

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Basic electrical methods.
2. Grounding and bonding.
3. Hangers and supports.
4. Electrical identification.
5. Motor starters, controls, and connections to mechanical equipment.
6. Electrical system testing and inspection.

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

C. Related Sections:

1. Section 019113 - General Commissioning Requirements
- ~~2.~~ Section 078400 - Firestopping
- ~~2-3.~~ Section 220500 - Common Work Results for Plumbing
4. Section 230500 - Common Work Results for HVAC
- ~~3-5.~~ Section 230915 - Variable Frequency Motor Controllers
- ~~4-6.~~ Section 251104 - Metering Devices
7. Section 255104 - EMS Integration
- ~~5-8.~~ Section 260513 - Medium Voltage Cables
- ~~6-9.~~ Section 260519 - Low-Voltage Electrical Power Conductors and Cables-
- ~~7-10.~~ Section 260533 - Raceway and Boxes for Electrical Systems
11. Section 260623 - Lighting Control Devices
12. Section 260800 - Commissioning of Electrical Systems
13. Section 261116 - Secondary Unit Substations
14. Section 261216 - Dry-Type, Medium-Voltage Transformers
15. Section 261313 - Metal Clad Medium-Voltage Circuit Breaker Switchgear
- ~~8-16.~~ Section 261317 - Medium-Voltage Interrupter Switchgear
- ~~9-17.~~ Section 261414 - Infrared Viewing Panes (IR Windows)
- ~~10-18.~~ Section 262200 - Low Voltage Transformers
- ~~11-19.~~ Section 262413 - Switchboards
- ~~12-20.~~ Section 262416 - Panelboards
- ~~13-21.~~ Section 262726 - Wiring Devices
22. Section 262816 - Enclosed Switches and Circuit Breakers
- ~~14-23.~~ Section 262923 - Variable Speed Drives
- ~~15-24.~~ Section 264113 - Lightning Protection for Structures

- ~~16-25.~~ Section 264128 - Surge Protective Devices (SPD's)
- ~~17-26.~~ Section 265100 - Interior Lighting (LED - Solid State)
- ~~18-27.~~ Section 265600 - Exterior Lighting
- ~~19-28.~~ Section 270500 - Common Work Results for Communications
- ~~20-29.~~ Section 275116 -- IP Integrated, Public Address Zone Paging Systems
- ~~21-30.~~ Section 275117 - Video Intercom and Exterior Gate Control System
- ~~22-31.~~ Section 275123 - Call Bell Systems
- ~~23-32.~~ Section 275313 - Wireless, Synchronized, GPS Clock System
- ~~24-33.~~ Section 281304 - Enterprise Physical Access Control System (ePACS)
- ~~25-34.~~ Section 281600 - Intrusion Detection System
- ~~26-35.~~ [Section 282305 - Integrated Security and Investigative Platform (ISIP) CCTV System]
- ~~27-36.~~ Section 283100 - Fire Emergency Voice/Detection and Alarm Communication System (EVACS)
- ~~28-37.~~ Section 337173 - Electrical Utility Services

## 1.2 REFERENCES

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

## 1.3 SUBMITTALS

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

- a. Locations of components and grounding electrodes.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing Work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements:
  - 1. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for the purpose specified and indicated.
  - 2. Work herein shall conform to all applicable laws, ordinances and regulations in accordance with the latest applicable requirements of:
    - a. National Electrical Manufacturer's Associates.
    - b. Standards of National Fire Protection Association (NFPA 72, 90A and 101).
    - c. Underwriter's Laboratories.
    - d. Occupational Safety and Health Agency Standards.
    - e. Illuminating Engineering Society Handbook.
    - f. The International Existing Building Code.
    - g. The International Electrical Code.
    - h. ASHRAE Standard 90.1—~~2010~~.
    - i. The International Energy Conservation Code.

#### 1.5 BASIC ELECTRICAL METHODS

- A. Drawings are schematic and diagrammatic. Use judgment and care to install electrical Work to function properly and fit within building construction and finishes. Electrical conductors, conduit, components, not shown or specified, which are required for any device or system to produce a complete and operative system are required to be furnished and installed.
- B. Exact location of outlets is determined from dimension on Drawings, manufacturer's shop drawings, or as may be determined at Project Site. Do not scale Drawings for exact location of any item. Verify item mounting heights as required by project conditions prior to rough-in.
- C. Route conduits and wiring associated with new equipment and systems above ceilings, in existing chases, and concealed within building structure.
- D. Surface mounted raceways or conduit permitted only at locations indicated on Drawings.
- E. Circuit grouping, conduit or cable runs and home runs are indicated with number of conductors shown in each raceway to clarify operation and function of various systems. Provide proper number of conductors and conduits or cables to provide operative system as indicated on Contract Documents. Do not regroup any feeder circuits, branch circuits, home runs, and zone alarms at any point, from that shown on Contract Documents. Each conduit run shall contain no more than (6) current carrying conductors.
- F. Branch and home run circuits are indicated as 2, 3, or 4 wire circuits unless otherwise noted. Do not connect two ungrounded conductors to same circuit breaker/fused switch in any panel. Circuit runs consist of a maximum of five conductors; 3 phase conductors, 1 neutral conductor, and 1 equipment ground conductor, unless otherwise noted. Do not splice branch circuit conductors in any panels, safety switches, or circuit breakers in separate enclosures.
- G. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutrals.

