning/Surge Protection: Products shall utilize internal or external (power and low voltage) surge protection such that a normally occurring power surge shall not void any manufacturer's warranty.
1. Provide individual surge protective devices (power and low voltage) at both ends of all exterior copper intercom wiring exiting the building. Surge suppression shall be provided for the power and control wiring associated with the barrier arm and sliding gates, exterior call stations and power supplies. Refer to specification section 264128.
 - a. Rack mounted surge protectors shall be provided within the network node cabinet to protect the CAT-6 cabling serving the exterior, call-in stations. Modular surge protectors shall also be provided at the call-in stations end of the CAT-6 cable.
 - b. The Contractor shall provide high-definition photographs showing the installation of the required surge protection devices at both ends of all exterior power and low voltage conductors. Photographs shall be transmitted to the A/E and USPS Project Manager.
- B. Intercom network node equipment rack shall utilize a standalone, UPS sized for a minimum of 18 minutes of battery run-time. The UPS shall be provided with a dedicated 20 Amp, 120VAC power and NEMA L5-20R receptacle.
1. The UPS shall be line-interactive, rack mounted and rated 1000VA/900Watt with an 18 minute battery reserve at 450 Watts; Tripp-Lite #SMART1000RML2U.

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- C. Wall Mounted Rack: Provide and install wall mounted, open equipment rack to provide sufficient mounting space for the required video intercom equipment.
 - 1. Racks shall be all metal construction conforming to EIA standards with 19 inch equipment mounting opening and 1-3/4" vertical spacing of equipment. Rack rails shall be punched with captive nuts, 10-32 screws and nylon washers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- 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.
- E. Provide required power outlets, low voltage power supplies, interconnecting cables, hardware and equipment for a complete and operable system.
- F. Master and call-in station locations are to be reviewed and approved by the Facility and Postal Inspector, through the USPS Project Manager, prior to installation of conduit and cabling.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Verify that electrical connections are made correctly.
- C. When not installed in cable trays, cable (CAT-6, fiber optic, and low voltage power) shall be supported with wide base cable hangers rated for proper support of CAT-6, fiber optic, and innerduct cables (compliant with UL and NEC requirements for structured cabling).
 - 1. Cable hangers shall be installed every 3 to 6 feet and shall be rated to support the weight of the cable multiplied by a factor of three (3).
- D. Install exposed conduits and cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours.
- E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Use lacing bars in cabinets.
- F. Cables are to be secured to the rack frames at sufficient intervals to ensure that the weight of the cable will not contribute to fatigue or early failure of that cable or the device and connector to which it is attached.

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- G. Sufficient excess cable shall be provided in "service loop locations" to ensure that the cable may be re-connected without requiring the addition of extension pieces.
- H. All permanent cabling shall be mechanically numbered to provide system documentation. Apply wire and cable marking tape to designate wires and cables to identify media in coordination with system wiring diagrams.
- I. All wiring to include CAT-6 and Fiber Optic cables shall utilize hook and loop fasteners to eliminate the risk of over-tightening cable bundles and affecting the strength or rated performance of the cable. The use of tie wraps is not acceptable.
- J. Double-sided foam tape shall not be used to secure any equipment, terminal blocks, or accessory devices. All device mounting shall be of a permanent nature.
- K. All excess length AC cords are to be tie-wrapped out of the way. Where possible, they shall be routed in a separate bundle a minimum of 6 inches away from any signal or control cable.
- L. Care shall be exercised at all times to protect Postal Service property. For example, ladders shall not be placed against wallpapered or finished surfaces, equipment or furnishings; desks or countertops shall not be used in lieu of ladders.
- M. Arrange all components to be mounted in the network node rack(s) to provide a neat appearance and accessibility for servicing equipment.
- N. Provide required power outlets, interconnecting cables, hardware and equipment for a complete and operable system.
 - 1. Power, 120VAC: As required by codes and standards for the facility.
 - 2. Where conduit is used, a minimum of 40% excess capacity shall be provided for future use.
- O. Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.
- P. Weatherproof Equipment: Install units that are mounted outdoors, in damp locations, or where exposed to weather consistent with requirements of weatherproof rating. Provide surge protection where required.

3.3 FIELD TESTING CAT-6 COPPER AND FIBER OPTIC CABLE

- A. Section 014000 – Quality Requirements: Field testing and inspection.
- B. Field Testing Procedures:
 - 1. Provide all equipment and services necessary to test the cabling.
 - 2. Test and calibrate instruments before testing.
 - 3. Re-terminate and retest any cable found to be defective.
 - 4. Perform cable testing and submit report prior to installation of any cameras or node cabinets.
- C. CAT-6 Copper Cable Testing:
 - 1. Use Level III Compliant test equipment.
 - 2. Test parameters shall include:
 - a. Wire map.
 - b. Insertion loss (attenuation).
 - c. DC loop resistance.
 - d. Return loss at camera.
 - e. NEXT, NEXT at camera.

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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.

D. Fiber Optic Testing:

1. Use 62.5/125 micron, OM1, multimode fiber optic cable testing.
2. Perform testing of fiber in accordance with the fiber type being tested, TIA-526-14-A, Method B for Multimode Fiber (One Jumper/Two Adapters).
3. Multimode fiber optic cable shall be tested bi-directionally at wavelengths of 850nm and 1300nm.
4. The fiber testers and test heads shall have passed calibration within one year of actual test date.
5. Tests include:
 - a. Tier 1 Testing with Optical Loss Test Set (OLTS) that includes testing for length.
 - b. Tier 2 Testing with OTDR to show all splices.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installations, including connections. Report results in writing.

B. Testing:

1. The Contractor shall perform tests and provide test equipment, tools, and personnel required to conduct system tests and inspections.
2. The Contractor shall conduct system acceptance test upon completion of installation using pre-approved procedures. Test shall consist of system, subsystem, and device level acceptance tests, including software.
3. The Contractor shall ensure that test procedures confirm each specification statement and manufacturer requirement has been met or exceeded. An actual demonstration of each system function and a simulation of each system failure shall be provided.
4. An acceptance test period of thirty days shall begin at the start of the acceptance test. Any system failure during the acceptance test period will suspend the acceptance test. The thirty-day test period will restart when the required repairs have been made and certified.
5. Perform all tests in the presence of the Postal Service Project Manager. The Postal Service reserves the right to accept any portion or activate any phase prior to acceptance of entire system.
6. Schedule tests with at least seven days advance notice of test performance.

3.5 ADJUST AND CLEAN

- A. Adjust equipment for proper operation.

3.6 PROTECTION

- A. Protect finishes until substantial completion.

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3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train maintenance personnel to adjust, operate, and maintain equipment as specified below:
1. Train maintenance personnel on programming equipment for starting up and shutting down, troubleshooting, servicing, and maintaining equipment.
 2. Review data in maintenance manuals.
 3. Schedule training with Postal Service at least seven days in advance.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2021
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SECTION 281304

ENTERPRISE PHYSICAL ACCESS CONTROL SYSTEM (ePACS)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes specifications for an integrated security management system which shall perform the following general service:
1. Access control.
 2. Alarm monitoring.
 3. Reporting functions.
 4. Security management functions.
 5. Photo-ID badge issuing.
- 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 including:
1. ePACS Standard System Configuration – revised March 2017.
 2. Access Control (ePACS) SOP – revised October 2019.
- C. Related Sections:
1. Section 260500 – Common Work Results for Electrical.
 2. Section 264128 – Surge Protective Devices (SPD's).
 3. Section 275117 – IP Video Intercom and Exterior Gate Control System.
 4. Section 282305 – Integrated Security and Investigative Platform (ISIP) CCTV System.

1.2 SYSTEM DESCRIPTION

- A. Enterprise Physical Access Control System:
1. The existing ePACS is operational and functioning properly. The existing system shall be enhanced to support the additional card readers and components indicated on the drawings.
 2. Enhancements shall consist of additional stand-alone microprocessor-based controllers, lock power supplies, card readers and associated ePACS devices.
 3. Existing ePACS controllers (Vanderbilt #SRCNX-1) shall be serviced to ensure their proper operation. Existing lock power supplies and batteries shall be replaced. Contractor shall field verify quantities of existing controllers, power supplies and batteries prior to bid.
 4. Access management system (System) shall monitor and control access to areas defined herein.
 5. The microprocessor based controllers will be capable of controlling 16 card reader inputs and 16 door outputs. It will also be able to monitor a minimum of 92 alarm points, storing a minimum of 5000 events before downloading to the central computer. It will be able to store a minimum of 10,000 cardholders.
 6. Specific types of devices and their functions shall be addressed in relevant sections.
 7. The existing system supports an integrated electronic photo identification (photo-ID) system.
 8. Existing system utilizes an ODBC compliant database, such that it can share or retrieve information from a local database.
 9. Existing system is able to compare its list with the information from the USPS database and flag discrepancies of listed individuals in either database and have the ability to generate a report listing the discrepancies and records.

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10. Existing system shares its database with the electronic photo-ID system to eliminate redundant input of data to the databases for common data fields.
11. The existing operating system is USPS Windows applicable version (ACE standard operating system).
12. The existing system supports true multi-user, multi-tasking with a minimum of 3 workstations.
13. The existing system includes the capability for remote access for off-site support and/or management workstations.
14. The existing system utilizes standard GUI interface allowing day-to-day operations to be performed using a standard mouse.

B. Description of Work:

1. The Systems Integrator shall include all necessary labor, tools, equipment, and ancillary materials required to enhance the existing operational access control and alarm monitoring system.
2. Enterprise Physical Access Control System will manage access to the following building and selected areas using encoded cards.
 - a. employee entrances/exits
 - b. access to administrative space
 - c. Registry Cage
 - d. Vehicular access (employee and USPS maneuvering area).
3. The extent of Enterprise Physical Access Control System work is defined to include, but not by way of limitation:
 - a. ePACS Controllers.
 - b. Reader Interface Modules.
 - c. Card reading sensors.
 - d. Cards: Not In Contract, provided by local USPS facility.
 - e. ACE Standard Server/Workstations & Software: Not In Contract, existing.
 - f. Photo-ID badge issuing software. Not In Contract, existing.
 - g. Photo-ID badge printer. Not In Contract, existing.
 - h. Digital badge camera, backdrop, consumables and peripherals. Not In Contract, existing.
 - i. Input monitoring modules.
 - j. Output relay modules.
 - k. Wiring, power supplies, switches and ancillary equipment.
4. Requirements are indicated elsewhere in these specifications for work including, but not limited to, raceways and electrical boxes and fittings required for installation of control equipment and wiring, not the work of this section.
5. The power supplies and micro-switches controlling the egress electric locks at each of the turnstiles and the RE-4 personnel door located at the employee entry shall be de-energized upon activation of a fire alarm emergency or manual operation of the emergency evacuation pushbutton. Turnstiles shall immediately operate in the "free spin" mode (egress direction only). Inbound entry direction shall remain secure. Coordinate all requirements with section 111415 – Turnstiles.

1.3 REFERENCES

- A. NEC: All electrical wiring work shall comply with the latest edition of the NEC.
- B. NEMA: Electrical equipment shall comply with applicable portions of NEMA.
- C. FCC: All assemblies shall be in compliance with FCC emission standards.
 1. Proximity/Contactless Smartcard Card Reading Sensors: Part 15, Subpart F (field disturbance sensors).
 2. Dial-up modems: Part 68.

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- D. UL-1012 and CSA: All power supplies shall be in compliance with Underwriters Laboratories standard 1012 and CSA standards for power supplies.
 - 1. UL-294: The system shall comply with Underwriters Laboratories standard 294 for Enterprise Physical Access Control Systems.

1.4 SUBMITTALS

- A. Product Data: Submit for prior approval, six (6) copies of manufacturer's data on Enterprise Physical Access Control System and components, including manufacturer's model numbers, catalog data sheets, power requirements, dimensions, layouts, installation details, single line riser diagram.
- B. Shop Drawings: Submit dimensioned drawings of Enterprise Physical Access Control System and accessories including controllers, proximity card reading sensors, keypads, power supplies, switches and ancillary equipment. Submit separate layout drawings of each terminal cabinet, equipment rack, control panel, interpanel and intrapanel wiring, power supplies, terminal strips, including labeling of all components, point-to-point wiring, and calculations for UPS power. Provide 1/8 inch scale floor plans showing locations of all devices.
 - 1. Submit dimensioned and scaled elevation drawings for each ePACS terminal cabinet showing the location of the reader interface modules, associated reader power supplies, terminal strips, surge protectors, receptacles and other ePACS components. Elevation drawings shall be submitted and approved prior to ordering the terminal cabinets.
- C. Security Riser Diagram: Shall detail the number and location of controllers, reader interface modules, power supplies, indicate all cabling and wiring, host equipment. Riser diagrams shall be submitted to the USPS Project Manager for review and concurrence prior to execution.
- D. Operator's Manual: Submit for prior approval, six (6) copies of manufacturer's manual for programming and operating the system and its related components.
- E. Submit evidence of training from the manufacturer of the system proposed for installation. Evidence shall include written certificates of training or similar documentation on manufacturer's letterhead demonstrating the installer's qualifications.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Manufacturer of products defined in this section must have:
 - 1. Industry experience: Company must have at least five (5) years experience in manufacturing and servicing integrated access control and alarm monitoring systems.
- B. Contractor
 - 1. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional enterprise physical access control system (ePACS). The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.
 - 2. The Contractor shall furnish certification that the entire system has been inspected and tested, is installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and ULI listings, and is in proper working order.
 - 3. The USPS requires professional workmanship from an experienced "systems" contractor and will reject any faulty workmanship or installation methods not meeting their satisfaction.

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- C. Systems Integrator:
1. Company with a minimum of five (5) years system design, engineering supervision, and installation experience in the alarm, building automation, or Access Control industry.
 2. The Integrator shall obtain a Sensitive Clearance from the USPS. This clearance will be coordinated by the USPS Project Manager. Use the following email for assistance in obtaining this clearance: pacs-support@usps.gov
 - a. An interim clearance will be issued to allow the Integrator to request an ACE login from the USPS Project Manager.
 - b. It will take a minimum of two weeks to obtain an interim clearance.
 3. Company that is trained and authorized to install manufacturer products. The ePACS wiring shall be installed by a systems integrator trained and authorized to install and wire the manufactured products.
 4. Company that has been successfully installing systems of equal size and complexity for a minimum of five (5) years. Submit a minimum of three (3) references. System references shall include projects where software and hardware installed is similar to the software and hardware proposed for this project.
 5. The systems integrator shall include all necessary labor, tools, equipment, and ancillary materials required to furnish and install a complete and operational access control and alarm monitoring system.
 6. The extent of Enterprise Physical Access Control System work is defined to include, but not be limited to:
 - a. Installation of and testing of system including controllers, reader interface modules, proximity/contactless smartcard card readers, keypads, input modules and output modules, software and photo-ID badge issuing system equipment.
 - b. Wiring, power supplies, switches and ancillary equipment.
 - c. Programming of system, including creation/translation of database with USPS input, and access levels.
- D. System Checkout:
1. Burn-in: 1,000 hours at normal operating conditions or equivalency.
 2. On-site testing: Manufacturer trained and authorized Systems Integrator shall functionally test each component in the system after installation to verify proper operation and confirm that the panel wiring and addressing conform to the wiring documentation.
 3. Service facility: Systems Integrator shall have service facilities within 4 hours travel time of the installation. Any increase in this time shall be approved by the USPS Project Manager.

1.6 WARRANTY

- A. System Components: Twelve (12) months from date of acceptance.
1. Systems Integrator shall provide twenty-four (24) hour emergency service for all reported system operational failures during such twelve (12) month warranty period. The system must be fully operational within forty-eight (48) hours. Include all necessary maintenance for the entire integrated system for the twelve (12) month warranty period. On-site service response shall be within four (4) hours of the initial request for service and shall be provided twenty-four (24) hours a day, seven (7) days a week inclusive of all holidays.
 2. Service requests shall be reported via phone call to a designated service toll free phone number provided by the Systems Integrator.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Enterprise Physical Access Control System Controller:
1. Contract transfer to Vanderbilt Industries (sole source provider for controller).
 - a. Contact the following;
 - 1) Patrick Shadood, USPS Account Manager, 2 Cranberry Road, Parsippany NJ 07054, office 973-316-3910; mobile 908-432-8806; fax 973-334-4850; PatrickShadood@vanderbiltindustries.com
 - 2) THE CONTRACTOR IS REQUIRED TO INFORM THE MANUFACTURER THAT THE CONTROLLER IS FOR A U.S. POSTAL SERVICE PROJECT.
 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not Permitted.
- B. All other Enterprise Physical Access Control System peripheral components:
1. Subject to compliance with project requirements, manufacturer offering Products which may be incorporated in the Work, including the following:
 - a. Alarm Controls Corporation (800) 645-5538.
 - b. Allegion/Schlage (877) 671-7011.
 - c. Altronix Corporation (888) 258-7669.
 - d. Bosch Security Systems, Inc. (800) 289-0096.
 - e. Ditek Corporation (800) 753-2345.
 - f. GE Security (800) 428-2733.
 - g. George Risk Ind./GRI (800) 523-1227.
 - h. HES Innovations (800) 626-7590.
 - i. HID Corporation (800) 237-7769.
 - j. Hirsch Electronics Corporation/Identiv, Santa Ana, CA (888) 809-8880.
 - k. Honeywell Security (800)323-4576.
 - l. Lenel Systems International (866) 788-5095.
 - m. Potter Electric Signal Co. (866) 240-1870.
 - n. Safety Technology International (STI) (800) 888-4784.
 - o. Software House (800) 507-6268.
 - p. Vanderbilt Industries: contact G. Patrick Shadood; Office - (973) 316-3910; Mobile – (908) 432-8806.
 - q. XCEEDID Corporation (877) 671-7011.
 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS AND COMPONENTS

- A. Enterprise Physical Access Control System Controller:
1. The Enterprise Physical Access Control System shall include microprocessor based controllers by Vanderbilt Industries #VRCNX-A.
 2. The contractor is required to inform the manufacturer that the controller is for a U.S. Postal Service project.
 3. The controller shall be ordered in a NEMA 1, metal enclosure for wall mounting and include integrated battery backup. The controller shall be equipped with keyed door latch.

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- B. Controllers: provide complete hardware to operate with the following features:
1. The controllers shall support a minimum of sixteen (16) card reading sensors and shall be capable of supporting additional input and output modules. Vanderbilt Industries #VRCNX-A.
 2. Database: Database shall store all user operating data and handle event reporting for all possible attached devices, and shall contain memory capacity for the following:
 - a. Minimum of 10,000 card holder records.
 3. Event activity: System shall designate activity as an alarm or non-alarm condition, dependent upon modules installed, and shall report activity for:
 - a. Supervised monitor points: ninety-two (92) minimum.
 - b. Outputs: forty-six (46) minimum.
 4. Relay outputs: System shall initiate relay output commands based on:
 - a. Card Access Activity.
 - b. Operator Keyboard Inputs.
 - c. Pre-programmed Time Periods.
 - d. Input activation.
 5. System diagnostics:
 - a. Automatic system diagnostics and automatic alarming based on detected faults in the controllers, card readers, wiring, and expansion modules. At a minimum, diagnostics shall include faults, card reader errors, input change of state, expansion module faults, host communications, power monitoring and reader communications errors. If a problem is detected, it shall be reported to the host (when communications is restored).
 - b. Each time the controller is powered, the panel shall go through an automatic diagnostic cycle. If a problem is detected, it shall be reported to the host. Diagnostics cycle shall include indications for fault, reader error, card swipe, monitor point change of state, host communication, card reader communication, program watchdog and power.
 6. Transaction buffer: 5,000 transactions, minimum.
 7. Flash memory for real time program updates from the host and/or locally connected computer.
 8. Communication: Primary communications shall support TCP/IP protocols for Ethernet using the USPS structured wiring system via an on-board Ethernet port. In addition, the controllers shall have an on-board RS-232 port for local connection and emergency dial-up communications.
 9. Tamper Switch: enclosure shall include a SPDT tamper switch wired at the factory.
 10. UL-294 rated.
 11. Power:
 - a. The controllers shall operate on 12 - 24VDC, powered from an external, regulated power supply with battery backup. The controllers shall provide necessary power to all card readers and expansion modules.
 - b. Memory Retention: The controllers shall maintain configuration and card holder information for up to seventy-two (72) hours when operating power is disconnected from the controllers.
- C. Reader Interface Module (RIM):
1. Each card reader sensor shall be interfaced with a dedicated, single reader interface module connected to the controller via RS-485 protocol, Vanderbilt "VRINX". Interface module shall have the following features:
 - a. The reader interface module shall support multiple reader technologies including, but not limited to:
 - 1) Smart Card
 - 2) Magnetic Stripe (swipe or insertion)
 - 3) Wiegand (swipe or insertion)
 - 4) Proximity
 - 5) Biometric
 - 6) Barcode

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- b. Input/Output configurations:
 - 1) Inputs: 4 supervised or non-supervised.
 - 2) Outputs: 2 form "C" SP/DT 1A relays.
 - c. RS-485 communication: Up to 4,000 feet.
 - d. Power:
 - 1) Voltage: 14 – 24 VDC predicted upon read head used.
 - 2) Current: 120 mA @ 24 VDC (without read heads).
 - e. Operating temperature: 0 degrees to 49 degrees C (32 degrees to 120 degrees F).
 - f. Operating relative humidity: 10 – 90 percent non-condensing.
 - g. The reader interface module shall be mounted within NEMA 1, metal enclosure with keyed door latch.
- D. Input/Output Expansion Board:
- 1. Input/Output expansion boards shall be utilized to provide additional input and output responses in excess of the available input/output configurations at the reader interface modules. Expansion boards shall also be utilized to supervise multiple door contacts, exit alarms, etc. in lieu of using reader interface modules.
 - 2. Input/Output expansion board shall be connected to the controller via RS-485 protocol, Vanderbilt #VIONX-8.
 - 3. The input/output expansion board shall support universal triggers which integrate any input with any or all output responses and shall have the following features:
 - a. 16Kb flush memory and 1Kb RAM
 - b. Two serial ports (RS232 or RS485)
 - c. (8) supervised or unsupervised contact inputs
 - d. Contacts can be defined as alarms, door status, egress, or other environmental conditions
 - e. (8) Form "C" SP/DT mechanically latching 1 A relay outputs
 - f. NEMA 1, metal enclosure with hinged door and keyed door latch
 - g. BAA compliant.
- E. Card Reading Sensor:
- 1. General:
 - a. Reader (CR) shall read both proximity card and contactless smartcard and send signal to Controller for processing. The CR shall be compatible with:
 - 1) 125 KHz proximity, such as HID Corp 1000, capable of direct image printing (PVC overlay for direct image printing is acceptable).
 - 2) Contactless smartcard (ISO 14443 Standard, such as Mifare, and FIPS 201 compliant) capable of direct image printing (PVC overlay for direct image printing is acceptable).
 - b. Reader shall be dual technology and be listed in the FIPS 201 Evaluation Program Approved Product list <http://fips201ep.cio.gov/apl.php>
 - c. CR shall comply with the Standards for Facility Accessibility by the Physically Handicapped (USPS Handbook RE-4).
 - d. CR shall have the means to be electrically isolated to prevent short circuits from disrupting other communications in the data line network.
 - 2. Capacities:
 - a. CR shall read digital proximity cards signals to a minimum distance of 2 inches and contactless smartcard to a minimum distance of 1.5 inches (5.08mm) and does not require contact with the sensor.
 - 3. Long Range Proximity Card Readers (LRCR) to be provided at:
 - a. High-speed rollup doors.
 - b. Employee parking area gates.
 - c. These LRCR's are exempt from the requirements of FIPS201.

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- d. Note that long range card readers require individual power supplies and batteries that must be served with 120 volt power. The power supplies shall be mounted within NEMA 1, metal enclosure equipped with keyed door latch.
 - 4. Specifications: Material shall be Polycarbonate UL94, and shall be UV resistant, sealed, water and weather resistant, and tamperproof.
 - 5. Environmental:
 - a. Humidity: 0 percent to 100 percent condensing.
 - b. Temperature: -40 degrees to +158 degrees F (-40 degrees to +70 degrees C).
 - 6. Regulatory: Controller shall be designed to meet the following regulatory requirements:
 - a. UL294 Listing Standard for Safety.
 - b. FCC EMI and EMC Class A.
 - c. EN55022 EMI and EMC Class A.
 - 7. Mounting:
 - a. CR shall have the capacity to be mounted and operated behind any non-metallic, non-conductive surface, including glass.
 - b. CR shall have the capability to be mounted on any metal door frame.
 - c. Long range proximity card readers (LRCR):
 - 1) At high-speed rollup doors mount per manufacturer's recommendations for industrial powered trucks and protect CR from vehicle impacts.
 - 2) At Vehicle Gates mount per Standard Details.
 - 8. Power:
 - a. Source: Via the Wiegand interface cable to the controllers.
 - b. The sensor shall emit a low power (less than one microwatt) RF field in up to six (6) inches from surface.
 - 9. Wiring: Multiple conductor overall shielded cable (6/C-#18 AWG minimum). Size cable gauge to meet distance requirements from the controllers.
 - 10. Feedback:
 - a. Single tri-color LED (green/amber/red) shall provide capability for diagnostic feedback.
 - b. Green LED indicates valid card and red LED indicates invalid card.
 - c. An audio tone shall indicate successful digital proximity/contactless smartcard card read and access granted.
 - 11. Diagnostics: CR and data-line integrity shall be monitored continuously and shall alarm if failure is detected and indicate device and location of fault.
 - 12. Self-protection:
 - a. Physical damage, including breaking open sensor housing, shall not allow access to any circuitry which would allow the system to be compromised.
 - b. Transmission of any frequency (or set of frequencies) into the sensor at any power level shall not compromise the system.
- F. Power Supplies with battery backup: Provide separate power supplies for controllers, associated electric locks and reader interface modules not powered by controllers.
- 1. General:
 - a. Uninterruptible Power Supply shall provide continuous power to the controller, card reader, expansion modules, annunciator devices, and electric locks and operate from a 120VAC/60Hz source.
 - b. Provide external rechargeable battery(s) to maintain all controller, card reader, expansion module, and electric lock operation for at least four (4) hours in event of power failure.
 - c. Power supplies and batteries shall be mounted within NEMA 1, metal enclosure equipped with keyed door latch.
 - 2. Capacities: The Power supply shall provide:
 - a. 12 Volt DC output to the controller; or 24 volt DC output to the electric locks.
 - b. Ampere output current at 12 VDC, 24 VDC – 6 amps continuous.
 - c. Power failure output and battery charger output.

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3. Environmental:
 - a. Humidity: 85 percent at 86 degrees F (30 degrees C).
 - b. Temperature: 32 degrees to +122 degrees F (-0 degrees to +50 degrees C).
 4. Regulatory: UL 294 and CSA.
 5. Power: 120VAC/60Hz source.
 6. Wiring:
 - a. The power supply shall be connected to the controller via wiring of at least 16 AWG.
 - b. The power supply shall utilize phoenix type connectors to allow for ease of field wiring and unit replacement or as recommended by the manufacturer.
 7. Feedback: A single LED indicates power ON condition.
 8. Self-protection: The power supply shall provide the following signals to the Controller:
 - a. Power fail.
 - b. Battery recharge signal.
 9. The electric lock power supplies controlling the exit doors shall be equipped with a fire alarm interface for emergency lock release.
- G. Electric Door Strike:
1. The electric strike shall transmit data to the interface module indicating the bolt is not engaged and the strike mechanism is unlocked. Power line supervision shall incorporate an end-of-line resistor.
 - a. Electric strike shall be concealed for use with cylinder locksets.
 - b. Electric strike shall be tamper resistant and rated 12 or 24 VDC with internally mounted solenoid.
 - c. Electric strike shall accommodate 1/2 inch to 5/8 inch cylindrical latch bolt (5/8 inch with 1/8 inch door gap).
 - d. Field selectable "Fail Secure/Fail Safe" (set to "Fail Safe").
 - e. Basis of Design: Assa Abloy #HES8000C (complete with faceplate).
- H. Magnetic Lock:
1. Provide bracket mounted, magnetic lock with 1200 pounds of holding force suitable for single door leaf installations. Double leaf doors shall be equipped with (2) single magnetic lock assemblies in separate enclosures. The magnetic lock shall have the following features:
 - a. U.L. 294, U.L. 10C and U.L. 864 Listed.
 - b. Current Draw: 505 mA.@12 VDC.
 - c. Magnet Size: 10-1/2" L x 2-7/8" H x 1-1/2" W.
 - d. Armature Size: 7-1/4" L x 2-3/8" H x 5/8" W.
 - e. Clear anodized finish.
 - f. Lifetime Warranty.
 - g. Magnetic lock to include all necessary mounting plates and brackets.
 - h. Built-in ARC suppression.
 - i. Instant Release: No hysteresis.
 - j. Basis of Design: Alarm Controls #1200S.
- I. Door Contact Switch:
1. Furnish and install door contacts at each door location indicated on the drawings. Door contact switches shall be concealed type, recessed in the jamb, opposite the hinged location.
 - a. Install per manufacturer's written recommendations and maintain the minimum gap separation.
 - b. Door contacts shall be compatible with steel doors and jambs.
 - c. Door contacts for new doors shall be concealed type only. Surface mounted door switches shall only be installed on existing doors and frames.
 - d. Basis of Design:
 - 1) Interlogix Magnetic Contacts, #1085TWN with 1K ohm resistor (surface mount).
 - 2) Interlogix Roller Plunger, #3005-N with 1K ohm resistor (recessed - wood doors).

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- 3) Interlogix Roller Plunger, #1076CW-N with 1K ohm resistor (recessed-steel doors).
- 4) Interlogix Overhead Door Magnet Contacts, #2315A-L with 1K ohm resistor (track mounted, overhead door contact - closed loop).

J. Emergency Evacuation Pushbutton:

1. Manual activation of the emergency evacuation pushbutton shall de-energize the power supplies and micro-switches serving the egress electric locks at the turnstiles and RE-4 personnel door. The turnstiles shall immediately operate in the "free spin" mode (egress direction only). Inbound entry direction shall remain secure. Normal exit operation of the turnstiles and RE-4 access gate will be disabled until the manual reset of the pushbutton. Minimum reset time shall be set at 30 seconds, per NFPA 101.
2. The pushbutton shall have indoor, "blue" polycarbonate housing with protective cover and the following features:
 - Push to activate; turn to reset operation.
 - "Red" LED indicator light.
 - Raised label to read "Emergency Evacuation Pushbutton".
 - Two (2) form "C" maintained contacts, rated 10 Amps at 125/250 VAC.
 - UL/cUL Listed; ADA compliant.
 - Indoor flush or surface mount.
 - Basis of Design: Safety Technology International, Stopper Station Series SS2429ZA-EN. Substitutions: Permitted.

K. Exit Door Alarm:

1. All controlled exit doors requiring emergency egress shall be equipped with an audible and visual alarm station. The horn/strobe exit alarm shall be equipped with a remote key operated "reset" station and shall be 12 VDC powered from the lock power supply and batteries located at the controller.
2. The exit door alarm shall have white polycarbonate housing and blue lens with the following features:
 - U.L. Listed; CE approved.
 - Sound output: 105 dBA at 10 ft.
 - Single tone: Piezo Siren-Warble.
 - Current draw: 180 mA at 12 VDC.
 - Rating: 12 VDC regulated.
 - Indoor flush or surface mount.
 - Flash rate: Same as siren sounding.
 - Basis of Design: ATW/Bosch – "The Doberman". Substitutions: Permitted.
3. Key operated "reset" stations for all door alarms shall be keyed alike and shall be wall mounted top at 60 inches AFF, adjacent to the door.
 - Basis of Design: Alarm Controls #KA105A.
4. Due to the capacity of the lock power supply, alarm and visual indications shall operate continuously for no more than (45) seconds. The visual/audible alarm shall be field adjusted to operate (30) seconds, if not reset.

L. Door Release Pushbutton:

1. Doors equipped with electromagnetic locks requiring free egress shall be released by a pneumatic time delay pushbutton.
2. Pushbutton shall contain 1½ inch diameter, mushroom head and pneumatic time delay with the following features:
 - a. U.L. listed components.
 - b. Green mushroom pushbutton with single gang, stainless steel plate.
 - c. Contacts rated 10A at 35 VDC.

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- d. Time range settable 2 seconds to 60 seconds.
- e. (1) Normally open and (1) normally closed contact.
- f. Switch time repeatable ± 10 percent.
- g. Labeled "Push to Exit".
- h. Basis of Design: Alarm Controls #TS-14.

PART 3 - EXECUTION

3.1 INSTALLATION METHODS

- A. Drawings are schematic and diagrammatic. Use judgment and care to install Work to function properly and fit within building construction and finishes. Power and low voltage conductors, conduit, components, not shown or specified, which are required to produce a complete and operative system are required to be furnished and installed. Refer to MPFS 260500.
- B. Exact location of components is determined from dimensions on the 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 equipment and systems above ceilings, in chases, and concealed within building structure.
- D. Surface mounted raceways or conduit permitted only at locations indicated on Drawings.
- E. Proposed equipment 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.
- F. Seal and make permanently watertight penetrations by 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.
- G. Install equipment and materials to provide required working clearance for servicing, repair 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.
- H. Install materials and equipment level and plumb, parallel and perpendicular to other building systems and components.
- I. Coordinate all cutting, patching and site work with the General Contractor.
- J. Touch-up scratched and marred surfaces to match original finishes; remove all dirt and construction debris.
- K. All work areas shall be left in a broom swept condition at the end of each day.

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3.2 INSTALLATION - HANGERS AND SUPPORTS

- A. Install products in accordance with manufacturer's published instructions. Install all electrical equipment in accordance with MPFS 260500.
- 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 with minimum of four anchors.
- I. In wet and damp locations use structural steel channel supports to stand cabinets one inch off wall.

3.3 INSTALLATION – TERMINAL CABINETS

- A. Terminal cabinets shall be provided to house long range reader power supplies, interface modules, SPD's and other access control system components. Enclosures shall be hinged and lockable with panelboard construction and plywood backboards.
- B. ePACS terminal cabinets shall not contain CCTV components. The ePACS shall utilize independent wiring, raceways and cabinets.
- C. Terminal cabinets shall be wall or pedestal mounted with bottom of cabinet at no less than 12 inches A.F.F. or A.F.G. Provide NEMA type 1 enclosures within interior locations and NEMA type 4X stainless steel type for exterior locations. Pedestal mounted cabinets shall be supported utilizing 4 inch square concrete posts buried 24 inches below finished grade and set in concrete footing with 6 inches of concrete all around.
- D. Terminal cabinets shall be amply sized to accommodate all components without overheating and forced air exhaust fans shall be provided. Cabinets shall be equipped with copper ground busses and those requiring 120 Volt power shall be provided with appropriate number of 20 Amp, 125 Volt receptacles complete with surge protection. Receptacles shall be securely mounted within the cabinet.
 - 1. Components shall be individually mounted and secured to the backboard. Stacking of components is not acceptable and the use of tie-wraps is prohibited.
- E. Exterior terminal cabinets mounted near or adjacent to vehicular traffic shall be protected using 6 inch dia. x 4 ft. high concrete bollards. Exterior terminal cabinets shall be located within the secured area of the facility.
- F. Exterior terminal cabinets shall be equipped with a copper ground bus bonded to a driven ground rod using #2/AWG copper grounding electrode conductor.

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3.4 EQUIPMENT INSTALLATION AND DOCUMENTATION

A. Installation:

1. The existing Enterprise Physical Access Control System is installed and wired completely on the USPS structured wiring system.
2. Systems Integrator shall make all necessary wiring connections to external devices and equipment. Systems integrator shall program anti-pass back modes into the system in accordance with USPS requirements. Use the following e-mail for assistance in obtaining information regarding current USPS requirements: pacs-support@usps.gov.
3. Systems Integrator employees shall carry proof of manufacturer's certification at all times.
4. Install systems to conform with the approved submittal data. Where coordination requirements conflict with the system requirements, refer conflicts to the USPS Project Manager.
5. All Enterprise Physical Access Control System devices shall be securely mounted to the building structure and fastened with tamper resistant screws. Provide USPS with three sets of tamper screw removal tools to be stored locally for service and maintenance.
6. All wiring connections shall enter enclosures at one location and be neatly dressed.
7. Device Mounting:
 - a. The controllers shall be wall mounted in a secure area.
 - b. The power supplies shall be installed in a secure area adjacent to the controllers.
8. All DC operated locking hardware, relays, and all other inductive loads shall have a diode connected to them to prevent noise and/or any induced currents. All AC operated relays or electric strikes shall have a MOV connected to them to suppress any current induced noise. Diodes and MOVs shall be connected at the strike or relay and shall be of the type recommended by the device manufacturer.
9. Install PIR request-to-exit sensors such that "corridor pedestrian traffic" will not activate the sensor. Ceiling or wall mount shall be acceptable. Adjust the pattern and sensitivity such that detection is ensured for all egress attempts and such that detection cannot be achieved from the exterior side of the door.

B. Network Communications:

1. Installer shall coordinate all network communications wiring requirements with the existing structured cabling system to insure transmission pathway through the structured wiring system.
2. Refer to "ePACS Standard System Configuration" and "Access Control (ePACS) SOP" for database configuration and local facility responsibilities.