- H. Proposed equipment, switches or devices, shown mounted on and/or adjacent to equipment, which if installed, would impair proper operation of existing or new equipment, shall be removed and relocated by Contractor as required so equipment will function properly. Notify 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.

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Include paragraph 1.5L. below for Projects within existing buildings.*

\*\*\*\*\*

- L. Remove existing equipment, lighting fixtures, switches, and receptacles as required to facilitate proposed installation and as specified in Section 024119 - Selective Structure Demolition. Remove existing wiring and conduit serving items to be removed. Conduit in inaccessible areas shall be cut off below finished surfaces and existing surface patched to match existing. Provide blank plates on existing flush mounted outlet boxes that will be abandoned. Remove all abandoned conductors from raceways.

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Include paragraph 1.5M. below for facilities LEASED FROM LANDLORD.*

\*\*\*\*\*

- M. Refer to section 015000 – Temporary Facilities & Controls for special requirements relating to facilities leased by USPS.

**PART 2 - PRODUCTS**

**2.1 GROUNDING AND BONDING**

- A. Grounding System Resistance: Five ohm.
- B. Rod Electrodes:
  - 1. Material: Copper.
  - 2. Diameter: 3/4 inch.
  - 3. Length: 10 feet.
- C. [Active Electrodes]:
  - 1. [Description: Metallic-salt-filled copper-tube electrode].
  - 2. [Shape: As required to pass test].
  - 3. [Length: As required to pass test].
  - 4. [Connector: U-bolt pressure plate].

- D. Mechanical Connectors: Bronze.
- E. Electrode Conductor:
  - 1. Material: Bare stranded copper.
  - 2. [Foundation Electrodes: [2/0] [2] [ \_\_\_\_\_ ] AWG].
  - 3. [Grounding Electrode Conductor: Size to meet NFPA 70 requirements].
- F. [Grounding Well Components]:
  - 1. [Well Pipe: 8 inch NPS by 24 inch long clay tile concrete pipe with belled end].
  - 2. [Well Cover: Cast iron with legend "GROUND" embossed on cover.]

## 2.2 HANGERS AND SUPPORTS

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

## 2.3 ELECTRICAL IDENTIFICATION

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

c. Communications Cable: Per section 270500.

C. Conduit Markers:

1. Underground conduit routings shall be marked utilizing magnetic marker tape set atop of the entire conduit run.
  - a. Underground-Type Plastic Line Marker: Manufacturer's standard detectable permanent, bright colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6 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.

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. Confined space markings: Work within electrical manholes and underground vaults must comply with "confined space" OSHA requirements. Manhole covers and the entrance to underground vaults shall be stamped or marked as "CONFINED SPACE – PERMIT REQUIRED".

## 2.4 MOTOR STARTERS, CONTROLS, AND CONNECTIONS TO MECHANICAL EQUIPMENT

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

1. Allen-Bradley Company, Milwaukee, WI (414) 382-2000.
2. Cutler-Hammer Eaton Corp, Milwaukee, WI (800) 833-3927.
3. Square D Company, Palatine, IL (847) 397-2600.
4. General Electric Company, Plainville, CT (860) 747-7111.
5. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
6. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

B. Motor Starters

1. Provide manual, single phase, 120/277V, toggle type, motor rated switches with thermal overload element (sized at 115 percent of full load current) for fractional horsepower motors not requiring automatic control interfaces.
2. Provide across-the-line, AC magnetic motor starters in applications where controls other than manual on and off are involved. Motor starters shall be UL labeled. Provide starters with the following features:
  - a. Rating for the voltage and current imposed.
  - b. Enclosure for the application usage: NEMA 1 for dry, indoors, NEMA 3R for outdoors, etc.
  - c. Control circuit voltage and amperage to match coil voltage and ratings of control apparatus.
  - d. Control transformers with primary and secondary fusing for control circuits, as required.
  - e. Overload elements for every conductor leg above ground. Elements are to be "thermal alloy" type, resettable and properly sized to motor nameplate rating. Elements located near boilers, heat strips, duct heaters or other heat sources or where heating by conduction or radiation can occur, shall be ambient temperature compensated types.
  - f. Adjustable phase loss/phase reversal protection (0-15 seconds), factory set at 7 seconds and a minimum of two field convertible auxiliary contacts.
  - g. Cover-mounted control switch is to be a "start-stop" or "hand-off-auto" type with "running" and "auto" pilot lights, as required by the control sequence. A suitable reset device for manually resetting overcurrent trip shall be provided.
3. Starters for motors 10 hp or less shall be connected to automatically return the motor to service after a power interruption. Starters for motors over 10 hp shall be equipped with time delay relays so that after a power resumption and after a preset delay of 0-30 seconds, the motor shall automatically be returned to service.
4. Combination magnetic motor starter/fused disconnect unit shall be utilized wherever possible.