C. Documentation:

1. Accurate "as built" drawings shall be furnished before final acceptance is requested, by the Systems Integrator to aid the USPS in programming. These shall indicate the door(s) controlled by each lock output, the monitoring points for the door controlled area, host server, workstation and badge issuing station location, all controllers locations, all electrical circuit and telecommunications outlet designations and any annunciator outputs or special inputs into the system in hard copy and electronic format (AutoCAD-coordinate version requirements with the USPS Project Manager).
2. The Systems Integrator shall supply six (6) copies of operating and maintenance manuals to aid the USPS in the programming of the system.

D. Special Requirements for Cable Routing and Installation:

1. The majority of the ePACS wiring in this building will be installed above ceilings without conduit. All communications cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed.
2. Sealing of openings between floors, through rated fire and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the contractor. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall

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be the responsibility of the contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.

3. Cabling routed underground, on the exterior, through inaccessible ceilings or less than 10 ft. – 0 in. A.F.F. in the workroom shall be contained in conduit. Provide flush boxes within finished areas and factory boxes in unfinished areas. Provide 3/4 inch conduit risers with 90 degree bend and bushing for all wall mounted devices.
4. The entire ePACS system shall utilize an independent wiring system not shared with any other building system. The structured cabling system racks, the TE's, the fiber backbone, cable trays, etc. cannot be utilized for any ePACS purpose. Cable trays installed for the ePACS cabling may be utilized to contain the CCTV wiring.

E. Surge Suppression:

1. Provide individual surge protective devices (power and low voltage) at both ends of all exterior copper ePACS wiring and associated wiring exiting the building. Surge suppression shall be provided for the power and control wiring associated with the barrier arm and sliding gates, exterior card readers, exterior reader interface modules, power supplies, door contacts and magnetic locks. Refer to MPF specification section 264128.
2. The Contractor shall provide high-definition photographs showing the installation of the required surge protection devices at both ends of all exterior power and low voltage conductors. Photographs shall be transmitted to the A/E and USPS Project Manager.

F. Gate and Door Release:

1. The gate and door release functions required for vehicle and employee entry shall not be controlled or wired as part of the ePACS. Independent wiring from the video intercom CEU is to be provided. The video intercom system shall perform all the gate and door release functions. Loss or interruption of the ePACS shall not affect the operation of the gate or door release functions.

3.5 SERVICE AND SUPPORT

A. Startup:

1. The Systems Integrator shall coordinate all system database requirements with the USPS and build the system database for the host server and workstations. At a minimum the Systems Integrator shall:
 - a. Provide worksheets to the USPS with requested database information a minimum of four (4) weeks prior to anticipated system startup.
 - b. Load all system device names and system addresses.
 - c. Load basic access levels.
 - d. Load and test all applications and interfaces.
 - e. Load and test sample proximity cards compatible with USPS Standard Card.
2. After the system has been installed, the documentation delivered to the USPS and network communications is established in compliance with Sections 3.1 & 3.2, A above, the Systems Integrator shall verify correct operation of all system components and demonstrate and test the system for the USPS.
3. Final system acceptance testing shall be conducted by the USPS Project Manager or, at the option of USPS, their authorized representative. Acceptance testing shall demonstrate all aspects of the Enterprise Physical Access Control System as described in the contract documents. The Systems Integrator shall make provisions for testing (any simulations required for testing) and provide a final acceptance test plan a minimum of one week prior to the anticipated testing date.
4. Final acceptance testing shall be conducted on the completed system as described in this specification and configured to the satisfaction of the USPS Project Manager.
5. The Systems Integrator shall guarantee all material and workmanship involving the system for twelve (12) months after startup.

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- B. Warranty Support:
1. The Authorized Systems Integrator shall be available during the warranty period to answer programming and application questions to support USPS personnel during this period.
 2. The Authorized Systems Integrator shall have the training and capability to provide additional support services including:
 - a. Regular testing and inspection of all system components and to submit reports on the results.
 - b. Emergency Service for repairs and adjustments to the system and part replacement if necessary.

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.

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- D. Dial-Up System: Communication link utilizing "POTS" line which connects alarm to central station through dial-up circuit.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

1. System: Central microprocessor, remote intrusion sensors and detection devices, and a communications link to perform monitoring and alarm functions. System physically and electronically modular with provision for field expansion. System self-monitoring and self-diagnostic.
2. Communication Link: Voice grade dial-up line and dedicated to intrusion detection, alarm service, and control of security related functions.
3. Environmental: Design to withstand the following environmental conditions without mechanical or electrical damage or degradation of operating capability.
 - a. Altitude: Sea level to 4000 feet.
 - b. Ambient Temperature for Interior Elements: 0 degrees C to plus 40 degrees C.
 - c. Relative Humidity for Interior Elements: 5 to 95 percent, noncondensing.
 - d. Ambient Temperature for Exterior Elements: Minus 25 degrees C to plus 50 degrees C.
 - e. Relative Humidity for Exterior Elements: 0 to 100 percent.

B. Performance Requirements:

1. Intrusion Detection: Performed by indicated intrusion detection devices. Devices are assigned to detection points/zones as indicated.
2. Alarm Indication: Audible signal sounds and alphanumeric display at the alarm keypad identifying the zone originating an alarm. An alarm displayed at the keypad will annunciate with an audible tone. Alarm keypad provides alpha text as to the location of the alarm zone.
3. A local 120 decibel siren is to be attached to alarm module Relay A output. Standard USPS programming as currently configured will not activate siren during alarms but installer tech should verify thru service interface that siren is functioning at time of installation.

1.5 SUBMITTALS

A. Submittal Procedures:

1. Product Data: Data for system components, including UL listing data and list of materials, dimensioned plans, sections, and elevations showing minimum clearances, mounting arrangements, and installed features and devices.
2. Shop Drawings: Wiring diagrams for system, including devices, components, and auxiliary equipment. System diagram is unique to the Project system; manufacturer's generic system diagram not permitted. Diagrams differentiate between manufacturer-installed and field-installed wiring. Include diagrams for equipment and for system with all terminals and interconnections identified.
3. Assurance/Control Submittals:
 - a. Design Data: System operation description indicating method of operation and supervision of each component and each type of circuit, and sequence of operations for all manually and automatically initiated system inputs for this specific Project. Manufacturer's standard descriptions for generic systems not permitted.
 - b. Test Reports: Submit the following reports directly to USPS Project Manager from Manufacturer's Quality Control Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
 - 1) Pre-test.
 - 2) Acceptance test.

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- 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 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.

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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 (888) 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 Magnet Contacts, #2315A-L with 1K ohm resistor (track mounted, overhead door contact - closed loop).
 - 2. 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).

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- j. Accessory Mounting Bracket: Bosch #D137.
- 3. 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 CONTROL PANEL

- A. Comply with UL Standard 1076.
- B. Cabinet: Lockable steel enclosure. Arrange panel so operations required for testing or for normal operation and maintenance are performed from front of enclosure. If more than single unit is required to form complete control panel, provide exact matching, keyed alike panels. Accommodate components and allow ample gutter space for interconnection of panels and field wiring. Identify each enclosure by engraved, laminated, phenolic resin nameplate. Lettering on enclosure nameplate shall not be less than 1 inch (25 mm) high. Identify individual components and modules within cabinets with permanent labels.
- C. Systems: Alarm and supervisory systems are separate and independent in control panel. Alarm-initiating zone boards in panel consist of plug-in cards. Arrangement requiring removal of field wiring for module replacement not permitted. Use Bosch #B9512G-USA Control Panel. The #B9512G-USA is the direct replacement for discontinued control panel #D7412GV4 and the manufacturer has verified that the control

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panel will be produced for U.S. Postal Service Projects. THE CONTRACTOR IS REQUIRED TO INFORM THE MANUFACTURER THAT THE CONTROL PANEL IS FOR A U.S. POSTAL SERVICE PROJECT.

- D. Control Modules: Types and capacities as required to perform functions of system. Visible and audible signals in control panel indicate alarm, supervisory, and trouble conditions for each zone. Each type of audible alarm has distinct sound.
- E. 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.
- F. 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).
- G. 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 the associated zone.
 - 1. The alarm keypad shall not display or annunciate the status of any IDS components (i.e., motion sensor, entry delay tone, etc.) associated with the Criminal Investigative Office.
- H. Resetting: Controls permit silencing audible signals for individual zones but prevent the resetting of alarm, supervisory, or trouble signals while condition still exists.
- I. 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.

2.6 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.

2.7 HORN

- A. 30 Watt, 12 VDC, 120 decibel, two-tone, siren type horn powered by control panel with battery backup (Bosch #D117).

2.8 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 be 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.

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2.9 SPECIAL REQUIREMENTS FOR CABLE ROUTING AND INSTALLATION

- A. The majority of IDS wiring in this building will be installed above ceilings without conduit. All communications cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed.
- B. Sealing of openings between floors, through fire rated and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the contractor. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.
- C. Support cables installed in ceiling spaces with wide-base canvas loop suspension devices such as the Erico Caddy #425 Loop anchored to building structural steel (red iron).
 - 1. Minimum and Maximum Spacing Between Supports: 4 - 5 feet.
 - 2. Furnish and install additional supports as required.
 - 3. Install complete cable support device system before starting installation of cable.
 - a. Installation of cable before completion of support system not permitted.
 - b. Unsupported cable shall not be permitted.
 - 4. Organize and group cables. Install cable group as single run through ceiling spaces following column and building lines. Do not install cable group runs diagonally across center of building.
 - 5. Cabling shall not be suspended from any electrical conduits, sprinkler systems, gas, or water pipes, etc.
 - 6. Cabling shall not be attached to suspended ceiling grid system.
 - 7. No element of the building structure (i.e. webbing of trusses) shall be used to support any low voltage cabling.
- D. Cabling routed underground, or exterior of the building, or through inaccessible ceilings or less than 10 ft. -0 in. 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.

2.10 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.

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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, LVMartinez@uspis.gov
- D. Connection and Programming Protocol:
 - 1. Connect the panel to a "POTS" telephone 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 device interface will not be permitted without advance special approval by HQ Security Group.

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- E. Wiring Within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Provide and use lacing bars and distribution spools.
- F. Number of Conductors: As recommended by system manufacturer for functions indicated.
- G. Tighten connections to comply with tightening torques specified in UL Standard 486A.
- H. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so media are identified and coordinated with system wiring diagrams as specified in Section 260500.
- I. Install power supplies and other auxiliary components for detection devices at alarm control panel or at a data-gathering panel except as otherwise indicated. Do not install such items in vicinity of devices they serve.
- J. Install panel and keypad at locations indicated on Drawings and verified by Postal Inspection Service through USPS Project Manager.
- K. Grounding: Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common mode returns, noise pickup, cross talk, and other impairments.
- L. All IDS system wiring shall be homerun from each individual device back to IDS control panel.
- M. At IDS control panel consolidate individual cable runs at a junction box located above ceiling near the IDS control panel with a single conduit down to the IDS control panel. Splicing within any cable run is not acceptable.

3.3 FIELD QUALITY CONTROL

- A. Inspection:
 - 1. Inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
 - 2. Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.
- B. Pretesting: Align and adjust system and perform pretesting of components, wiring, and functions to verify conformance with specified requirements. Correct deficiencies by replacing malfunctioning or damaged items with new items. Retest until satisfactory performance and conditions are achieved.
- C. Acceptance Operational Tests:
 - 1. Perform operational system tests to verify conformance with specifications. Test modes of system operation and intrusion detection. Methodically test for false alarms in each zone of space intrusion detection devices by simulating activities outside indicated detection patterns.
 - 2. Provide minimum 10 days notice of acceptance test performance schedule to USPS Project Manager who will coordinate with Postal Inspection Service.
- D. Retesting: Correct deficiencies and retest until total system meets the requirements of Specifications and complies with applicable standards.

3.4 ADJUSTING

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- A. Occupancy Adjustments: When requested within 1 year of date of Final Acceptance, provide on-site assistance in adjusting and reprogramming to suit actual occupied conditions. Provide up to 2 visits to site for this purpose at no additional cost to United States Postal Service.

END OF SECTION

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SECTION 282305

INTEGRATED SECURITY AND INVESTIGATIVE PLATFORM (ISIP) CCTV SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provide and install a complete IP Video System including, but not limited to;
 - a. IP Video Surveillance Cameras, housings, mounts, power supplies, cabling, and related equipment.
 - b. Video management software.
 - c. Video monitoring and recording equipment.
 - d. Equipment enclosures and remote node cabinets.
 - e. Network equipment including routers and switches.

B. Direct Vendor:

1. In the Offer, include the cost of all equipment including the cameras, housings, mounts, servers, monitors, network switch, etc. that are to be procured directly from the Direct Vendor (Securitas Electronic Security) utilizing the pass-through pricing (PTP) process. "PTP" allows you to directly order parts and equipment at prices leveraged by the Postal Service. Purchase parts and equipment in the name of your Company, which will be responsible for inspection, acceptance and payment to the "PTP" supplier.
2. The cameras, servers, monitors and associated equipment shall be supplied and installed by Securitas Electronic Security, Inc the sole approved USPS CCTV Direct Vendor. The Direct Vendor is to provide a Bill of Materials, pricing, and installation costs. The General Contractor is responsible for power, conduit, cable tray, cable and cable pulling. For assistance contact the Direct Vendor at:

Securitas Electronic Security, Inc.
Michael Tracey, USPS Account Manager
3 Westchester Plaza
Elmsford, NY 10523
Cell: 571-451-7629
e-mail: michael.tracey@Securitates.com

3. Contract to Securitas should be addressed to:

Securitas Electronic Security, Inc.
1790 Graybill Road, Suite 100
Uniontown, OH 44685

4. SES Inquiry Number: 855-331-0359
 - For any SES inquiries.

C. General Contractor:

1. Responsible for providing power, conduit, cable tray, cable, and cable pulling and NEMA 1/ NEMA 4SS Enclosures to be used as part of the installation.
2. Provide AutoCAD electronic copies of the final camera placement drawings and camera schedules (from the project issued for construction drawings produced and provided by the design A/E) to the Direct Vendor and any requested documentation. This will include head end and remote node locations and any monitors requested.

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3. Verify customer location has 56 network available for installation of system via USPS site project manager or USPS IT.
- D. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents including:
 1. System Installation Manuals (provided by the Direct Vendor) shall be left on-site during the final acceptance. Manuals will not be provided prior to installation completion.
- E. Prompt Payments. In accordance with the Contractor Certification on Postal Service Form 4211B, "Project Contract Payment Authorization", the contractor certifies that prompt payment, (within 30 days) to the subcontractor (Direct Vendor) will be made.
- F. Related Sections:
 1. Section 260500 – Common Work Results for Electrical.
 2. Section 260533 – Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

- A. The references listed below form a part of this specification:
 1. NFPA 70 - National Electrical Code.
 2. ANSI / TIA / EIA 568-C Commercial Building Telecommunications Cabling Standard.
 3. ANSI / TIA / EIA 569-B Commercial Building Standard for Telecommunications Pathways.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: IP video system between points of surveillance indicated on Drawings and the central monitoring station consists of video IP cameras, camera outlets, camera controls, monitors, control stations, distribution components, video servers, network connections and accessories.

1.4 DEFINITIONS

- A. "Non Blue Sky": The following camera locations are considered to be non blue sky applications:
 1. Interior cameras.
 2. Exterior building mounted cameras (covered or uncovered).
 3. Exterior cameras covered by an overhang or canopy or similar protection.
- B. "Blue Sky": Exterior cameras mounted remote from the building exterior wall are to be considered "blue sky" applications.

1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures:
 1. Product Data: Manufacturer's specification sheets for each component shall not be required for all products provided as part of this Direct Vendor agreement.
 2. Due to USPS security requirements, submittals will be limited to one electronic copy of the block diagram and one copy of the shop drawings to be provided to the General Contractor.
 3. Final As-Built Drawings, Operation and Installations Manual, will be supplied directly to USPS and stored within the rack per USPS Project Manager.

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- B. Shop Drawings:
1. The Direct Vendor will provide a Standard Drawing Package that shall be utilized for the installation of the CCTV system. This package shall include:
 - a. Block Diagram: System block diagrams noting major system components and interrelationships of each component.
 - b. Console and Equipment Racks: Rack elevation drawings showing console/equipment arrangement.
 - c. The shop drawings shall include camera placement (camera placements shall be provided by the project specific design entity).
 - d. The General Contractor shall submit dimensioned and scaled elevation drawings for each CCTV terminal cabinet and equipment enclosure showing the location of fiber media converters, fiber patch boxes, power supplies, receptacles, ethernet extenders, surge protectors and other CCTV components. Elevation drawings shall be submitted and approved prior to ordering the terminal cabinets and equipment enclosures.
- C. Field Testing Reports for Cat-6 Copper and Fiber Optic Cable
1. Test reports: Typewritten with complete listing of all required test parameters.
 2. Submit test reports prior to installation of any cameras or the headend.
- D. Sequence and Scheduling Plan: Direct Vendor shall provide installation scheduling plan for review and approval. Coordinate scheduling of software and revisions with the USPS.
- E. Section 017704 - Closeout Procedures and Training:
1. Operation and Maintenance Data: Include data for each type of product, including features and operating sequences, both automatic and manual. This information shall be supplied directly to the USPS by the Direct Vendor.
 2. Product Quick Reference cards for the operation of all key system components.
 3. Project Record Documents: Direct vendor shall provide field-accurate drawings that reflect actual locations of cameras and, indicating cable identifiers, layout, location and numbering of system devices to reflect as-built conditions. The General Contractor shall provide routing of cabling information.
 4. Provide a final materials list of equipment installed and spare parts on hand. Materials list shall include model number, serial number, and date installed.
 5. Project Completion Certification: Document signed by the direct vendor and a Postal Service representative indicating that the project is fully complete with all punch-listed items resolved. IN NEW CONSTRUCTION, THE GENERAL CONTRACTOR WILL SIGN THE PROJECT COMPLETION CERTIFICATION.
 6. OPERATING INSTRUCTION
 - a. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance that is required to ensure normal operation. Authorized USPS (USPIS & USPS OIG) Representatives will receive this training.
 - b. Provide one complete set of equipment operating and installation manuals that will be stored in the rack per USPS Project Manager.

1.6 QUALITY ASSURANCE

- A. Contractor
1. Company with a minimum of five (5) years system design, engineering supervision, and installation experience in the CCTV industry.

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2. Company that is trained and authorized to install manufacturer products and approved by the CCTV Direct Vendor. The CCTV wiring shall be installed by a CCTV systems installer trained and authorized to install and wire the manufactured products.
3. Company that has been successfully installing CCTV systems of equal size and complexity for a minimum of five (5) years. Submit a minimum of three (3) references. System references shall include projects where software and hardware installed is similar to the software and hardware proposed for this project.
4. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional CCTV system. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.
5. The Contractor shall furnish certification that the entire CCTV system has been inspected and tested, is installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and UL listings, and is in proper working order.
6. The USPS requires professional workmanship from an experienced "CCTV systems" contractor and will reject any faulty workmanship or installation methods not meeting their satisfaction.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Keep devices and equipment in manufacturer's packaging in a secured location until system is ready for installation.
- C. Comply with Direct Vendor requirements. Coordinate storage location with the Postal Service.
- D. The equipment delivered must be insured at the contractor's expense through acceptance.

1.8 DIRECT VENDOR WARRANTY/SERVICE/TECHNICAL SUPPORT PLAN

- A. Warranty:
 1. Direct Vendor to include manufacturer warranty for three (3) years after facility acceptance and project completion certification for materials and labor.
 - a. Service plan shall include all parts and labor, the cost of utilizing a lift truck (if required) and shall include return shipping. Failed equipment shall be repaired or replaced at no charge to the Postal Service during the Direct Vendor warranty period.
 - b. USPS shall not be required to process any paperwork in order to be entitled to service plan coverage. It is the Direct Vendor's sole responsibility to monitor and comply with warranty eligibility.
 - c. Where operational performance is substantially affected, all software and firmware shall be upgraded to the latest version supported by the purchased hardware platform throughout the service plan period and be provided at no cost to USPS. Such upgrades shall be covered under the warranty/service plan and are at the discretion of the USPS Project Manager.
 - d. Any software bugs identified by the USPS and mutually agreed upon as 'level one' bugs (impacting operation with no work-around) shall be rectified within two (2) weeks of their being reported.
 - e. Any software bugs identified by the USPS and mutually agreed upon as 'level two' bugs (impacting operation but with a work-around) shall be rectified within 90 days of their being reported.
 - f. Turnaround time for all repairs (warranty and out-of-warranty) shall not exceed 72 hours.

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- g. The annual "PM" service performed by the Direct Vendor shall include testing and exercising of the PTZ cameras. Direct Vendor shall provide annual service test results to USPIS/OIG.

B. Technical Support:

- 1. Direct Vendor shall provide toll-free 24/7 technical support at no charge throughout the warranty period.
- 2. Direct Vendor shall provide on-site installation support for systems with more than 40 total cameras. These visits shall include pre-construction site survey and project review, punch-list generation, and final inspection and system certification.
- 3. Data Recovery — Direct Vendor shall provide a service to assist the USPS in recovering data from digital recording system hard drives and removable storage media in the event of a failure.
 - a. Turnaround time for data recovery shall be less than seven (7) days from receipt of hard drives at Direct Vendor's data recovery center.

1.9 MAINTENANCE STOCK SUBMITTALS:

- A. At the completion of the installation, furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. These extra materials shall be stored within the Investigative Office.

- 1. Indoor/Outdoor fixed camera: Two cameras.
- 2. Indoor/Outdoor PTZ camera: Two cameras.
- 3. Indoor/Outdoor, Two multi-directional cameras: One camera complete with housing.
- 4. Video decoder: One decoder.
- 5. Fiber optic transmitter/receiver: Two of each type.
- 6. Camera power supply transformer: Two power supplies
- 7. Ethernet cable injector: Two PoE injector modules.

- B. These extra materials are to be used as advanced replacement parts in cases where USPS operational issues require immediate replacement and procurement of the material is delayed due to inavailability from the manufacturer. The spare parts utilized are to be replenished upon completion of the replacement or repair. Installation of the replacement units shall only be performed by an authorized representative of the Direct Vendor.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Selected Direct Vendor:

Securitas Electronic Security, Inc.
Michael Tracey, USPS Account Manager
3 Westchester Plaza
Elmsford, NY 10523
Cell: 571-451-7629
e-mail: michael.tracey@Securitates.com

- B. Section 016000 - Product Requirements:

- 1. Product options and substitutions are not permitted without a written and USPS approved deviation.
- 2. All equipment to be supplied under this specification shall be new and the current model of the Direct Vendor listed above.

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3. Systems and components shall have been thoroughly tested and proven in actual use.

2.2 VIDEO SERVER AND STORAGE

- A. Based on the Construction Documents, the General Contractor shall purchase all equipment from the Direct Vendor.
- B. Server:
 1. Server/Storage Requirements: Server storage, processor, and RAM requirements will be based off a mathematical formula from the information obtained during the site survey process. Once the number, type and classification of cameras are approved by all parties, it will calculate the required server(s) fit for the site. These servers are all HP Servers that contain USPS IT ACE images. These are approved CLINS and Assets by USPS.
 - a. Storage for 30 Days continuous video with 30% expansion capability and motion identified assuming a frame rate of no less than 15 fps. Depending on size of system storage may be either internal to the server or external iSCSI attached NAS device.
 - b. Dual Network Interface Cards on board and 4 additional GB NIC ports via PCIe card per USPS requirements. The system also contains HP's integrated Lights Out management cards. This requires 1 connection on the USPS network per server. Thus each server will have (at minimum) 2 USPS 56 Network connections.
 - c. UPS Power Supplies for Server and Storage.
 - d. Input Power: 120VAC, 60Hz (a power adaptor may be used to provide this voltage).
 - e. Operating Temperature: Range shall be equal to or greater than 10 to 40 degrees Celsius.
 - f. Humidity: Withstand a minimum of 10% to 80% humidity.
 - g. Software: "March Networks" Video Management System. Purchase one license per camera.
 - h. Laptop computer.
 - i. All items rack mounted.

2.3 IP VIDEO SWITCH

- A. CISCO Network Switch (IP Video):
 1. Based on the Construction Documents, the CISCO Switch is to be procured by the General Contractor from the Direct Vendor.

2.4 VIDEO DECODERS

- A. Video Decoders will support up to (2) remote monitors with full screen camera views; (4) camera views per monitor.
- B. Camera displays approved only by OIG and CIS.
 1. Video Output - HDMI.
 2. Video Decoding - H.265, H.264 and MPEG-4 Unicast and Multicast.
 3. Security – Password protected user access HTTPS encryption.
- C. Decoder shall be wall mounted behind the CCTV monitor(s) utilizing factory wall brackets. The decoder shall be supplied with 120 Volt obtained from the monitor's UPS unit.
- D. Basis of Design: Costar #CV12MV2.

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2.5 VIDEO CAMERAS

- A. Direct Vendor shall provide cameras.
- B. IP Color cameras for video surveillance and monitoring of specific areas as shown on the drawings and confirmed with Postal Inspection Service and/or OIG through the USPS Project Manager.
- C. Fixed, indoor/outdoor, dome type camera shall be a network camera with WDR, light finder, remote focus and zoom and shall incorporate Power over Ethernet. The camera shall meet or exceed the following requirements:
1. Be equipped with a 10BaseT/100BaseTX Ethernet interface.
 2. Include a vandal resistant, indoor/outdoor casing with smoked transparent cover where required.
 3. Equipped with pixel counter.
 4. Image sensor: Progressive scan RGB CMOS 1/2.8 inch (effective).
 5. Lens: Varifocal, 3.4 to 8.9mm, F1.8: 100 degree to 36 degree horizontal/53 degree to 20 degree vertical.
 6. Minimum illumination:
 - a. Color: 0.1 LUX @ 50 IRE, F1.8.
 - b. B/W: 0.02 LUX @ 50 IRI, F1.8.
 7. Shutter time: 1/66,500 to 2 second; 60 Hz.
 8. Pan/Tilt/Zoom: Digital PTZ, preset positions, guard tour.
 9. Angle Adjustment: Pan \pm 180 degrees, tilt \pm 75 degrees, rotation \pm 175 degrees.
 10. Resolution: 1920x1080 (2 MP).
 11. Video compression:
 - a. H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles.
 - b. H.265 (MPEG-H Part 2/HEVC), Main Profile.
 - c. Motion JPEG.
 12. Frame Rate:
 - a. WDR; 30 fps in all resolutions; 60 Hz.
 - b. No WDR; 60 fps in all resolutions; 60 Hz.
 13. Support both unicast and multicast MPEG-4.
 14. Support Power over Ethernet according to IEEE802.3af.
 15. Support both IPv4 and IPv6.
 16. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
 17. Be equipped with 1 alarm input and 1 alarm output.
 18. Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.
 19. Be supported by an open and published API.
 20. Casing: Indoor/Outdoor; IP66, NEMA 4X and IK10 impact resistant, aluminum dome with encapsulated electronics (1.8 lbs).
 21. Processor and Memory: 1024 MB RAM, 512 MB Flash.
 22. Connectors: RJ45 10 BASE – T/100BASE-TX PoE terminal block for (1) alarm input and (1) alarm output.
 23. Operating Conditions: Indoor/Outdoor; -40 to 122 degrees F; 10 to 100 percent RH.
 24. Accessories: Mounting plate, smoked transparent cover. Provide ceiling, pendant or wall bracket mounting and connector kits.
 25. Basis of Design: Indoor/Outdoor, Axis #P3245-VE.
- D. Indoor/Outdoor PTZ camera shall be a network dome camera and shall incorporate 21x optical zoom, day/night functionality, and simultaneous Motion JPEG and MPEG-4 video streams. Camera Shall meet or exceed the following requirements:
1. Be equipped with a 10BaseT/100BaseTX Ethernet interface.

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2. Include a vandal resistant, indoor/outdoor casing with smoked transparent cover.
 3. Feature a progressive scan CMOS sensor with Wide Dynamic Range (WDR), electronic image stabilizer and day/night functionality.
 4. Be equipped with 21x optical zoom.
 5. Image Sensor: 1/2.8" Progressive scan RGB CMOS.
 6. Lens: Varifocal, F1.6 to F4.5, 4.0 to 84.6 mm, angle of view: Horizontal – 77.0 to 3.6 degrees, vertical – 43.1 to 2.0 degrees.
 7. Minimum Illumination:
 - a. Color: 0.11 LUX @ 50 IRE F1.6.
 - b. Color: 0.1 LUX @ 30 IRE F1.6.
 - c. B/W: 0.03 LUX @ 50 IRE F1.6.
 - d. B/W: 0.01 LUX @ 30 IRE F1.6.
 8. Shutter Time: 1/66,500s to 2s.
 9. PTZ:
 - a. E-Flip, 256 preset positions.
 - b. 21x optical zoom and 12x digital zoom, total 252x zoom.
 - c. Pan: 360 degrees, 0.1 to 350 degrees/s.
 - d. Tilt: 180 degrees, 0.1 to 350 degrees/s.
 10. Video Compression: H264 (MPEG – 4 part 10/AVC) baseline, main and high profiles motion J-PEG.
 11. Resolution: 1280 x 720 (1 MP).
 12. Frame Rate: Up to 60 fps in all resolutions.
 13. Support multiple, motion JPEG4 and H264.
 14. Support Power over Ethernet according to IEEE802.3af.
 15. Support both IPv4 and IPv6.
 16. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
 17. Be equipped with full memory card for alarm triggers.
 18. Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.
 19. Be supported by an open and published API.
 20. Casing: Indoor/Outdoor; IP66, IK10 and NEMA 4X impact – resistant aluminum.
 21. Processor and Memory: 1024 MB RAM, 512 MB Flash.
 22. Connectors: RJ45 10 BASE – T/100BASE-TX PoE push-pull connector for (2) alarm input and (2) alarm output.
 23. Operating Conditions: -22 to 122 degrees F; 10 to 100 percent RH.
 24. Security: Password protection, IP address filtering, HTTPS encryption, IEEE 802.1x network access control.
 25. Power: 24 to 34 VDC max 16W; power over Ethernet IEEE 802.3at.
 26. Accessories: Mounting plate, smoke transparent cover. Provide ceiling, pendant or wall bracket mounting and connector kits.
 27. Basis of Design: Indoor/Outdoor, Axis #P5654-E.
- E. Indoor/Outdoor, multi-directional, fixed dome camera shall be (15) mega pixel (with (4) varifocal lenses), network type with WDR, light finder, remote focus and zoom and shall incorporate Power over Ethernet (PoE). The camera shall meet or exceed the following requirements:
1. Be equipped with 4 individually configurable camera lenses that can be individually positioned to monitor large areas.
 2. Be equipped with a 10BaseT/100BaseTX Ethernet interface.
 3. Include a vandal proof resistant casing with fan and heater.
 4. Equipped with pixel counter.
 5. Image Sensor: 1/2.5 inch progressive scan RGB CMOS (per lens).
 6. Lens: Varifocal, 3mm (F1.8) to 6mm (F2.6); (per lens).

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7. Angle of view:
 - a. 4 x 1440p: Capture mode.
 - b. 101 - 49 degrees: Horizontal.
 - c. 54 - 29 degrees: Vertical.
 - d. 116 - 58 degrees: Diagonal.
 - e. Motorized focus, motorized zoom.
 8. Angle adjustment:
 - a. Pan: ± 90 degrees.
 - b. Tilt: +25 to +95 degrees.
 - c. Rotation: -5 to +95 degrees.
 - d. Twist: ± 20 degrees.
 9. Minimum Illumination:
 - a. Color: 0.20 LUX @ F1.8.
 - b. BW: 0.04 LUX @ F1.8.
 10. Shutter time: 1/66,500s to 1/5s.
 11. Video compression: H264 (MPEG-4 part 10/AVC), main and high profiles, H265 (MPEG-H Part2).
 12. Resolutions: (4) 2560 x 1440 (4 x QHD 1440p) to 80 x 60.
 13. Frame rate: Up to 30 fps.
 14. Video Streaming: Multiple, individually configurable streams in H264 and H265.
 15. Support Power over Ethernet according to IEEE802.3at.
 16. Support both IPv4 and IPv6.
 17. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
 18. Be equipped with 1 alarm input and 1 alarm output.
 19. Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.
 20. Be supported by an open and published API.
 21. Casing: Outdoor; IP66 and NEMA 4X, IK09 impact resistant aluminum and plastic casing with polycarbonate hard-coated dome and integrated dehumidifying membranes.
 22. Processor and Memory: 2048 MB RAM, 512 MB Flash.
 23. Connectors: RJ45 10 BASE – T/100BASE-TX PoE terminal block for (1) alarm input and (1) alarm output.
 24. Power: Camera with built in fan and heater, 24 to 34 VDC, max 26 Watts, PoE (IEEE802.3af) class 2.
 25. Operating Conditions: -22 to 122 degrees F, Humidity 10 to 100 percent RH (condensing).
 26. Accessories: Outdoor, weather shield, cable shield, 16 ft. network cable with pre-mounted gasket. Provide pole attachment, pendant and recessed housing where indicated.
 27. Basis of Design: Axis #P3719-PLE.
- F. Products shall utilize internal or external surge protection such that a normally occurring power surge shall not void any manufacturer's warranty.
- G. Product model numbers indicated with the cameras are for convenience only. Errors or obsolescence shall not relieve the furnishing of cameras, which meet the technical description given in specifications noted or required by function designated. Cameras of equal or better specifications shall be provided for those cameras found to be discontinued by the manufacturer.

2.6 VIDEO MONITORS

- A. Provide 21.5-inch LCD flat-panel color monitors with the following minimum capabilities.
 1. Product Requirements:

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- a. Video Interface Connections: HDMI – 1 in, VGA – 1 in, Audio – 1 in, Audio – 1 out.
 - 1) Switching between inputs shall be performed using a front panel control.
 - 2) VGA resolution shall be equal to the native resolution of the installed Digital Video Recorder, if applicable.
- b. Input Power: 120VAC, 60Hz (a power adaptor may be used to provide this voltage).
- c. Mounting: Each monitor shall be wall or desktop mounted. VESA mounting holes shall be provided and a series of optional VESA compliant mounts shall be made available at extra cost.
- d. Operating Temperature: Range shall be equal to or greater than 0 to 40 degrees Celsius.
- e. Humidity: Withstand a minimum of 20% to 80% humidity.
- f. Resolution: 1920 x 1080 SXGA.
- g. Pixel Pitch: 0.2482 x 0.2482 mm.
- h. Brightness: 250 cd/m².
- i. Contrast Ratio: 1000:1.
- j. Backlight Type: LED BLU.
- k. Panel Aspect Ratio: 16:9.
- l. Warranty: 3 years – parts/labor.
- m. Adjustments: Must support on-screen display for setup and adjustment of monitor parameters.
- n. Colors: Must support a minimum of 16.7 million colors.
- o. Basis of Design: Orion #22RCE.
- p. Alternate Models:
 - 1) Orion #22RDHY
 - 2) Orion #23REDE

- B. The contractor shall provide a wall mounted UPS unit at each monitor station location.
 - 1. The UPS shall be line-interactive, rated 1000VA/900W with (18) minute battery reserve at 450 Watts; Tripp-Lite #SMART1000RMXL2U and #2POSRMKITWM wall bracket.

2.7 CAMERA POWER SUPPLIES

- A. Based on the Construction Documents, the Direct Vendor will identify camera power source. When required the Direct Vendor will provide power supplies for camera.
- B. Interior Fixed Cameras: Camera shall be powered by PoE from network switch. Maximum total cable length (including horizontal and vertical distances) from switch to camera is 300 ft. Provide fiber cabling for cable runs exceeding 300 ft.
 - 1. Network switch shall be equipped with UPS power supply.
- C. Interior and Exterior PTZ or Multi-Directional Cameras (non “Blue Sky”): Camera shall be powered by PoE from network switch. Maximum total cable length (including horizontal and vertical distances) from switch to camera is 300 ft. Provide fiber cabling for cable runs exceeding 300 ft.
 - 1. Network switch shall be equipped with UPS power supply.
- D. Exterior Building Wall Mounted Fixed Cameras (non “Blue Sky”): Camera and enclosure shall be powered by PoE from network switch. Maximum total cable length (including horizontal and vertical distances) from switch to camera is 300 ft. Provide fiber cabling for cable runs exceeding 300 ft.
 - 1. Network switch shall be equipped with UPS power supply.
 - 2. Camera enclosures shall be equipped with integral heaters and defoggers.
 - 3. All exterior building wall mounted cameras are to be considered as “non blue sky” type.

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- E. Exterior Fixed or Multi-Directional Cameras ("Blue Sky"): Exterior cameras mounted remote from the building exterior wall are considered "blue sky" type.
 - 1. Wall mounted environmental enclosure power supplies shall be located in a suitably protected area near the camera. Provide individually fused power supplies.
 - 2. Pole mounted environmental enclosure power supplies shall be located within a NEMA 4 enclosure at the pole. Provide individually fused power supplies.
 - 3. Camera enclosures shall be equipped with integral heaters and defoggers.
 - 4. Equip environmental enclosures for exterior cameras with individual 120 VAC / 12 VDC power supplies when required.
- F. Cameras requiring cable runs in excess of 300 ft. and all exterior cameras not building wall mounted and exposed to the elements ("blue sky" type) shall utilize fiber optic transmission equipment and shall be powered by individually fused power supplies.
- G. Provide a means for disconnecting camera power supplies from main power at the power supply enclosure, either through a detachable power cord, master fuse or circuit breaker located in the power supply cabinet, or other UL approved switching device. There are two options for providing power to the cameras:
 - 1. Provide dedicated 120VAC lockable panelboards as required, to serve all Investigative CCTV cameras. Comply with National Electric Code clearance requirements.
- H. Power supplies shall be rated to support 200 percent of the actual (nominal) power loading and shall be as recommended by the camera manufacturer, equipped with ESD protection for data and video feeds.
- I. Enclosures housing camera power supplies, media converters, fiber patch box and 120 Volt receptacles shall contain interior back planes for mounting of all components and shall be provided by the General Contractor. NEMA type 4X, stainless steel, hinged and lockable enclosures shall be provided for exterior applications serving (3) or less pole mounted cameras. CCTV terminal cabinets shall be used to house the components serving more than (3) cameras. Refer to paragraph 2.16.