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

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to ~~Contracting Officer through~~ 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. Install additional rod electrodes as required to achieve specified resistance to ground.
- B. Provide grounding well pipe with cover at [\[each rod location\]](#) [\[rod locations where indicated\]](#). Install well pipe top flush with finished grade or surface.
- C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing, building steel above grade and metallic cold water pipe.
- D. Provide bonding and grounding in conformance with NFPA 70.
- E. Equipment Grounding Conductor: Provide separate, insulated conductor within all lighting and power raceways. Terminate each end on suitable lug, bus, or bushing.
- F. Testing and Inspection:
  1. Inspect and test in accordance with NETA ATS, where applicable.
  2. Perform inspections and tests listed in NETA ATS, Section 7.13.

3. Test ground resistance of system with ground resistance tester. The resistance of the grounding system shall not exceed 5 ohms. Where tests show resistance-to-ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms, or less, but driving additional ground rods; then retest to demonstrate compliance. Install rods at least 8 feet apart.
4. Method for testing individual ground rods and overall grounding system shall be accomplished by the three point method per military handbook 419. Test probes shall be placed minimum of 30 feet and 60 feet from rod being tested. Furnish written report of all test results for all ground rods.

### 3.3 INSTALLATION - HANGERS AND SUPPORTS

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

### 3.4 INSTALLATION - ELECTRICAL IDENTIFICATION

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

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

- A. Verify and check equipment manufacturer's nameplate and installation instructions to obtain exact location of outlets for equipment before installation.



- B. Wire and connect line voltage controls in accordance with approved wiring diagrams. Provide line voltage interlock and control wiring as indicated on Drawings using conduit and No. 12 type THHN wire.

### 3.6 FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION

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

- B. Section 260800 - Commissioning of Electrical Systems: Requirements related to Division 26 Commissioning

- C. Conduct testing to Determine that Electrical Equipment and Systems:

1. Are in conformance with Contract Documents and applicable reference standards.
2. Is properly installed without damage due either to installation or shipment.
3. Operate correctly, meet design intent, and are performing at optimum level, in safe manner.

- D. Provide a complete written record of operational values to be used as a baseline for future operational testing.

- E. Instrumentation:

1. Provide calibration program that assures applicable test instrumentation is maintained within rated accuracy and directly traceable to National Bureau of Standards.
2. Calibrate instruments in accordance with following frequency schedule:
  - a. Field Instruments:
    - 1) Analog - 6 months maximum.
    - 2) Digital - 12 months maximum.
  - b. Leased Specialty Equipment: 12 months. (Where accuracy is guaranteed by lessor.)
3. Dated Calibration Labels: Visible on test equipment.
4. Keep records current; Show date and result of instruments calibrated or tested.
5. Maintain current instrument calibration instruction and procedure for each test instrument.
6. Calibrating Standard: Higher accuracy than that of instrument being calibrated.

- F. Regulatory Requirements:

1. Safety Practices: Include, but not limited to, the following requirements:
  - a. Occupational Safety and Health Act of 1970 - OSHA.
  - b. Accident Prevention Manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
  - c. Applicable State and Local Safety Operating Procedures.
  - d. NETA Safety/Accident Prevention Program.
  - e. United States Postal Service Safety Practices.
  - f. NFPA 70E - Electrical Safety Requirements for Employee Workplace.
  - g. American National Standards for Personnel Protection, ANSI Z244.1.
2. Perform tests with apparatus de-energized except where otherwise specifically required herein.
3. Testing Laboratory: Provide a designated safety representative present at Project Site and supervise safety operations.
4. Power Circuits: Conductors shorted to ground by a hot line grounded device approved for the purpose.
5. Do not proceed until safety representative has determined that it is safe to do so.
6. Testing Laboratory: Provide sufficient protective barriers and warning signs to conduct specified tests safely.

- G. Tests and inspections include, but are not limited to the following:

1. Proper operation of lights and equipment.
2. Continuity of raceway system.
3. Insulation leakage and impedances.
4. Ground system resistance.
5. Elimination of reverse rotation and single-phasing of motors.

6. Sub-system tests indicated in other Sections.
  7. Proper operation of communications systems specified in Section 270500.
  8. Proper operation of intrusion detection systems specified in Section 281600.
  9. Proper operation of video surveillance system specified in Section 282305.
  10. Proper operation of fire alarm system specified in Section 283100.
- H. Load balance all electrical phases, at device, panels, and switchboards.
- I. Perform electrical system testing and inspection as specified in each related Section and as specified in this Section.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~  
Last revised: ~~9/5/2018~~9/1/2017

SECTION 260513

MEDIUM VOLTAGE CABLES (5 KV – 15 KV)

**NOTE TO SPECIFIER**

Use this Outline Specification Section for ~~Mail Processing~~ Customer Service Facilities only. This Specification defines "level of quality" for ~~Mail Processing~~ Customer Service Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.

**NOTE TO SPECIFIER**

This specification shall be utilized only upon written approval from USPS Headquarters, submitted through the Contracting Officer.

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes requirements for medium voltage 5 kV to 15 kV, shielded single and-multiple conductor power cables, cable splices and terminations.
- B. Related Documents: The Contract Documents, as defined in Section 011100 – Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
  - 1. Section 019113 - General Commissioning Requirements
  - 2. Section 260500 - Common Work Results for Electrical
  - 3. Section 260800 - Commissioning of Electrical Systems
  - 4. Section 261116 - Secondary Unit Substations
  - 5. Section 261216 - Dry-Type, Medium-Voltage Transformers
  - 6. Section 261313 - Medium Voltage Circuit Breaker Switchgear
  - 7. Section 261317 - Medium-Voltage Non-Fusible Interrupter Switchgear
  - 8. Section 337173 - Electrical Utility Services

1.2 REFERENCES

- A. The references listed below form a part of this specification to the extent referenced.
  - 1. AEIC C8: (2000) Extruded Dielectric Shielded Power Cables Rated 5 through 46 kV.
  - 2. ASTM B 3: (2001; R 2007) Standard Specification for Soft or Annealed Copper Wire.
  - 3. ASTM D 746: (2007) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
  - 4. IEEE 383: (2003; R 2008) Standard for Qualifying Class 1E Electric Cables and, Field Splices for Nuclear Power Generating Stations 2004.
  - 5. IEEE 400 (2001) Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems

260513 - 1

USPS MPFS

Date: 10/1/2018

MEDIUM VOLTAGE  
CABLES (5 KV – 15 KV)

- 5-6. IEEE 400.12: (20074; R-2005) Guide for Field Testing of Laminated Dielectric, Shielded Power Cable Systems Using Rated 5kV/kV and Above with High Direct Current Voltage Very Low Frequency (VLF).
- 6-7. NEMA WC 74 / ICEA S-93-639: (2006) 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy.
- 7-8. NFPA 70: National Electrical Code.
- 8-9. FED-STD-228: (2000) Cable and Wire, Insulated; Methods of Testing.

### 1.3 GENERAL REQUIREMENTS

- A. Provide Certificates for the following showing that the cable manufacturer has made factory-conducted tests on each shipping length of cable. Provide certified copies of test data that shows conformance with the referenced standards prior to delivery of cable.

### 1.4 SUBMITTALS

- A. Submit the following in accordance with Section 013300 - Procedures for Submittals.
1. Provide performance data and manufacturer's catalog data for each cable type.
  2. Provide field test reports for the following in accordance with Section 014000 - Quality Requirements: Field Inspection.
    - a. Dielectric Absorption Tests
    - b. High Voltage Tests
  3. Provide manufacturer's instructions showing the recommended sequence and method of installation.
  4. Provide qualifications for cable splicers.

### 1.5 QUALITY ASSURANCE

- A. Manufacturer qualifications: The bidder must have at least 10 years experience in manufacturing medium voltage cable assemblies.
- B. Regulatory requirements:
  1. Conform to requirements of NFPA 70.
  2. Provide products listed and classified by Underwriters Laboratories, Inc.
- C. For the cable specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

### 1.6 QUALIFICATIONS

- A. Cable splicers performing splicing are required to have [10] [ ] years experience in cable splicing and terminations. Once a termination or splice has been started by a worker, the same person completes that particular splice. Start and complete each termination and splice in one continuous work period.

### 1.7 CABLE VOLTAGE RATINGS

- A. Provide medium voltage power cables including multiple and single conductor cables rated as follows, phase-to-phase, for grounded and underground neutral systems:
  1. Use cable rated [5,000] [15,000] volts, ungrounded neutral, on [2,400 / 4,160] [13,200 / 13,800] [12,470]-volt, three phase, 60-hertz distribution systems.
  2. Cable insulations shall be rated at 133 percent.