2.8 VIDEO CAMERA HOUSINGS AND MOUNTS

- A. Direct Vendor shall provide arm brackets, recessed housings, surface mounts, ceiling mounts, pendant kits and surface conduit back boxes as required for all camera types with the following minimum capabilities:
 - 1. Interior Cameras:
 - a. All cameras shall be in a housing that is coordinated with adjacent finishes with the appropriate mounting hardware. Selection of housings and mounts, including incremental changes to paint colors, dome materials, and cosmetic finishes shall be approved by the USPS or their authorized agent.
 - b. All housings shall be sufficiently dust and moisture resistant to withstand normal environmental conditions in their chosen installation location.
 - c. Hardware shall be provided to ensure tamper-resistant mounting in public access areas after normal business hours without modification to the integrity of the housing.
 - d. Where used, pendant mounts shall be suitable for use as wall, ceiling and column mounts. Pendant mounts shall attach to the appropriate camera housing using standard threaded, rigid aluminum (type IMC) pipes. Pipes are to be a minimum of 1 ½ inch in diameter. General Contractor shall furnish and install 1 ½ inch pipe to pendant kit at each camera (length as required).

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- e. All pendant mounts shall incorporate installer provided safety chain or cable of sufficient endurance to support 2 times the weight of the camera and mounting hardware. Safety chain or cable shall be securely attached to the building structure at one end and to the bottom of the pendant stem at the other end.
 - f. The General Contractor shall terminate the Ethernet and fiber optic cabling to the patch panels provided by the Direct Vendor and located in the node cabinets or headend racks.
2. Exterior Cameras:
- a. Environmental: Thermostatically controlled heaters and blowers with defrosting capabilities.
 - b. Moisture: Rainproof seals and gaskets.
 - c. Wind Resistance: Rated for 80mph sustained winds, minimum.
 - d. Ambient Temperature Rating: -22 to 131 degrees F.
 - e. Areas with more demanding environmental conditions will be granted a deviation from this specification.
 - f. Exterior building mounted cameras shall be provided with surge protection at the camera and at the node or headend.
 - g. All exterior housings, mounts and components including arm brackets, pole mounting kits, cabling, connectors, seals, etc. shall be rated NEMA 4 watertight. Provide factory termination kits and seals.

2.9 FIBER OPTIC MEDIA CONVERTER MODULES

- A. Direct Vendor shall provide fiber optic transmitters, receivers and associated power supplies.
- B. Fiber optic transmission equipment shall be used when one or more of the following conditions are met:
 - 1. Camera cable lengths (including horizontal and vertical distances) exceed 300 linear feet.
 - 2. The camera is located outdoors, is not building wall mounted and is exposed to the elements ("blue sky" type).
 - a. Building wall mounted cameras and any cameras protected by canopies or other architectural elements that shield them from direct view of the overhead sky are excluded from this requirement.
 - 3. Cabling from the remote node cabinets to the CCTV headend.
 - 4. The cable path is within 20 feet of a TIME or MIMS aerial.
- C. Fiber transmitters and power supply modules located at field devices shall be low profile "miniaturized" type and shall be mounted in the NEMA 1 (indoor) or NEMA 4SS (outdoor) enclosures containing the PoE Injectors for both fixed and PTZ cameras.
 - 1. AC power is required for the transmitter power supply and PoE injector.
 - 2. The power cords shall be 24 inches long to avoid large cable bundles within the enclosures.
- D. Fiber receiver modules located at the node or head-end locations shall be rack mounted.
 - 1. If more than one fiber optic rack is used, modules shall be distributed as evenly as possible among the racks to reduce the load on the rack power supply and minimize the impact of a failed rack.
- E. Fiber optic modules shall conform to the following minimum specifications:
 - 1. 10/100 MBps RJ45 Ethernet port, SC Fiber Port.
 - 2. 62.5/125, OM1, tight-buffered, multimode fiber.
 - 3. PoE (PD) device or locally powered.
 - 4. Protocol independent.
 - 5. -31 to 158 deg operating Temperature.
 - 6. IEEE 802.3, IEEE 803.2u and IEEE 803.2af Complaint.

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F. Remote Node Cabinet:

1. Remote Node Cabinet shall be lockable and will house an IP video system network switch, patch panel, UPS and camera power supply.
 - a. The GC shall install the remote node cabinet and terminate fiber optic and CAT-6 cables.
 - b. Direct Vendor will supply line-interactive, rack mounted UPS with battery reserve rated to supply the continuous load for 18 minutes.
 - c. The GC shall provide a dedicated 20 Amp, 120 Volt circuit for each remote node cabinet.
2. Remote node cabinets shall be mounted high enough to deter unauthorized tampering, but low enough to avoid the use of motorized lifts for future repair or warranty work.
 - a. Node cabinets mounted within ePACS secured rooms shall typically be wall mounted top at 6 feet AFF.
 - b. Node cabinets mounted within the workroom and platform areas must be wall or column mounted bottom at no less than 9 feet AFF and no more than 14 feet AFF.
3. Interior cable runs from remote node cabinets to the CCTV headend rack shall be (6) count, 62.5/125, OM1, indoor rated fiber cable; utilize plenum rated where required (General Cable #CG0061PNR or #CG0061PNU).

G. Patch Cables:

1. Direct Vendor will provide fiber optic patch cables for patched connections within the node cabinet.

2.10 MIDSPAN INJECTORS / ETHERNET CABLE EXTENDERS

- A. Direct Vendor shall provide Ethernet Midspan Injectors and Cable Extenders as required.
- B. Modules located at the cameras shall be located within a properly sized junction box mounted near the camera. Field device modules require local 120 Volt power.
 1. The power cords shall be 24 inches long to avoid large cable bundles within the enclosures.
- C. Midspan injectors located at the head-end and node cabinets are standalone modules rack mounted within the equipment rack.

2.11 CABLING

A. Cabling Requirements:

1. Interior cable runs from cameras to node cabinets or to the CCTV headend that do not exceed 300 feet shall be category 6; utilize plenum rated where required.
2. Interior cable runs exceeding 300 feet from cameras to node cabinets or to the CCTV headend shall be (2) count 62.5/125, OM1, multimode, indoor fiber cable; utilize plenum rated where required.
3. Exterior cable runs routed to remotely located "blue sky" cameras shall be (2) count, 62.5/125, OM1, multimode, indoor/outdoor rated fiber cable. Where multiple fiber cables are routed within a common conduit provide innerduct separation of each cable.
4. Interior cable runs from remote node cabinets to the CCTV headend rack(s) shall be (6) count, 62.5/125, OM1, multimode, indoor fiber cable; utilize plenum rated where required.
5. All exterior CAT-6 and fiber cable runs shall be contained in conduit or an approved raceway.

B. Camera Ethernet Data Cabling:

1. 4-Pair Category 6 Unshielded Twisted Pair Cable shall be provided and installed by the General Contractor.

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2. The General Contractor shall provide and install the RJ45 male jack with coupler jack module attached at the camera end and RJ45 male jack at the patch panel end of each cable as indicated in paragraph 3.2 G. The General Contractor shall terminate and test the CAT-6 cable and RJ45 jacks.
 - a. Basis of Design: Belden #AX104210 (coupler jack).
 - b. Acceptable Alternate Manufacturer: ICC #IC107CP6BK (coupler jack).
 3. CAT-6 cable shall be terminated utilizing male RJ45 jacks on both ends of the cable to facilitate cable testing prior to installation of the node cabinets or headend. All testing shall be performed only after the cables have been terminated with the male RJ45 jacks.
 4. Complies with individual characteristics established in ANSI/TIA/EIA-568-B terminated to T568A and all addendums for Category 6 cable performance specification.
 5. Cabling and wire ways shall be installed in accordance with section 260533.
 6. Final CAT-6 cabling routed from the pole mounted NEMA 4SS enclosures and the terminal cabinets, serving the "blue sky" cameras and the patch cords utilized within the exterior enclosures and cabinets, shall be "outside plant (OSO)" rated, gel-filled, direct burial type.
- C. Power cable shall be appropriately sized to ensure that any signal loss as a function of cable length does not prohibit the delivery of sufficient voltage and current from the power supply to the powered device. A separate power cable may be required by the design engineer as shown on the drawings.
- D. Cable shall have footage markings to identify CCTV system cable lengths.
- E. Fiber Optic - When fiber optic modules are required, the General Contractor shall provide fiber optic cable appropriate for the application. Cable shall conform to the following specifications:
1. 62.5/125, OM1, multimode, indoor rated fiber.
 2. 62.5/125, OM1, multimode, indoor/outdoor rated fiber.
 3. "SC" type connectors shall be used on all cable terminations, including junction boxes and break-out trays.
 4. Performance characteristics (including optical attenuation) shall be such that the fiber optic modules specified in Section 2.9 function to deliver signals end-to-end with sufficient bandwidth and quality to meet the specified application.
 5. Physical characteristics such that the cable has sufficient strength and endurance to withstand installation and environmental conditions without adversely affecting optical performance.
 6. At no time shall fiber optic cable have loose ends terminated and left loose. All fiber optic cable shall be looped, stored, connected and permanently mounted in appropriate LIU cabinets/devices prior to testing.
 7. Fiber cabling not routed within conduit shall be encased within appropriately sized inner ducts; utilize plenum rated where required.
 8. The general contractor shall terminate and test the fiber optic cable and connectors.
 9. Fiber distribution, patch boxes (interconnect centers) shall be provided within the NEMA 4 stainless steel enclosures at the pole mounted, blue-sky type cameras for termination of the fiber cabling.
 - a. Fiber patch box shall be (6) port complete with adapter plate, "SC" connectors, splice tray, protection sleeves and enclosure, and shall be provided by the General Contractor.
 - 1) Basis of Design: RLH Industries #PWSN-A-1 (Slimline patch panel: 4 inch W x 5 1/2 inch H x 2 inch D).
 - 2) Alternate U.S. manufacturers permitted.
 10. Fiber cabling shall be well managed and protected and never directly connected to any camera device or component.
 11. Fiber patch boxes (interconnect centers) shall be equipped with covers, so the fiber strands are not exposed.
 12. Cap all unused fiber ends to maintain cleanliness and avoid physical damage; all fiber strands are to be terminated.
 13. Clean out any metal shavings or other debris from the enclosure.

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14. Do not run fiber strands through any brackets or around other cables
15. Label each fiber cable with to/from destination. Attach a panel label to the inside of the patch panel cover.
16. Allow access to optical fiber cabling for testing.
17. Protect connections against accidental contact with foreign objects that may disturb optical continuity.
18. Properly handle optical fiber cables and patch cords and promote their orderly management.
19. A fiber optic service loop of sheathed fiber no less than 20 feet at each end 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 and shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic patch panel, 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.

Cable Type	Signal	Use
(2) Count, 62.5/125, OM1, multimode, indoor riser rated fiber optic (General Cable #CG0021PNR or Approved Equal)	Camera Data	Interior (non-plenum) camera cable runs exceeding 300 feet. See Sections 2.9 and 2.13
(2) Count, 62.5/125, OM1, multimode, indoor plenum rated fiber cable (General Cable #CG0021PNU or Approved Equal)	Camera Data	Interior (plenum) camera cable runs exceeding 300 feet. See Sections 2.9 and 2.13
(6) Count, 62.5/125, OM1, multimode, indoor riser rated fiber optic (General Cable #CG0061PNR or Approved Equal)	Data	Interior (non-plenum) cable runs – node cabinets to headend. See Sections 2.9 and 2.13
(6) Count, 62.5/125, OM1, multimode, indoor plenum rated fiber cable (General Cable #CG0061PNU or Approved Equal)	Data	Interior (plenum) cable runs – node cabinets to headend. See Sections 2.9 and 2.13
(2) Count, 62.5/125, OM1, multimode, indoor/outdoor rated fiber optic contained in conduit (General Cable #CG002ANR.BK or Approved Equal)	Camera Data	Exterior cable runs to “blue sky” cameras. See Sections 2.9 and 2.13
CAT-6 riser rated cable with footage markings (purple) (General Cable 7133809 or Approved Equal)	Camera Data	Interior (non-plenum) camera cable runs less than 300 feet. See Section 2.12
CAT-6 plenum rated cable with footage markings (purple) (General Cable 7131809 or Approved Equal)	Camera Data	Interior (plenum) camera cable runs less than 300 feet. See Section 2.12
CAT-6 “OSP” rated cable with footage markings (black) (General Cable 7136100 or approved equal)	Camera Data	Exterior final cable runs to cameras. See Section 2.12.

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2.12 CATEGORY 6 CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the work include the following:
1. Belden
 2. Berk-Tek
 3. CommScope Uniprise
 4. General Cable - Preferred
 5. Leviton
 6. Ortronics (Legrand)
 7. Panduit
 8. Product options and substitutions. Substitutions: Permitted if approved by Direct Vendor and Manufacturer.
- B. Conductors: 4 twisted pair, minimum 23 AWG, solid copper.
1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire area where cable is installed is not considered a return air plenum according to any applicable codes. Provide outdoor, "OSP" rated cable and patch cords for exterior applications.
 2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6 cable performance specification.
 3. Nominal Impedance: 100 ohms plus or minus 15 percent.
 4. Certified and capable of performing to a minimum of 250 MHz.
 5. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify or add to manufacturer's twisting of cable. Do not untwist more than ½ inch of the stripped cable.

2.13 OM1 FIBER CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Belden
 2. Berk-Tek
 3. CommScope Uniprise
 4. Corning Cable Systems
 5. General Cable - Preferred
 6. Leviton
 7. Optical Cable Corp.
 8. Ortronics (Legrand)
 9. Superior Essex
 10. Product options and substitutions. Substitutions: Permitted if approved by Direct Vendor and Manufacturer.
- B. Conductors: 2 / 6 strand
1. Provide multi-strand, 62.5/125 micron, tight-buffered, multimode, OM1 fiber cabling rated as follows:
 - a. 1 Gb/s ≤ 150m @ 850 nm.
 - b. 1 Gb/s ≤ 1000m @ 1300 nm.
 2. The fiber cabling shall meet the following specifications:
 - a. EIA/TIA-492AAAA-A-1997, "Detail Specification for 62.5 micron Core Diameter/125 micron Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers."
 - b. IEC 60793-2-10, "Product specifications – Sectional specification for category A1 multimode fibers", Type A1b 62.5/125 micron graded index fiber.
 3. Terminate fiber strands onto "SC" ports.

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4. Provide individually insulated plenum rated strands under common plenum rated sheath, unless entire area where cable is installed is not considered a return air plenum according to any applicable codes.
5. Fiber cabling shall comply with individual characteristics established in TIA-568-C including all addendums for fiber optic cable performance specification.
6. Interior fiber cabling shall be indoor rated and contained within innerduct.
7. All exterior or underground fiber cable shall be indoor/outdoor rated. Provide indoor/outdoor, "OSP" rated, fiber patch cords for exterior applications.

2.14 SECONDARY BONDING BUSBAR – SBB BEHIND HEADEND (REFER TO TIA-607-D)

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Harger – P/N GBI/14212 TMGB
 2. Chatsworth – P/N CPI 13622
 3. Legrand – P/N OR-GB2X12TGB
 4. Product options and substitutions. Substitutions: Not Permitted.
- B. Provide and install one SBB behind the CCTV headend rack(s), below ceiling acoustic tile, with all bonding leads clearly labeled by machine labeler. All bonding leads shall be 2 hole compression lugs. Minimum size will be 2 inch H x 0.25 inch W x 12 inch L.
- C. Each headend rack shall be bonded to the SBB using a #6/AWG/CU stranded bond wire.
- D. Each (2) lug compression connector shall have antioxidant coating applied to lug and busbar prior to attachment.

2.15 ACCESSORIES

- A. Lightning/Surge Protection: Products shall utilize internal or external (power and low voltage) surge protection such that a normally occurring power surge shall not void any manufacturer's warranty.
 1. Rack mounted surge protectors shall be provided within the headend and remote node cabinets to protect the CAT-6 cabling serving the exterior, building wall mounted cameras. Modular surge protectors shall also be provided at the camera end of the CAT-6 cable.
- B. The headend equipment rack shall utilize a standalone UPS sized for a minimum of 10 minutes of battery run-time. The UPS shall be provided by the Direct Vendor. General contractor will provide dedicated 30 Amp, 120VAC power and NEMA L5-30R twist-lock receptacle.
 1. The UPS shall be line-interactive, rack mounted and rated 3kVA/2.88kW with a 10 minute battery reserve at 1440 Watts; Tripp-Lite #SMART3000RML2U.
 2. Provide quad-plex Telecommunications Outlet (T/O) bottom mounted at 24 inch AFF behind the headend rack.
- C. Upright Racks: The Direct Vendor shall provide and install upright equipment racks to provide sufficient mounting space for the required equipment.
 1. Racks shall be all metal construction conforming to EIA standards with 19 inch equipment mounting opening and 1-3/4" vertical spacing of equipment. Rack rails shall be punched with captive nuts, 10-32 screws and nylon washers.
- D. The General Contractor shall terminate the ethernet and fiber optic cabling to the patch panels provided by the Direct Vendor and located in the upright racks.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive work.
 - 1. Verify that power and video outlets are in correct locations.
 - 2. Verify that building structure for attachment of equipment mounting devices is in place.
- C. Report in writing to the USPS Project Manager any prevailing conditions that will adversely affect satisfactory execution of work of this section. Do not proceed with work until unsatisfactory conditions have been corrected.
- D. By beginning work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Postal Service.
- E. Provide required power outlets, low voltage power supplies, interconnecting cables, hardware and equipment for a complete and operable system.
- F. Camera locations are to be reviewed and approved by a Postal Inspector and/or OIG, through the USPS Project Manager, prior to installation of conduit and cabling.