260513 - 2

USPS MPFS

Date: 10/1/20187

MEDIUM VOLTAGE  
CABLES (5 KV – 15 KV)

1.8 SHIPMENT

- A. Ship cables on reels such that the cable is protected from mechanical injury. Hermetically seal and securely attach each end of each length of cable to the reel.
- B. Make minimum reel drum diameter [14] [ ] times the overall diameter of the cable. Provide a pulling eye that is installed by the manufacturer fro each length of cable supplied for installation in ducts, manholes, and utility tunnels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Experience: Manufacturer shall provide evidence demonstrating a minimum of ten (10) years U.S. production experience in the type cable specified herein.
- A.B. Subject to compliance with project requirements, U.S. manufacturer's offering Products which may be incorporated in the Work include the following:
  1. Okonite Cable, Inc., Ramsey, NJ (201) 825-0300.
  2. Aetna Insulated Wire, LLC, Virginia Beach, VA (800) 423-6505.
  2. Pirelli Cable Corp., Olathe, KS (913) 829-2588.
  3. Southwire, Inc. Carrollton, GA (800) 444-1700.
  - 3-4. Prysmian Group, Lexington, SC (803) 951-4800.
  - 4-5. Substitutions permitted; subject to prior approval.

2.2 CONDUCTORS

- A. Provide 15 kV [15 kV] conductors that are MV-105 copper, conforming to ASTM B 3.

Formatted: Font color: Blue  
Formatted: Font color: Blue

2.3 CABLE IDENTIFICATION

- A. The overall cable jacket shall be printed in a contrasting color with the following informationProvide cables that have a tape placed immediately under the outer jacket showing the name of the manufacturer, the year in which the cable was manufactured, and a unique number for identification purposes. Closely group information on the tape at 1-foot intervals to permit complete identification.:
  1. Manufacturer name
  2. Location code of plant
  3. Number and conductor size
  4. Insulation type and thickness
  5. Voltage rating
  6. UL designation
  7. CT use
- B. Closely group information on the tape at 1-foot intervals to permit complete identification.

2.4 FLAMMABILITY

- A. Test cables not to be enclosed in metallic conduit for flammability in accordance with [FED-STD-228, Method 5221 [vertical], [spark]] [IEEE 383, 20,000 Watt, 70,000 Btu per hour per hour vertical tray flame test].

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Utilize multiconductor, interlocked armor cable for interior, cable tray applications and single conductor shielded cables for exterior, in-conduit installations. Single or multiple conductor cables may be utilized. Edit paragraphs 2.5 and 2.6 below accordingly.*

**2.5 MULTIPLE CONDUCTOR SHIELDED CABLES**

- A. Multiple conductor ethylene propylene rubber (EPR) insulated with jacketed interlocked armor.
  - 1. Provide multiple conductor insulated interlocked armor covered [5 kV] [15 kV] cable assemblies that consist of: Class B stranded copper conductors, an extruded semi-conducting shield over the conductors, 5.6 millimeter 200 mils of ethylene propylene rubber (133 percent) insulation, an extruded or other approved semi-conducting shield, a 0.130 millimeter 5 mil minimum copper tape shield wrapped helically with a minimum of [12.5] [ ] percent overlap and a Class B, bare copper, grounding conductor with a single strip of interlocked armor of aluminum and a red PVC jacket.
- B. Provide multiple conductor, ethylene propylene rubber insulated with interlocked armor jacketed, shielded cable that conforms to NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, NEMA WC 74/ICEA S-93-639, AEIC C8, IEEE Std 532.

Formatted: Font color: Blue

Formatted: Font color: Auto

**C. Basis of Design:**

- 1. Okonite #C-L-X, MV-105.
- 2. Southwire #AL13ET, type MV-105.
- 3. Alternate U.S. manufacturers permitted; subject to prior approval.

Formatted: USPS4

Formatted: USPS4

**2.6 SINGLE CONDUCTOR SHIELDED CABLES**

- A. Single conductor, ethylene propylene rubber (EPR) insulated with PVC jacketed shielded cable interlocked armor.
  - 1. Provide single conductor insulated interlocked armor covered [5 kV] [15 kV] cable assemblies that consist of: Class B stranded copper conductors, an extruded semi-conducting shield over the conductors, 5.6 millimeter 220 mils of ethylene propylene rubber (133 percent) insulation, an extruded or other approved semi-conducting shield and 1/3 copper concentric neutral, a 0.130 millimeter 5 mil minimum copper tape shield. The concentric neutrals shall be encapsulated with a 50 mils overall linear low density polyethylene (LLDPE) jacket wrapped helically with a minimum [12.5] [ ] percent overlap and a PVC jacket.
- B. Provide single conductor, ethylene propylene insulated, LLDPE interlocked armor jacketed, concentric neutral shielded cable that conforms to NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, NEMA WC 74/ICEA S-93-639 and AEIC C8.

Formatted: Font color: Blue

**C. Basis of Design:**

- 1. Okonite type URO-J, MV-105.
- 2. Aetna #2-81-3, type MV-105.
- 3. Southwire #15 kV primary UD EPR, type MV-105.
- 4. Alternate U.S. manufacturer permitted; subject to prior approval.

Formatted: USPS4

**2.7 TERMINATIONS NONMETALLIC JACKET**

- A. Interlock Armored Cable
  - 1. Provide nonmetallic, corrosion resistant jacket over interlock armored cable that is [thermoplastic black] [colored] [polyvinylchloride]] [black polyethylene] conforming to [NEMA WC 27500] [NEMA WC 2] [NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659 and NEMA WC 74/ICEA S-93-639].