3.2 INSTALLATION

- A. Install all equipment in accordance with Direct Vendor's published instructions. Installation must be done by the Direct Vendor to assure proper installation and accountability. This includes, but is not limited to the following:
 - 1. All hardware used to secure equipment to racking shall include nylon or other non-metallic washer or grommet between the screw head and equipment panel to prevent any damage to the equipment.
 - a. Rack mount screws shall be self-centering, philips-head configuration unless specialized tam-per-resistant hardware has been specified.
 - b. Screws shall be tightened in such a manner as to allow their removal with common hand tools.
 - 2. Any equipment placed on shelving mounted on an incline of greater than 2 degrees shall be secured to the rack or shelving in such a manner as to prevent movement of the equipment in the direction of the incline. Such fastening shall be done in a manner as to preserve the integrity of the equipment case and chassis, and shall in no way jeopardize warranty coverage of the device.
 - 3. All equipment cabling shall be dressed in such a manner as to ensure a neat and clean appearance.
 - 4. Cable breakouts shall be at 90-degree angles from the harness or chase, and all chases shall be parallel to or at 90-degree angles from the rack frame.
 - 5. Cables are to be secured to the rack frames at sufficient intervals to ensure that the weight of the cable will not contribute to fatigue or early failure of that cable or the device and connector to which it is attached.
 - 6. Sufficient excess cable shall be provided in "service loop locations" to ensure that the cable may be re-connected without requiring the addition of extension pieces.
 - 7. All permanent cabling shall be mechanically numbered in a manner consistent with Direct Vendor's written system documentation.

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8. All wiring to include CAT-6 and Fiber Optic cables shall utilize hook and loop fasteners to eliminate the risk of over-tightening cable bundles and affecting the strength or rated performance of the cable. The use of tie wraps is not acceptable.
 9. Where wiring is routed through sheet metal or over frame members, the metal edges shall be covered with flexible grommeting or edge dressing (such as automobile door edge trim).
 10. Double-sided foam tape shall not be used to secure any equipment, terminal blocks, or accessory devices. All device mounting shall be of a permanent nature.
 11. All excess length AC cords are to be tie-wrapped out of the way. Where possible, they shall be routed in a separate bundle a minimum of 6 inches away from any signal or control cable.
 12. Exposed wires run to wall mounted cameras shall be fed through tubing or the body of the mount to present a professional appearance.
 - a. Any accessible cables that can be reached by an individual standing on the floor, a stool, or a small stepladder shall be encased in protective tubing or armored sheathing to prevent tampering or cutting with common hand tools.
 13. Care shall be exercised at all times to protect Postal Service property. For example, ladders shall not be placed against wallpapered or finished surfaces, equipment or furnishings; desks or countertops shall not be used in lieu of ladders.
 14. Each camera shall be labeled by a numbering system requiring no more than three digits. The camera numbering system chosen shall be utilized by the A/E during preparation of the design drawings and by Securitas in preparation of their construction drawings to provide consistent, matching and accurate as-built documentation.
 - a. Each pendant or arm mounted, PTZ camera shall be labeled on three sides with 3 inch high numbers supplied by the Direct Vendor.
 - b. Each ceiling, wall or pendant mounted, multi-directional camera shall be labeled on three sides with 1 inch high numbers supplied by the Direct Vendor.
 - c. Each ceiling, standard, wall or pendant mounted, fixed camera shall be labeled on two sides with 1 ½ inch high numbers supplied by the Direct Vendor
 - d. The outer shroud of each wall or pole arm mounted, fixed camera shall be labeled on two sides with 2 inch high numbers supplied by the Direct Vendor.
 - e. The flange of each recessed ceiling mounted PTZ, fixed or multi-directional camera shall be labeled on two sides with 1 inch high numbers supplied by the Direct Vendor.
 - f. Labeling shall be stenciled or laminated vinyl in a contrasting color to the camera housing.
 - g. Labeling shall not be placed on lower dome or any area that would obstruct camera viewing.
 15. Ensure that pendant mounted cameras are hung from stable, vibration free mounting platforms, using guy-wires or other support mechanisms to ensure stability where required. Mount cameras below any suspended lighting to avoid glare or reflection on camera dome and/or lens.
 16. Perform complete programming of the system, in coordination with the Postal Inspector and USPS Project Manager or designated representative. Programming shall include, but not be limited to, elimination of duplicate or redundant titling information, synchronization of system clocks, camera sequences, dome presets, salvos and tours. Programming of any system passwords or limiting of accessibility prior to commissioning and training is prohibited.
 17. Provide the Direct Vendor redlined drawings with job condition changes required to provide accurate close-out documentation.
- B. Power requirements shall be determined by actual equipment used.
- C. Ensure that:
1. All applicable statutes, ordinances, regulations, license requirements and codes are fully complied with.
 2. All required permits are obtained.
 3. All required inspections are conducted.
 4. All necessary certificates are issued, obtained, and delivered to the Postal Service.

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5. All equipment installations and mounting are in strict accordance with requirements for applicable seismic classification.
- D. Arrange all components to be mounted in the console(s)/rack(s) in accordance with Direct Vendor and/or Postal Service provided System Elevation drawings. Design shall provide a neat appearance and accessibility for servicing equipment.
- E. Provide required power outlets, interconnecting cables, hardware and equipment for a complete and operable system.
 1. Power, 120VAC: As required by codes and standards for the facility.
 2. Where conduit is used, a minimum of 40% excess capacity shall be provided for future use.
- F. Install cameras as shown on the drawings and in accordance with the USPS specifications.
 1. Provide 84-inch minimum headroom below cameras and their mountings. Where necessary modify mounting type to maintain clearance.
- G. All CAT-6 cable connections must be made to 8 pin coupler jacks at the device and to 8 pin, feed-thru coupler jack patch panels at the head end or node cabinets per T568A standard. Patch panel shall be terminated per Direct Vendor.
 1. The CAT-6 CCTV cabling shall be equipped with an RJ45/CAT-6 male jack with coupler jack attached at the camera end ready for final patch cord connection to the camera. The node or headend connection of the cable shall be a CAT-6/RJ45 male jack. Terminations provided by the General Contractor.
 2. The remote node cabinets and headend rack(s) shall be equipped with feed-thru, coupler jack patch panels to accept the RJ45 male jacks terminated on the camera cabling. The feed-thru coupler jack patch panels (complete with the coupler jack modules) shall be provided by the Direct Vendor.
- H. When not installed in cable trays, cable (CAT-6, fiber optic, and low voltage power) shall be supported with wide base cable hangers rated for proper support of CAT-6, fiber optic, and inner-duct cables (compliant with UL and NEC requirements for structured cabling).
 1. Cable hangers shall be installed every 3 to 6 feet and shall be rated to support the weight of the cable multiplied by a factor of three (3).
 2. Cable tray for camera wiring shall not include any low voltage AC wiring.
 3. Interior fiber optic cabling shall be contained within innerduct.
- I. The entire CCTV system shall utilize an independent wiring system not shared with any other building system. The structured cabling system racks, the TE's, the fiber backbone, cable trays, etc. cannot be utilized for any CCTV system purpose. Cable trays installed for the CCTV cabling may be utilized to contain the ePACS wiring.

3.3 DOCUMENTATION

- A. The Contractor shall provide high definition photographs showing the interior components of all equipment enclosures, terminal cabinets, remote node cabinets and the headend rack(s). Photographs shall show wiring and placement of the midspan injectors, fiber media converters, surge protectors, fiber patch boxes, power supplies, power strips and receptacles. Photographs shall be transmitted to the A/E and USPS Project Manager.

3.4 FIELD TESTING CAT-6 COPPER AND FIBER OPTIC CABLE

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

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- B. Field Testing Procedures:
 - 1. Provide all equipment and services necessary to test the cabling.
 - 2. Test and calibrate instruments before testing.
 - 3. Re-terminate and retest any cable found to be defective.
 - 4. Perform cable testing and submit report prior to installation of any cameras or node cabinets.

- C. CAT-6 Copper Cable Testing:
 - 1. Use Level III Compliant test equipment.
 - 2. Test parameters shall include:
 - a. Wire map.
 - b. Insertion loss (attenuation).
 - c. DC loop resistance.
 - d. Return loss at camera.
 - e. NEXT, NEXT at camera.
 - 3. Perform end-to-end tests of each 4-pair cable as follows:
 - a. Pair/conductor for proper pinouts and continuity.
 - b. Ground fault.
 - c. Proper termination, shorts, and crossed pairs.
 - d. Channel attenuation per TIA-568-C, including all addendums.
 - e. Channel bi-directional worst case near end cross talk (NEXT) at frequencies up to 250 MHz, per TIA-568-C, including all addendums.
 - f. Measured effective cable run length.

- D. Fiber Optic Testing:
 - 1. Use 62.5/125 micron, OM1, multimode fiber optic cable testing.
 - 2. Perform testing of fiber in accordance with the fiber type being tested, TIA-526-14-A, Method B for Multimode Fiber (One Jumper/Two Adapters).
 - 3. Multimode fiber optic cable shall be tested bi-directionally at wavelengths of 850nm and 1300nm.
 - 4. The fiber testers and test heads shall have passed calibration within one year of actual test date.
 - 5. Tests include:
 - a. Tier 1 Testing with Optical Loss Test Set (OLTS) that includes testing for length.
 - b. Tier 2 Testing with OTDR to show all splices.

3.5 CONSTRUCTION COORDINATION

- A. The Direct Vendor shall interface with Other Work.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Inspection and testing procedures.

- B. Inspection:
 - 1. The Direct Vendor shall inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
 - 2. The Direct Vendor shall verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.

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- C. Testing:
1. The Direct Vendor shall perform tests and provide test equipment, tools, and personnel required to conduct system tests and inspections. These tests shall include video quality and PTZ operation (where applicable) for all cameras.
 2. The Direct Vendor shall provide an actual demonstration of each system function.
 3. The Direct Vendor shall conduct system acceptance test upon completion of installation using pre-approved procedures. Test shall consist of system, subsystem, and device level acceptance tests, including software.
 4. The Direct Vendor shall use accepted Checklist for system testing.
 5. The Direct Vendor shall ensure that test procedures confirm each specification statement and manufacturer requirement has been met or exceeded. An actual demonstration of each system function and a simulation of each system failure shall be provided.
 6. An acceptance test period of thirty days shall begin at the start of the acceptance test. Any system failure during the acceptance test period will suspend the acceptance test. The thirty-day test period will restart when the required repairs have been made and certified.
 7. Perform all tests in the presence of the Postal Service Project Manager. The Postal Service reserves the right to accept any portion or activate any phase prior to acceptance of entire system.

3.7 CLEANING AND ADJUSTING

- A. Adjust manual lens irises to meet lighting conditions.
- B. Adjust field of view for each camera per USPS Project Manager direction.

END OF SECTION

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SECTION 312300
EXCAVATION AND FILL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating and backfilling for structures, utilities, and pavement.
 - 2. Pipe bedding.
 - 3. Compacting fill materials.
 - 4. Borings and casings under roads.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - 2. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 180 - Moisture-Density relations of Soils Using a 10 Pound Rammer and an 18 Inch Drop.
- C. American Water Works Association (AWWA):
 - 1. AWWA C 200 - Steel Water Pipe, 6 Inch and Larger.
 - 2. AWWA C 206 - Field Welding of Steel Water Pipe.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electric code.

1.3 DEFINITIONS

- A. Building Area Subgrade Pad: Portion of site directly beneath and within a line 10 feet beyond building and appurtenances including limits of any future building expansion areas indicated on Drawings.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Submit drawings or details indicating proposed alternate earthwork procedures or proposed procedures not indicated in Contract Documents.

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- b. Shop Drawings or details pertaining to Site Utilities are not required unless required by regulatory authorities or unless use of materials, methods, equipment, or procedures are contrary to Drawings or these specifications are proposed. Do not perform work until required shop drawings have been approved by Contracting Officer.
- 2. Assurance/Control Submittals:
 - a. Material Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Contracting Officer approval.
 - b. Test Reports: Submit the following reports directly to Contracting Officer from Testing Laboratory, with copy to Contractor:
 - 1) Test reports on borrow material.
 - 2) Verification of each footing subgrade.
 - 3) Field density test reports.
 - 4) Optimum moisture-maximum density curve for each type of soil encountered.
 - 5) Report of actual unconfined compressive strength and bearing tests/results for each strata tested. Give "three-dimensional" description of each test location.
 - c. Certificates: Gradation and certification of aggregate material for Testing Laboratory review.
 - d. Qualification Documentation: Submit earthwork company documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following.
 - a. Spot elevations for building area subgrade pad.
 - b. Location of existing utilities remaining, re-routed utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.5 QUALITY ASSURANCE

- A. Qualifications: Earthwork company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements: Perform earthwork in accordance with applicable requirements of governing authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipe Bedding Material: Processed sand and gravel free from clay lumps, organic, or other deleterious material complying with the following gradation requirements:

SIEVE SIZE	PERCENT PASSING
1 Inch	100
3/4 Inch	90 to 100
3/8 Inch	20 to 55
No. 4	0 to 10
No. 8	0 to 5

- B. Steel Casing Pipe: AWWA C 200, minimum grade B; size and wall thickness as indicated on Drawings.

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- C. Stabilization Fabrics and Geogrids:
 - 1. Mirafi 500X or 600X.
 - 2. Amoco Style #2002 Woven.
 - 3. Reemay Typar 3401 and 3601.
 - 4. Trevira S1114 and S1120.
 - 5. Tensar 1100 and 1200.

- D. Filter/Drainage Fabrics:
 - 1. Mirafi 140 N.
 - 2. Amoco Style #4546.
 - 3. Reemay Typar 3341.
 - 4. Carthage Mills, Carthage 6%.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Identify required lines, elevations, levels, contours, grades, and datum necessary to perform earthwork operations as indicated on Drawings.
- B. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings.
- C. Locate, identify, and protect existing utilities to remain and previously installed utilities that may be damaged by construction operations.
 - 1. Notify Contracting Officer, municipality, and utility company immediately of utilities, not indicated on Drawings, encountered.
 - 2. Maintain existing utilities, active utilities, and drainage systems in operating condition.
 - 3. Comply with utility company requirements and directions of Construction Manager to keep utilities in operation.
 - 4. Repair damage to utilities as directed by Contracting Officer.
- D. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from earthwork operations, excavating equipment, and vehicular traffic.

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- E. Protect bench marks, property corners, and other survey monuments from damage or displacement. Where markers are required to be removed, provide removal and reinstallation by licensed land surveyor licensed in State where project is located.

3.3 EXCAVATION

A. Excavation for Utilities:

1. Excavate trench width and depth required for laying pipe, conduit, or cable. Cut trench banks vertical. Remove stones from bottom of trench as required to avoid point-bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as required to provide suitable base for continuous and uniform bedding.
2. During excavation, stockpile materials suitable for backfilling away from trench bank to prevent overloading, slides, or cave-ins.
3. Remove material encountered in trenching operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and Contracting Officer. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
4. Prevent surface water from flowing into trenches or other excavations by temporary grading or other approved methods.
 - a. Do not allow water to accumulate in excavations.
 - b. Remove accumulated water in excavations.
 - c. Provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components required to remove water from excavations.
5. Open cut excavation using trenching machine or backhoe. Do not use dirt clods for backfill created by use of machines other than ladder or wheel-type trenching machines.
6. Grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material along entire trench length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Do not excavate trench deeper, longer, or wider than required to make proper joint connection.
7. Excavate trench width below the top of pipe minimum 300 mm wide and maximum 460 mm wider than outside surface of pipe or conduit installed to elevations and grades indicated on Drawings. Excavate trench width for other pipe, conduit, or cable to least practical width allowing for proper compaction of trench backfill.
8. Excavate trench depth measured from finished grade or paved surface to the following requirements or applicable codes and ordinances:
 - a. Electrical Conduits: 24 inches minimum to top of conduit or as required by NFPA 70, or local utility company requirements, whichever is deeper.
9. Provide shoring, sheeting, and bracing, as required, in trenches and other excavations where protection of construction personnel is required. Shoring may be removed after sufficient backfilling to protect against damaging or injurious caving.

3.4 PIPE BEDDING

- A. Excavate trenches, for pipe or conduit installed to elevations indicated on Drawings, 4 inches below bottom of pipe and to width as specified. Place 4 inches of bedding material, compact in bottom of trench, and shape to conform to lower portion of pipe barrel. After pipe installation, backfill and compact to top of trench.
- B. Place geotextile fabric as indicated on Drawings.

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3.5 BACKFILLING AND SUBGRADE PREPARATION

- A. Backfilling:
 - 1. Verify that backfill areas are free of debris, snow, ice, or water, and that ground surfaces are not frozen.
- B. Areas Exposed by Excavation or Stripping:
 - 1. Scarify areas exposed by excavation or stripping on which building subgrade preparations are to be performed to minimum 8 inch depth.
 - 2. Compact to minimum 95 percent optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content 1 percent below and maximum 3 percent above optimum moisture content.
 - 3. Proofroll to detect any areas of insufficient compaction by making minimum of 2 complete passes with fully-loaded tandem-axle dump truck, or Contracting Officer approved equivalent, in each of two perpendicular directions under supervision and direction of Contracting Officer.
 - 4. Excavate and recompact areas failing to meet specified requirements.
- C. Fill Material Placement:
 - 1. Place in 8 inch maximum lifts compacted minimum 95 percent optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content of 1percent below and maximum moisture content 3 percent above optimum moisture content.
 - 2. Maximum allowable values for plasticity index (PI) and liquid limit (LL) of suitable fill materials to be used as fill in the specified areas, unless indicated otherwise on Drawings:

LOCATION	PI	LL
Paving area, below upper 4 feet of proposed subgrade elevation	30	40
Paving area, upper 4 feet of proposed subgrade elevation	20	30

- D. Provide material imported from off-site with CBR (California Bearing Ratio) or LBR (Limerock Bearing Ratio) value equal to or above pavement design subgrade CBR or LBR value indicated on Drawings.

3.6 MAINTENANCE OF SUBGRADE

- A. Verify finished subgrades for elevations indicated on Drawings and specified conditions for construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
- C. Remove areas of finished subgrade found to have insufficient compaction density. Replace in a manner that will comply with compaction requirements as directed by Contracting Officer. Provide hard, uniform, smooth, stable surface, true to grade and cross-section after completion of compaction.

3.7 BORINGS AND CASINGS UNDER ROADS

- A. Install street, road, or highway crossings for utility mains by jacking and boring method in accordance with requirements of governing authorities having jurisdiction.

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- B. Locate approach pits and trenches within right- of-way of street, road, highway, or railroad distance from paving permitting traffic to pass without interference. Tamp backfill for approach pits and trenches within right- of-way in layers not greater than 6 inches thick for entire length and depth of trench or pit. Compact backfill to 95 percent of maximum density obtained at optimum moisture as determined by AASHTO T 180, Method A (Modified Proctor). Mechanical tampers may be used after cover of 6 inches has been obtained over top of pipe barrel.
- C. Use commercial type boring rig providing hole bored to proper alignment and grade within 2 inches of same diameter as largest outside joint diameter of pipe installed. Install pipe in hole immediately after bore has been made, and in no instance shall hole be left open while unattended.
- D. Clean and prime interior and exterior of casing pipe; apply two coats of asphalt in accordance with requirements of governing authorities having jurisdiction.
- E. Butt weld steel casing. Weld using full penetration single butt-welds in accordance with AWWA C 206.
- F. Install casing and utility pipe with end seals, vent pipe, and other special equipment in accordance with requirements of governing authorities having jurisdiction.
- G. Paving Damage Caused by Contractor Construction Operations:
 - 1. Repair paving where cracks occur on either side of line where pipe was installed by removing damaged paving between cracks, sawcutting paving in straight line at a point sufficiently beyond location of cracks for repair, and placing new paving to match existing in areas where paving removed.
 - 2. Make repairs to the satisfaction of paving owner.
 - 3. Make repairs at no additional cost to United States Postal Service within one year from Date of Substantial Completion.