B.A. Terminations

1. Provide cable terminations with grounding terminals rated ~~[5 kV]~~ [15 kilovolts (KV)], to withstand ~~[25 kV]~~ [45 kKV]-ac for 10 seconds, minimum.

Formatted: Font color: Blue

Formatted: Font color: Blue

2.8 CABLE SUPPORTS AND FITTINGS

- A. Provide cable racks, cable tray supports and related fittings that are UL listed heavy-duty nonmetallic ~~[glass-reinforced nylon]~~ [polycarbonate].

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to ~~USPS Project Manager 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 medium-voltage cables in accordance with NFPA 70.
- B. Install cable inside buildings; by open wire method and ceiling mounted cable trays.
- C. Secure cables with heavy duty cable ties in trays mounted horizontally, where cable rests on tray bottom. Install cable ties at minimum of [10] [ ] foot intervals.
- D. Secure cables with ~~[PVC coated]~~ [non-metallic] cable clamps, straps, hangers, or other approved supporting devices in cable trays mounted vertically, where tray bottom is in a vertical plane.
- E. When field cuts or other damage occurs to the PVC coating, apply a liquid PVC patch to maintain the integrity of the coating. After the installation is complete, perform an inspection to ensure the absence of voids, pinholes, or cuts.
- F. Ensure that all cable tray is properly secured and supported prior to installing armored cable. Add permanent and/or temporary tray support devices as required to preclude cable tray failure during cable pulling or after cable is installed.
- G. Pull medium-voltage cables into cable tray with equipment designed for this purpose, including power-driven winch, cable-feeding flexible tube guide, cable grips, and lubricants. Employ a sufficient number of trained personnel and equipment to ensure the careful and proper installation of the cable.
- H. Unreel cable from the top of the reel. Carefully control payout. Make cable to be pulled be attached through a swivel to the main pulling wire by means of a ~~[pulling eye]~~ [suitable cable grip permitted only on cables less than 60 meter 200-feet long and less than 50 millimeter 2 inches in diameter].

- I. Use woven-wire cable grips to grip the cable end when pulling small cables and short straight lengths of heavier cables.
- J. Attach pulling eyes to the cable conductors to prevent damage to the cable structure. Use pulling eyes and cable grips together for nonmetallic sheathed cables to prevent damage to the cable structure. Provide a minimum bending radius in accordance with the following manufacturer's recommendations.
- K. Provide cables cut in the field that have the cut ends immediately sealed to prevent entrance of moisture. Seal cables with rubber tape wrapped down to [3] [ ] inches from the cable end. Cover-wrap rubber tape with polyvinylchloride tape.
- L. Dry terminations with medium voltage pennants, preformed, and hand wrapped stress cones are allowed for terminating cables.
- M. Installation includes built-up or prefabricated heat or cold shrink stress-relief cones at the terminals of all shielded cables.

~~N. Splices within medium-voltage cables are not acceptable.~~

O-N. Provide bushings that are glazed wet-process electrical porcelain insulators, factory assembled and hermetically sealed.

P-O. Provide cable connectors that are high-conductivity copper accurately machined and threaded for internal and external electrical connections. Provide cross-sectional and contact areas that are adequate to carry the full-load current rating of the conductors. Provide solder type cable connectors with gasket seal between the connector and bushing.

Q-P. Provide bonding and grounding in conformance with NFPA 70.

### 3.3 PACKAGING

#### A. Reels

1. ~~Reels shall be in good condition and serviceable enough to hold the weight of the cable under fairly rugged handling.~~
2. ~~Reels should be tagged with a durable metal or paper tag containing at a minimum: "sold to" name, manufacturer's name, corporation PO number, product description, quantity on reel, shipment reel number and required UL tagging information.~~
3. ~~Reels should only be shipped upright and shall be wrapped in such a way as to minimize damage and show evidence of tampering or in shipment damage.~~
4. ~~Cables shall be reeled in such a way as to leave both ends available for testing.~~

B. Cable End Preparation: Cables shall be cut flush and the ends sealed with heat shrink end caps.

Formatted: USPS3

### 3.3.4 FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Section 260800 - Commissioning of Electrical Systems: Requirements related to Division 26 Commissioning.
- C. Instrumentation:
  1. Provide calibration program that assures applicable test instrumentation is maintained within rated accuracy and directly traceable to National Bureau of Standards.
  2. Calibrate instruments in accordance with following frequency schedule:
    - a. Field Instruments:
      - 1) Analog - 6 months maximum.



- 2) Digital - 12 months maximum.
- b. Leased Specialty Equipment: 12 months. (Where accuracy is guaranteed by lessor.)
- 3. Dated Calibration Labels: Visible on test equipment.
- 4. Keep records current; show date and result of instruments calibrated or tested.
- 5. Maintain current instrument calibration instruction and procedure for each test instrument.
- 6. Calibrating Standard: Higher accuracy than that of instrument being calibrated.