3.8 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. If tests indicate the Work does not meet specified requirements, remove Work, replace, compact and retest at no additional cost to United States Postal Service.

3.9 PROTECTION

- A. Protect building subgrade pad and building related earthwork from damage by construction operations and erosion.
- B. Prohibit vehicles from entering building subgrade pad area. Vehicles not permitted.
- C. Scarify surface, reshape, and compact areas damaged by construction operations or weather erosion.

END OF SECTION

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SECTION 321216

ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Bituminous concrete paving.
 - 2. Surface course.
 - 3. Binder course.
 - 4. Paving base course.

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

- C. Related Sections:
 - 1. Section 321313 - Concrete Paving: Concrete paving, curbs, and sidewalks.

1.2 REFERENCES

- A. Asphalt Institute (AI):
 - 1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
 - 2. AI MS-3 - Asphalt Plant Manual.
 - 3. AI MS-8 - Asphalt Paving Manual.
 - 4. AI MS-19 - Basic Asphalt Emulsion Manual.

- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM D 242 - Specification for Mineral Fiber for Bituminous Paving Mixtures.
 - 2. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 Pound Rammer and 12 inch Drop.
 - 3. ASTM D 1188 - Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
 - 4. ASTM D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 Pound Rammer and 18 inch Drop.
 - 5. ASTM D 1560 - Test Method for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.
 - 6. ASTM D 2397 - Specification for Cationic Emulsified Asphalt.
 - 7. ASTM D 2399 - Practice for Selection of Cutback Asphalt.
 - 8. ASTM D 2726 - Test Method for Bulk Specific Gravity and Density of Nonabsorbative Compacted Bituminous Mixtures.
 - 9. ASTM D 3381 - Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
 - 10. ASTM D 3549 - Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
 - 11. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

- C. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 88 - Particle Size Analysis of Soils.

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1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Provide asphalt-aggregate mixture as recommended by local or state paving authorities to suit project conditions. Use locally available materials and gradations which meet standard state highway specifications and exhibit satisfactory records of previous installations.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
1. Assurance/Control Submittals:
 - a. Design Data:
 - 1) Submit design mix following format indicated Asphalt Institute Manual MS-2, Marshall Stability Method; including type/name of mix, gradation analysis, grade of asphalt cement used, Marshall Stability (pounds), flow, effective asphalt content (percent), and direct references to applicable state highway department specification sections for each material.
 - 2) Provide design mixture listed in current edition of applicable state highway department specifications.
 - 3) Use mix designs prepared within 3 years maximum.
 - 4) Provide documentation of state highway limitations, if any, on use of recycled content materials.
 - b. Certificates: Submit materials certificate to Testing Laboratory signed by material supplier and Contractor, certifying that materials comply with, or exceed, the requirements specified herein.
 - c. Qualification Documentation: Paving installer documentation of experience indicating compliance with specified qualification requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AI MS-8.
- B. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
 1. Conform to applicable requirements for paving work on public property.
 2. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Use temporary striping, flagmen, barricades, warning signs, and warning lights as required.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 1. Apply prime and tack coats when ambient temperature is above 40 degrees F, and when temperature has been above 35 degrees F for 12 hours immediately prior to application. Do not apply when base is wet, contains excess moisture, or during rain.
 2. Construct bituminous concrete paving when atmospheric temperature is above 40 degrees F.

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1.7 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management:
 - 1. Recycled Content: Provide aggregate fabricated from a minimum of 30% recycled rubble or concrete. Provide asphalt cement fabricated from recycled content asphalt.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Base Course: As indicated on Drawings, complying with applicable state highway specifications regarding source, quality, gradation, liquid limit, plasticity index and mix proportioning.
 - 1. Unless otherwise specified in applicable state highway specifications, provide base course aggregate fabricated from minimum 30 percent recycled rubble or concrete.
- B. Asphalt Cement: Fabricated from minimum 15 percent recycled asphalt and complying with ASTM D 3381; Table 2 AC-10, AC-20, or AC-30, viscosity grade, depending on local mean annual air temperature as indicated below:

TEMPERATURE CONDITION	ASPHALT GRADES
Cold, mean annual air temperature at 45 degrees F or lower	AC-10 85/100 pen.
Warm, mean annual air temperature between 45 degrees F and 75 degrees F	AC-20 60/70 pen.
Hot, mean annual air temperature at 75 degrees F or higher	AC-30

- C. Tack Coat: Emulsified asphalt; ASTM D 2397 or ASTM D 2399, SS-1h, CSS-1, or CSS-1h, diluted with one part water to one part emulsified asphalt.
- D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M-17/ASTM D 242, if recommended by applicable state highway department standards.

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- E. Asphalt-Aggregate Mixture: Unless otherwise indicated on Drawings, the Design Mix shall have a minimum stability based on CALTRANS AR4000. The Design Mix shall be within sieve analysis and bitumen ranges below:

SIEVE ANALYSIS OF MIX

Square Sieve	Total Percent Passing	Percent Tolerance
1/2 inch	80 - 100	5
3/8 inch	65 - 93	4
No. 8	0 - 55	4
No. 50	2 - 27	2
No. 200	0 - 10	2

Percent Bitumen by Weight of Total Mix: 5.0 - 8.5.

Percent Air Voids: 3-6.

Percent Aggregate Voids Filled with Asphalt Cement: 70 - 82.

Allowable Variance of Percent Bitumen by Weight of Total Mix: 0.4.

2.2 EQUIPMENT

- A. Maintain equipment in satisfactory operating condition and correct breakdowns in a manner that will not delay or be detrimental to progress of paving operations.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 BASE COURSE PLACEMENT

- A. Perform base course construction in a manner that will drain surface properly at all times and at the same time prevent runoff from adjacent areas from draining onto base course construction.
- B. Compact base material to not less than 98 percent of optimum density as determined by ASTM D 698 or 95 percent of optimum density, as determined by ASTM D 1557, unless otherwise indicated on the Drawings.

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- C. Granular Base: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 8 inches, measured loose.
- D. Sand/Shell Base: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 4 inches, measured loose.
- E. Asphalt Institute Type IV Mix for Full Depth Asphalt Base: Construct to thickness indicated on Drawings in lifts or layers not exceeding 3 inches, measured loose.
- F. Asphalt Institute Type VI, VII, or VIII Mixes for Hot-Mix Sand Asphalt Bases: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 3 inches, measured loose.
- G. Soil Cement Stabilized Base: Construct to thickness and strength as indicated on Drawings and in accordance with applicable state highway specifications. If not indicated on the Drawings, the minimum compressive strength shall be 500 pounds per square inch, tested at 28 days.

3.3 APPLICATIONS

- A. Prime Coat:
 - 1. Apply bituminous prime coat to all base material surfaces where bituminous concrete paving will be constructed.
 - 2. Apply bituminous prime coat in accordance with applicable state highway specifications.
 - 3. Apply at minimum rate of 0.25 gallon per square yard over compacted base material. Apply to penetrate and seal, but not flood surface.
 - 4. Make necessary precautions to protect adjacent areas from overspray.
 - 5. Cure and dry as long as necessary to attain penetration of compacted base and evaporation of volatile substances.
- B. Tack Coat:
 - 1. Apply to contact surfaces of previously constructed bituminous concrete base courses or portland cement concrete and surfaces abutting or projecting into bituminous concrete or into bituminous concrete pavement.
 - 2. Apply tack coat to bituminous concrete base course or sand asphalt base course. Apply emulsified asphalt tack coat between each lift or layer of full depth bituminous concrete and sand asphalt bases and on surface of all such bases where bituminous concrete paving will be constructed.
 - 3. Apply emulsified asphalt tack coat in accordance with applicable state highway specifications.
 - 4. Apply at minimum rate of 0.05 gallon per square yard of surface.
 - 5. Allow to dry until at proper condition to receive paving.

3.4 BITUMINOUS CONCRETE PLACEMENT

- A. Place bituminous concrete mixture on completed compacted subgrade surface, spread, and strike off. Spread mixture at following minimum temperatures:
 - 1. When ambient temperature is between 40 degrees F and 50 degrees F, mixture temperature equal to 285 degrees F.
 - 2. When ambient temperature is between 50 degrees F and 60 degrees F, mixture temperature equal to 280 degrees F.
 - 3. When ambient temperature is higher than 60 degrees F, mixture temperature equal to 275 degrees F.

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- B. Whenever possible, all pavement shall be spread by a finishing machine; however, inaccessible or irregular areas may be placed by hand methods. The hot mixture shall be spread uniformly to the required depth with hot shovels and rakes. After spreading, the hot mixture shall be carefully smoothed to remove all segregated course aggregate and rake marks. Rakes and lutes used for hand spreading shall be of the type designed for use on asphalt mixtures. Loads shall not be dumped faster that they can be properly spread. Workers shall not stand on the loose mixture while spreading.
- C. Paving Machine Placement: Apply successive lifts of bituminous concrete in transverse directions with the surface course placed in the direction of surface-water flow. Place in typical strips not less than 10 feet wide.
- D. Joints: Make joints between old and new pavements, or between successive days and work in a manner that will provide a continuous bond between adjoining work. Construction joints shall have same texture, density, and smoothness as other sections of bituminous concrete course. Clean contact surfaces of all joints and apply tack coat.

3.5 ROLLING AND COMPACTION

- A. The mixture, after being spread, shall be thoroughly compacted by rolling as soon as it will bear the weight of the rollers without undue displacement. The number, weight, and types of rollers and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in a workable condition.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling with hot material.
- D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
- E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
- F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot bituminous concrete. Compact by rolling to maximum surface density and smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 CONSTRUCTION

- A. Site Tolerances:
 - 1. Paving Surface Smoothness: Maximum allowable 10 foot straightedge tolerance for smoothness.
 - a. Base Course Surface: 1/4 inch.
 - b. Wearing Surface Course: 3/16 inch.

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3.7 FIELD QUALITY CONTROL

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

B. Site Tests:

1. Paving Base Course: Perform testing of in-place base courses for compliance with requirements for thickness, compaction, density, and tolerance.
 - a. Moisture/Density Test: ASTM D 698 or ASTM D 1557.
 - b. Mechanical Analysis Test: AASHTO T-88.
 - c. Plasticity Index Test: ASTM D 4318.
 - d. Base Material Thickness Test: Minimum one test for every 20,000 square feet.
 - e. Base Material Compaction Test: Minimum one test for every 20,000 square feet.
 - f. Field Density Tests: Perform testing of in-place base courses for compliance with requirements for density using one of the following methods:
 - 1) Sand-cone Method: ASTM D 1556.
 - 2) Balloon Method: ASTM D 2167.
 - 3) Nuclear Method: ASTM D 2922, Method B (Direct Transmission).
 - g. Test each source of base material for compliance with applicable state highway specifications.
2. Asphalt Concrete Paving: Perform testing of in-place asphalt concrete paving courses for compliance with requirements for thickness, compaction, and surface smoothness.
 - a. Thickness: ASTM D 3549; Thickness shall not be less than thickness specified on Drawings.
 - b. Surface Smoothness: Testing shall be performed on the finished surface of each asphalt paving course using 10 foot straightedge applied parallel with, and at right angles to centerline of paved areas. Smoothness shall not be less than tolerances specified herein.
3. Compaction: Field density test for in place materials shall be performed by examination of field cores in accordance with one of the following standards:
 - a. Bulk Specific Gravity of Paraffin-Coated Specimens: ASTM D 1188, minimum one core per 20,000 square feet.
 - 1) Standard Duty Areas: Minimum 3 cores.
 - 2) Heavy Duty Areas: Minimum 3 cores.
 - b. Bulk Specific Gravity Using Saturated Surface-Dry Specimens: ASTM D 2726, minimum one core per 20,000 square feet.
 - 1) Standard Duty Areas: Minimum 3 cores.
 - 2) Heavy Duty Areas: Minimum 3 cores.

END OF SECTION

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SECTION 321313
CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete Pavement
 - 2. Concrete walks and terraces.
 - 3. Concrete curbs, and curb and gutters.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 033000 - Cast-In-Place Concrete: Concrete requirements for pavement.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 308 - Standard Practice for Curing Concrete.
- B. American society for Testing and Materials (ASTM):
 - 1. ASTM A 185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
 - 2. ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
 - 4. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - 5. ASTM D 1751 - Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for the following:
 - a. Joint filler.
 - b. Joint sealant.
 - c. Concrete admixtures.
 - d. Concrete curing compounds.
 - 2. Assurance/Control Submittals:
 - a. Concrete Mix Design: Submit three copies of each proposed mix design for each class of concrete in accordance with ACI 301, Sections 3.9 "Proportioning on the basis of previous field experience or trial mixture", or 3.10 "Proportioning based on empirical data". Submit separate mix design for concrete to be placed by pumping, in addition to the mix design for concrete to be placed directly from the truck chute.

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- b. Include the following information in concrete mix design:
 - 1) Proportions of cement, fine and coarse aggregate, and water.
 - 2) Water-cement ratio, 28-day compressive design strength, slump, and air content.
 - 3) Type of cement and aggregate.
 - 4) Aggregate gradation.
 - 5) Type and dosage of admixtures.
 - 6) Special requirements for pumping.
 - 7) Range of ambient temperature and humidity for which design is valid.
 - 8) Special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product specified.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Conform to ACI 305R when mixing and placing concrete during hot weather.
- C. Conform to ACI 306R when mixing and placing concrete during cold weather.
- D. Regulatory Requirements:
 - 1. Conform to applicable requirements for paving work on public property.
 - 2. Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 - PRODUCTS

2.1 FORM AND REINFORCING MATERIAL

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required.
 - 1. APA Exterior Plyform BB with a medium density, smooth, hard, fused resin fiber overlay, or metal forms.
 - 2. Form Oil: Coat forms with nonstaining type coating that will not discolor or deface surface of concrete. Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Eucoslip" - Euclid Chemical Co., Cleveland, OH (800) 321-7628.
 - b. "Form Coating" - Nox-Crete Chemicals, Omaha, NE (800) 669-2738.
 - c. Substitutions: Under provisions of Section 016000.
- B. Curb, Curb and Gutter Forms: Use flexible spring-steel forms or laminated boards to form radius bends. Tolerance: Not to deviate more than 1/4 inch in 10 feet in grade and alignment.
- C. Reinforcing:
 - 1. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to Owner.
 - 2. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.

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3. Fiber reinforced concrete mixtures having the same strength or exceeding as specified for concrete mixes, as verified by Manufacturer's testing laboratory procedures, shall be considered as an alternate for welded wire mesh in exterior flat work, curbs, and sidewalks.

D. Reinforcing Accessories:

1. Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. Dayton Superior Corp., Miamisburg, OH (800) 745-3700.
 - b. Heckmann Building Products, Inc., Chicago, IL (800) 621-4140.
 - c. Hohmann & Barnard, Inc., Hauppauge, NY (800) 645-0616.
 - d. Richmond Screw Anchor Co., Inc., Ft. Worth, TX (817) 284-4981.
2. Conform to Concrete Reinforcing Steel Institute Manual of Standard Practice. Include spacers and chairs with plastic tipped legs, ties, and other devices necessary for properly assembling, placing, spacing, and supporting forms and reinforcement in place.
3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 CONCRETE MATERIALS

- A. Comply with requirements of applicable Section 033000 for concrete materials, admixtures, bonding materials, curing materials, surface sealers and others as required.

B. Cement:

1. Portland Cement: ASTM C150 Type 1.
2. High-early Strength Portland Cement: ASTM C150, Type III.

C. Aggregates: ASTM C33.

1. Fine aggregate shall be natural sand, or sand prepared from stone or gravel. Grains shall; be clean, hard, durable, uncoated, and free from silt, loam, and clay.
2. Coarse Aggregates: Crushed stone, gravel, or other approved inert materials of similar characteristics, or combinations thereof, having hard, strong, durable pieces free from adherent coatings. Maximum size of pieces shall be 3/4" to #4 except for footings, which may be 1-1/2". The maximum size of aggregate may also be not larger than one fifth of the narrowest dimension between forms, nor larger than three fourths of the minimum clear spacing between reinforcing bars.

- D. Water: Clean and free from injurious amounts of oil, acids, salts, organic or other deleterious matter.

E. Air Entrainment: ASTM C260.

1. Use air-entrained concrete for exterior exposed concrete including walls, walks, paving, etc. where minimum daily temperatures are expected below 38 degrees F during pouring or subsequent 38 day curing period.
2. Proportion air-entraining concrete to attain minimum 28-day compressive strength specified.
3. Total Air Entrainment in Concrete: Not less than four percent nor more than six percent volume of concrete.

F. Admixtures:

1. May be used at contractor's option to provide workability at low slumps, increased compressive strength, retardation, or acceleration of the concrete.
2. Chemical Admixtures: ASTM C494. Mineral Admixtures: ASTM C618.
3. The cement factor shall not be reduced and changes shall be made in the other mix proportions to ensure the minimum strength requirements.

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4. Use of admixtures approved in writing by Architect. No additional expense to the Owner will be allowed.
5. No calcium chloride shall be used.
6. Before any admixture is accepted for use, the Contractor shall submit certified laboratory reports on each additive material to the architectural consultant. The report shall show the following:
 - a. Confirmation of compliance with the applicable ASTM Standard.
 - b. Evaluation of the effects of the admixture on the properties of the concrete to be made on the job, including consideration of the anticipated ambient conditions on the job, and proposed construction procedures.
 - c. Determination of within-lot uniformity of product proposed for use.

2.3 CONCRETE MIXES

A. Concrete Proportions:

1. Concrete shall be homogenous, and when hardened, shall have the required strength, resistance to deterioration, durability, water tightness and the properties as specified.
2. Minimum Concrete Strength at 28 days shall be:
 - a. 3,000 psi for walks, terraces, curbs, and gutters.
 - b. 4,000 psi for concrete pavement and pads.
3. Slump of Concrete:
 - a. Pavement: 2-1/2 inch minimum to 4 inch maximum.
 - b. Ramps and Sloping Surfaces: Not more than 3 inches.

B. Ready-Mix Concrete:

1. Ready-mix concrete shall conform to ASTM C94. The mixing agitation shall begin within 30 minutes, and the concrete shall be discharged from the truck within one hour after the water has been added to the concrete mix.
2. Delivery tickets are to accompany each concrete truck and shall be kept in the job superintendent's file. Delivery tickets must indicate the following information or be subject to rejection:
 - a. Name of project.
 - b. Supplier of concrete.
 - c. Truck identity and ticket serial number.
 - d. Date of delivery.
 - e. Brand of cement.
 - f. Cement content.
 - g. Strength classification.
 - h. Batching time.
 - i. Point of deposit.
 - j. Total amount of water.
 - k. Weight of aggregate.
 - l. Daily temperature.
 - m. Number of cubic yards in load.
 - n. Admixture content.
 - o. Name of Contractor.
 - p. Name of driver.
 - q. Time loaded and first mixing of concrete.
 - r. Reading of revolution counter.
3. Quantity of water used for each batch shall be accurately measured.

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2.4 JOINT MATERIALS

- A. Sealed Expansion and Contraction Joints: Filler of nonbituminous rubber or cork conforming to ASTM D1752.
- B. Non-sealed Joints:
 - 1. Non-sealed Joints: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Flexcell" - Celotex Corp., Tampa, FL (813) 873-1700.
 - b. "Seal Tight Fiber Expansion Joint" - W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.
 - 2. Filler premolded bituminous type conforming to ASTM D1751.
 - 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Noncompressive Filler:
 - 1. Noncompressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Styrofoam SM" - Dow Chemical Co., Midland, MI (517) 636-0754.
 - b. "Foamular" - Owens Corning, Toledo, OH (800) 828-7155.
 - 2. 2 inch or 1 inch thick sheets.
 - 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- D. Compressive Filler:
 - 1. Compressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Ethafoam" - Dow Chemical Co., Midland, MI (800) 322-8723.
 - b. "Rodofoam No. 423" - Sternson Group, Brampton, ON (800) 265-8417.
 - 2. 2 inch or 1 inch thick sheets, compression modulus within the range of 15 to 25 pounds per square inch per inch.
 - 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- E. Filler Adhesive for Noncompressive Filler and Compressive Filler:
 - 1. Filler Adhesive: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "General Purpose Mastic No. 11" - Dow Chemical Co., Midland, MI (800) 322-8723.
 - b. "Rodofast" - Sternson Group, Brampton, ON (800) 265-8417.
 - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- F. Slab-on-grade Construction Joints: Provide a full slab depth 24 gauge metal preshaped key, approximate depth of key to be 1/4 slab thickness and a key width of about 1/10 slab thickness.
- G. Joint Sealants: ASTM C920. Non-priming, pourable, self-leveling polyurethane. Subject to compliance with project requirements manufacturers offering joint sealants which may be incorporated in the Work include, but are not limited to the following:
 - 1. Sonolastic Paving Joint Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 - 2. Sonomeric CT 1 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 - 3. Sonomeric CT 2 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 - 4. Vulkem 45, by Mameco, Cleveland, OH (800) 321-6412.
 - 5. Chem-Caulk, by Bostik, Middleton, MA (800) 726-7845.
 - 6. "THC-900" - Tremco, Beachwood, OH (800) 562-2728.
 - 7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

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2.5 CURING MATERIALS

- A. Sealers:
1. Sealers: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Polyseal" - W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.
 - b. "Kure-N-Seal" - Sonneborn, Shakopee, MN (800) 433-9517.
 - c. "Cure-Hard" - W.R. Meadows, Inc., Elgin, IL (312) 683-4500.
 2. ASTM C156 and ASTM C309, Type I. Material shall become integral part of concrete and leave slab free of residue or film.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Membrane: Opaque-white polyethylene sheet, 0.006 inch thick, meeting requirements of ASTM C171.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 SUBGRADE PREPARATION

- A. Conform with the requirements specified in Section 312000.
- B. Thoroughly wet subgrade and then compact with two passes of a 500 pound roller.
- C. Pumping: Where concrete paving or sidewalks, and curbs are to be placed, yielding material deflecting more than 1/2 inch under a 500 lb. roller shall be removed to a depth of not less than 4 inches below subgrade elevation and replaced with an approved granular material which shall then be compacted as described above.
- D. The subgrade shall be in a moist condition when the concrete is placed. In cold weather the subgrade shall be prepared and protected so as to provide a subgrade free from frost when the concrete is deposited.

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3.3 FORM CONSTRUCTION

- A. Comply with the requirements of Section 033000. Install sufficient quantity of forms to allow continuous progress of the work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check complete formwork for grade and alignment to the following tolerances:
 - 1. Top of form: Not more than 1/8 inch in 10 feet.
 - 2. Vertical face: Longitudinal axis not more than 1/4 inch in 10 feet.

3.4 PLACING REINFORCEMENT

- A. Support reinforcing and wire securely together to prevent displacement by construction loads and traffic, or the placing of concrete. For slabs on grade, supporting pieces of concrete blocks or bricks may be used.
- B. Place wire mesh reinforcing two inches above bottom of slab unless otherwise indicated.
- C. Reinforcement shall be kept clean from oil, dirt and loose mill scale or other coatings which might destroy the concrete bond. Remove tags and markings prior to concrete placement.
- D. Do not place concrete until reinforcement has been inspected and approved by local authorities, if required.

3.5 CONCRETE PLACEMENT AND FINISHING

- A. Tamp and consolidate concrete with a suitable wood or metal tamping bar and the surface shall be finished to grade with a wood float.
- B. Finished surfaces shall not vary more than 3/16 inch from the testing edge of a 10 foot straightedge.
- C. Curb Expansion Joints: Fill joints with 1/2 inch thick joint filler strips conforming to ASTM D1751 or ASTM D1752.
- D. Contraction Joints: Divide the surface of paving, walks and terraces into rectangular areas not to exceed 5 feet 0 inches each way.
 - 1. Cut a groove in the top portion of the slab to a depth of at least one-fourth of the slab thickness using a jointer or by sawing a groove in the hardened concrete with a power-driven saw.
 - 2. Membrane-cured surface damaged during the sawing operations shall be resprayed as soon as the surface becomes dry.
- E. Slab Finishes: ACI 301, paragraph 11.7 and as follows:
 - 1. Broom Finish: On stair treads with abrasive nosings and on walks, unless other finishes have been indicated or specified.
 - 2. Broom or Belt Finish: On level walks. Broom in direction perpendicular to travel and approved sample panel. Submit joint pattern layout prior to starting work.

3.6 TOLERANCES

- A. Horizontal Slabs: Finished surfaces true with no deviation in excess of 1/8 inch when tested with a 10 foot straightedge, non-accumulative. No coarse aggregate showing.

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- B. Steps:
1. Variation in steps within a flight of stairs:
 - a. Rise: 1/8 inch.
 - b. Tread: 1/4 inch.
 2. Variation in consecutive steps:
 - a. Rise: 1/16 inch.
 - b. Tread: 1/8 inch.

3.7 EXPANSION JOINTS

- A. Install transverse expansion joints at returns and 15 feet on center.
- B. Install longitudinal expansion joints where curbs and paved areas abut each other, buildings, other concrete slabs and pads or vertical restraints.
- C. Place joint filler with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing.
- D. Immediately after finishing operations are completed, round joint edges with edging tool having a radius of 1/8 inch. Remove concrete over the joint filler.
- E. At the end of the curing period, clean and fill expansion joints with joint sealer. Fill joints flush with concrete surface. Dummy groove joints shall not be sealed.

3.8 CURING

- A. Immediately after the finishing operations, the exposed concrete surface shall be cured for 7 days by the mat, impervious sheet, or membrane-curing method.

3.9 BACKFILLING

- A. After curing, remove debris and backfill the adjoining areas, grade and compact to conform to the surrounding area in accordance with the lines and grades indicated.

3.10 PROTECTION

- A. Protect the completed work from damage. Repair damaged concrete and clean concrete discolored during construction. Remove work that is damaged and reconstruct to entire length between regularly scheduled joints. Refinishing damaged portion is not acceptable.
- B. Prevent cars and trucks from driving on new pavement for a minimum of 14 days.

END OF SECTION

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SECTION 323113

CHAIN LINK FENCES AND GATES

PART 1- GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Chain link motorized gates and related hardware.
- B. Related Sections:
 - 1. Section 281304 – Physical Access Control System.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 3. ASTM F 1184 - Specification for Industrial and Commercial Horizontal Slide Gates, Type II, Class 2.
 - 12. ASTM F 2200 – Specification for gates to be automated.
- B. Underwriter's Laboratories (UL):
 - 1. UL325, Door, Drapery, Gate, Louver, Window Operators, and Systems.
- C. Chain Link Fence Manufacturer's Institute (CLFMI):
 - 1. CLF-PM0610 (July 2011) - Product Manual.

1.3 SUBMITTALS

- A. Procedures for Submittals.
 - 1. Product Data: Submit product data for gate controller and hardware.
 - 2. Shop Drawings: Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorage's, and schedule of components.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate certifying that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with CLFMI PM.
- B. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

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1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site, 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. HySecurity, Kent, Washington, (800) 321-9947.
- B. Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 GATE OPERATORS

- A. Gate operators must conform to UL325, Standards for Safety. The operator must be tested by an independent testing laboratory such as UL or ETL and found to conform to these standards. The completed installation shall conform to applicable ASTM and UL requirements.
- B. Basis of Design: HySecurity Slide Driver Unit.
- C. All electrical work is to be done by qualified electricians and is to conform to all applicable local, state, and federal codes.
- D. General Operation:
 - 1. The operator must be designed for high-cycle applications and low maintenance. The operator shall be capable of actuating gates up to 30 feet in overall length. The gate operator must be able to operate gates up to 150 per cent of weight of actual gate at 2.2feet (66 cm) per second.
 - 2. All fasteners, except structural bolts, are to be stainless steel, or other non-corrosive material.
 - 3. The operator is to provide wear compensating, spring-loaded, friction-feed type drive mechanism. The drive mechanism is to consist of two drive wheels that can be manually disconnected by a toggle style disconnect. This disconnect is to instantly disengage the drive wheels for manual operation. The operator, upon returning to automatic operation by engaging the drive mechanism, shall function properly without regard to the gate's actual position.
- E. Housing Construction:
 - 1. The housing cover must swing open to allow access to the internal components.
 - 2. The housing cover must be lockable.
 - 3. All operator cover locks are to be keyed alike.
 - 4. The housing, chassis and cover to be galvanized for corrosion resistance per ASTM 123 M.
- F. Electric Motor:
 - 1. The electric motor used in the gate operators must have a continuous-duty rating of two horsepower with a service factor of 1.15 or greater and shall be available in all voltages and phases to suit the installation requirements of the site.
 - 2. The electric motors must have built-in overload protection and resettable with a sealed pushbutton reset.

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- G. Hydraulic System:
1. The hydraulic system must be self-contained and contain pump, reservoir, two position control valve, hydraulic hoses, fittings, and hydraulic motors.
 2. All hydraulic hoses shall have a minimum burst pressure of 12,000 pounds per square inches.
 3. The hydraulic motors must be automatically locked when the control valve is in the de-energized to prevent slippage of the drive wheels.
 4. The hydraulic system must be soft-start and soft-stop to minimize shock loads transmitted to the gate system including a reverse delay to maximize gate hardware life.
- H. Electrical:
1. Built in "warn before operate" system.
 2. Anti-tailgate mode.
 3. 26 programmable user relay output options.
 4. Built-in power surge/lightning strike protection.
 5. Control circuit: 24VDC.
 6. Electrical enclosure: Oversized, metal, with hinged lid gasketed for protection from intrusion of foreign objects, and providing ample space for the addition of accessories.
 7. Menu configuration, event logging and system diagnostics easily accessible with integral touchpad or a PC and free START software.
 8. Limit switch shall feature a built in LED "tripped" indicator light. The limit switch must readily accessible, adjustable, and replaceable with normal hand tools.
 9. The limit switches are to provide the ability to remote monitor the gate position when in the fully closed and fully open positions.
 10. Provide individual surge protection at both ends of all power and low voltage controls conductors serving the gate operator(s). Refer to Section 281304.
- I. Accessories:
1. Through beam type photo eyes.
 2. Heater with thermostat for cold damp climates.
 3. Snow brushes and blades for cold snowy climates.
 4. Strobe or other similar visual beacon to operate simultaneously with standard gate operator "warn before operate" audible beacon.
- J. Inductive Vehicle Loop Detectors:
1. Inside and outside obstruction loops are to be installed to prevent the gate from closing when vehicle traffic is present. Anti-Tailgating logic is to be applied to entrance lane gates.
 2. Free exit loops are to be installed for exit lane gates.
 3. Loops for gates with heavy truck traffic will have no side of the loop less than 6'.
 4. Loop wire to be stranded Thhn or XLPE, crosslink poly-ethelene jacketed type acceptable for direct burial.
 5. Refer to detail drawings for specific loop placement or refer to manufacturer's recommendations.

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.

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- 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. Gates: Install gate controller plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.3 CONSTRUCTION

- A. Gate Operator:
 - 1. Coordinate conduit runs and electrical connections with Access Control Section 281304, Common Work Results for Communications Section 270500, and Communications Horizontal Cabling Section 271500.

3.4 FIELD QUALITY CONTROL

- A. Test gate operator through ten full cycles and adjust for operation without binding, scraping or uneven motion. Test limit switches for proper "at rest" gate position.
- B. All anchor bolts shall be fully concealed in the finished installation. Owner, or owner's representative, shall complete "punch list" with installing contractor prior to final acceptance of the installation and submit completed warranty documentation to manufacturers where applicable.

3.5 CONTINUED SERVICE AND DOCUMENTATION

- A. Train owner's personnel on how to safely shut off electrical power, release and manually operate the gates. Additionally, demonstrate the general maintenance of the gate operator and accessories and provide one copy of "Installation and Reference" manual for the owner's use (a second manual is available upon request). Manuals will identify parts of the equipment for future procurement. Direct maintenance personnel to HySecurity's website, specifically the technical support sections.

END OF SECTION

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SECTION 329200
TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sod.
 - 2. Mulches.
 - 3. Water.

- 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 C 602 - Specification for Agricultural Liming Materials.

- B. American Sod Producers Association (ASPA):
 - 1. ASPA STSMT - Specification for Turfgrass Sod Materials and Transplanting/Installing.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit certificate from sod supplier for each seed mixture, identifying sod source, including name and telephone number of supplier.

- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operation and Maintenance Data: Include maintenance instructions, cutting method and maximum grass height, types of application frequency, and recommended coverage of fertilizer for one full growing cycle.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to applicable requirements of the Local and State Department of Agriculture Extension Service of the state in which the project is located.

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1.5 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management:
1. Renewable Resources: Plants specified are indigenous, low maintenance varieties, tolerant of site's existing soils and climate without supplemental irrigation or fertilization once established.
 - a. Soil amendments: No chemical fertilizers; use organic/natural matter to support establishment of indigenous plants; use inorganic materials such as sand or gypsum to improve workability and drainage of soil as appropriate to indigenous plants.
 - b. Mulch: Provide organic mulch products.
 2. Recycled Content:
 - a. Wood Fiber Mulch: Provide products manufactured from 100% post-consumer paper content and yard trimming composts.
 - b. Mulch from Recycled Site Debris: Coordinate with Section 311000 - Site Clearing to identify and prepare suitable organic debris for use as mulch on site.
 - c. Soil Amendment from Recycled Scrap Gypsum: Coordinate with Section 092900 - Gypsum Board to prepare scrap gypsum board for use as soil amendment.

PART 2 - PRODUCTS

2.1 SOD

- A. Classification:
1. Field as classified in ASPA STSMT.
 2. Machine cut sod at a uniform thickness of 3/4 inch with a tolerance of 1/4 inch, excluding top growth and thatch. Each individual sod piece capable of supporting its own weight when lifted by ends.
 3. Broken pads, irregularly shaped pieces, torn or uneven ends will be rejected.
 4. Wood pegs and wire staples for anchorage as recommended by sod supplier.

2.2 MULCHES

- A. Provide mulch free from noxious weeds, mold, and other deleterious materials.
- B. Wood Cellulose Fiber:
1. Processed to contain no growth or germination-inhibiting factors, dyed with non toxic, biodegradable dye to an appropriate color to facilitate visual metering of materials application.
 2. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 3.5 to 5.0
 3. Use with hydraulic application of grass seed and fertilizer.
 4. Provide organic mulch products manufactured from 100 percent post-consumer paper content and yard trimming composts.
 5. Manufacturers:
 - a. National Fiber, Belcher, MA, (800) 282-7711 or (413) 283-8747.
 - b. Wood Recycling Inc., Woburn, MA, (800) 982-8732 or (617) 937-0855.
 - c. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.3 WATER

- A. Suitable quality for irrigation.

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2.4 pH ADJUSTERS

- A. Lime:
 - 1. Material: ASTM C 602, Class T, agricultural commercial grade ground limestone containing not less than 50 percent of total oxides.
 - 2. Gradation: Minimum 75 percent passing 100 mesh sieve and 100 percent passing 20 mesh sieve.
- B. Ferrous Sulfate: Commercial Grade.

2.5 FERTILIZER

- A. Bonemeal: Commercial, raw, finely ground; minimum 4 percent nitrogen and 20 percent phosphoric acid.
- B. Superphosphate: Commercial-Grade complete fertilizer of neutral character consisting of fast-and-slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium.
- C. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorous, and potassium.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

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3.3 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's published instructions.
- B. Apply after smooth after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.
- F. No chemical fertilizers.

3.4 SODDING

- A. Placing:
 - 1. Place a maximum of 20 hours after initial harvesting, in accordance with ASPA GSS as modified herein.
 - 2. Thoroughly moisten areas to be sodded immediately prior to placing.
- B. Slopes and Ditches:
 - 1. For slopes 2:1 and greater, lay with long edge parallel to slope.
 - 2. V-ditches and flat bottomed ditches, lay with long edge perpendicular to flow of water.
 - 3. Anchor each piece of sod with wood pegs or wire staples maximum 2 feet on center.
 - 4. On slope areas, start sodding at bottom of slope.
- C. Finishing: After completing sodding, blend edges of sodded area smoothly into surrounding area.
- D. Watering: Start immediately after completing each day's sodding. Apply at a rate sufficient to ensure thorough wetting of soil to minimum depth of 4 inches.

3.5 CLEANING AND PROTECTION

- A. Remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.
- B. Immediately after sodding protect the area against traffic or other use.
- C. Restore existing lawn and grass areas which have been damaged during execution of this work to original condition.
- D. Keep one paved pedestrian access route and one paved vehicular access route to each building clean at all time. Clean other paving when work in adjacent areas is complete.

3.6 ESTABLISHMENT PERIOD

- A. Definitions:
 - 1. Lawns and grasses establishment period will be in effect until lawns and grasses have been mowed 3 times.
 - 2. Stand of lawn and grass is 95 percent ground cover of established species.

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3.7 FINAL INSPECTION AND ACCEPTANCE

A. Final Inspection and Acceptance:

1. Final inspection will be made upon written request from the Contractor at least 10 days prior to last day of lawn and grasses establishment period.

B. Replanting: Replant areas which do not have a satisfactory stand of lawns and grasses.

END OF SECTION

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