D. 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.
  - h. Recommended Practices for Safety in High-Voltage Testing, IEEE 510 (1983).
- ~~2. Perform tests with apparatus de-energized except where otherwise specifically required herein.~~
- ~~3.2. Safety Representative Testing Laboratory:~~ Provide a designated safety representative present at Project Site ~~to~~and supervise safety operations. ~~Do not proceed until safety representative has determined that it is safe to do so.~~
- ~~4. Do not proceed until safety representative has determined that it is safe to do so.~~
- ~~5.3. Testing Laboratory:~~ Provide sufficient protective barriers and warning signs to conduct specified tests safely.

Formatted: USPS5

E. Safety Practices:

- 1. When testing, personnel safety and service reliability of the electrical systems are of ultimate importance. All cable and equipment tests shall be performed on isolated and de-energized systems except where otherwise specifically required and authorized. The safety practices must include at least the following requirements:
  - a. Applicable user safety operating procedures.
  - b. Recommended practices for safety in high-voltage testing (see IEEE Std 510-1983).
  - c. Applicable national, state and local government safety operating procedures.
  - d. Part 4 of the National Electrical Safety Code® (NESC®)(Accredited Standards Committee C2-2002) where applicable.
  - e. Provide protection of utility and customer property by such means as barriers, enclosures with warning signs, and safety watchers at all points. The protection shall provide minimum interference, as much as practicable, with related operations channels, systems and equipment.
  - f. Cables must be de-energized and grounded before testing is begun.
  - g. While testing, one or more cable ends will be remote from the testing site; therefore cable ends must be cleared and guarded.
  - h. At the conclusion of high-voltage testing, cables and cable systems shall be discharged and careful consideration must be given to eliminate the aftereffects of the cables' dielectric absorption and capacitance characteristics. Those effects shall be reduced by leaving both the conductors and sheath of the cable grounded until it is placed in service.

Formatted: USPS5

E.F. Testing and Inspection:

- 1. Inspect and test in accordance with NETA ATS, where applicable.
- 2. Perform inspections and tests listed in NETA ATS, Section 7.13.
- 3. Subject each cable assembly to dielectric-absorption tests and high-voltage tests after the installation of medium-voltage power cables and terminations have been completed and before the cable is energized.

260513 - 7

USPS MPFS

Date: 10/1/2018

MEDIUM VOLTAGE  
CABLES (5 KV – 15 KV)

4. Provide test equipment, labor, and technical personnel as necessary to perform the electrical acceptance tests. Make arrangements to have tests witnessed and approved by the USPS Project Manager/Contracting Officer.

G. Preliminary Testing Procedure (Megger Testing):

- 4.1. Completely isolate each power-cable installation from extraneous electrical connections at cable terminations.
- 5.2. Initially each power cable shall be subjected to a full dielectric-absorption (megger) test with ~~2500~~5000-volt insulation-resistance test set. Apply test for a long enough time to fully charge the cable. Record readings every 15 seconds during the first 3 minutes of test and at 1 minute intervals thereafter. Continue test until three equal readings, 1 minute apart, are obtained. Minimum reading is 200 megohms at an ambient temperature of 20 degrees C 68 degrees F. Correct readings taken at other than 20 degrees C 68 degrees F ambient temperatures.
- 6.3. Upon successful completion of the dielectric absorption tests, subject the cable to a direct-current high-potential test ~~for 5 minutes with test voltages applied~~ in accordance with AEIC C8 and IEEE 400.12 for ethylene propylene rubber-insulated cable.

Formatted: USPS3

Formatted: Font color: Blue

H. Acceptance Testing Procedure (DC High Potential Testing):

- 1. Disconnect all equipment not to be included in the test, but leave all ground connections intact. Prepare the cable system for testing in accordance with manufacturer or utility recommendations. Clean insulator surfaces with a dry cloth and, if necessary (in severely polluted areas), apply silicone grease to minimize leakage currents and prevent flashover.
- 2. Check the operation of the test equipment in accordance with the manufacturer's recommendations prior to connecting the test cable.
- 3. If the leakage current in the test equipment is a substantial portion of the test value to be measured, this current should be measured and subtracted from the test current readings.
- 4. The ground lead for the test equipment shall be connected to a local ground or in the absence of a local ground to the metallic shield of the cable that is grounded. For ungrounded cable terminations, the metallic shield shall be connected to a local ground, during the high direct voltage testing.
- 5. Connect the test lead to the first conductor or conductors to be tested. When multiconductor cables are tested, each conductor should be tested separately, with the remaining conductors and shields grounded.
- 6. The initially applied voltage shall not exceed 1.8 times the rated ac rms phase-to-phase voltage of the cable. The voltage may be increased continuously or in steps to the maximum test value. Apply voltage slowly enough to prevent overloading and/or tripping of the power supply or overshooting the test level.
  - a. If the voltage is increased continuously, the rate of increase shall be uniform and should result in the maximum test voltage being reached in a time period of not less than 10 s and not more than 60 s. In cases where extremely long cable runs are to be tested, the rate of voltage rise may be slower.
  - b. If the step method of voltage increase is employed, a minimum of five steps shall be employed. Duration at each step should be long enough for the current to reach a steady value (1 min suggested). Current readings at each voltage step shall be recorded at the end of the step duration.
- 7. The maximum test voltage shall be maintained for 15 min. After reaching the maximum test voltage, the current magnitude shall be recorded at least twice: once at approximately 2 min and again at the end of the test period (15 min).
- 8. Recommended test voltages for shielded cable systems 5 kV and above shall be as listed in IEEE 40.1 – 2007 Table 1. Recommended field test voltages for the 5kV and 15kV system voltages are listed below:

Formatted: USPS5

Formatted: USPS4

**Table 1 - Field test voltages for shielded power cables 5 kV to 15 kV system voltage**

<b>System voltage, kV rms.</b>	<b>System BIL, kV crest</b>	<b>Acceptance test, kV dc.</b>
------------------------------------	---------------------------------	------------------------------------

Formatted: Font: Bold

Formatted: Font: Bold

Formatted: Font: Bold

Formatted: Centered, Space After: 6 pt, Keep lines together

phase-to-phase		phase-to-ground
5	75	28
8	95	36
15	110	56

**NOTES:**

1. The user shall consult with the suppliers of the cable and any/all accessories before applying the high voltage.
2. If the test voltage exceeds 50% of system BIL, surge protection against excessive overvoltages induced by flashovers at the termination should be provided.
3. The user shall consult with the manufacturer(s) of all components that will be subjected to such testing before performing any tests on cables and cable accessories.
4. If any equipment is included beyond the cable and its terminations, the dielectric strength of such equipment must be taken into consideration when establishing the test voltage.
5. If an external flashover occurs during a high-voltage test of a shielded cable, it is possible to develop fast transients and voltage reversals of high magnitude that may damage the cable or accessories. Precautions should be taken to provide high-voltage connections that are suitable for the testing voltage.

9. At the completion of the test period, the voltage can be reduced by returning the voltage control of the test equipment to zero. The voltage on the cable will discharge through the internal resistance of the test equipment.
  - a. The discharge time for cables longer than 300 ft. will be very long, therefore a separate automatic grounding systems with built-in high-voltage discharge resistance shall be utilized to reduce the discharge time. In all cases, discharge mechanisms should be designed to safely handle the test voltage and energy stored in the cable under test.
10. After the test voltage is reduced to a low level, the high-voltage conductor shall be solidly grounded. The cable shall remain grounded until ready for service or further testing. A retest shall not be started until the cable has been grounded for a period of at least four times the duration of the previous test.

Formatted: USPS4, Space Before: 12 pt

Formatted: USPS5

**I. Evaluation of Results:**

1. The test current will momentarily increase for each voltage increment due to the charging of the capacitance and the dielectric absorption characteristics of the cable. Both of these decay, the first in a few seconds, the latter more slowly, ultimately leaving only the conduction current plus any external surface leakage or corona currents.
2. One criterion of a satisfactory test is a steady current value or a decrease of current with time at a fixed voltage application. The absence of an increase in current with time is a practical criterion for acceptance.
  - a. If the current starts to increase without any increase in applied voltage, gradual insulation failure may be in progress. This process will most likely continue until the cable or accessories eventually fail unless the voltage is rapidly reduced. Immediately terminate the testing and take steps to find and correct the fault. Upon completion of the correction, repeat the test procedure.
3. If the test equipment overload system trips at any time during a test, it may indicate one of the following events:
  - a. A very rapid increase in current
  - b. A flashover of the test equipment, the leads, or a termination
  - c. A failure of the circuit under test, the cable, a splice, or a termination.
  - d. The failure can be confirmed by the inability to sustain another application of the test voltage.
4. In the event of such an apparent cable failure, the source of the failure shall be determined and corrected prior to retesting of the cable assembly.
7. Record leakage current readings every 30 seconds during the first 2 minutes and every minute thereafter for the remainder of the test. When the leakage current continues to increase after the first minute, immediately terminate the test and take steps to find and correct the fault. When a second test becomes necessary, repeat this test procedure.

Formatted: USPS4

Formatted: USPS4

8.5. Upon satisfactory completion of the high-potential test, give the cable a second dielectric-absorption test. Provide results of the second dielectric-absorption test that agree with the first test and that indicate no evidence of permanent injury to the cable caused by the high-potential test.

9. ~~Record test data and include identification of cable and location, megohm readings versus time, leakage current readings versus time, and cable temperature versus time.~~

6. Final acceptance depends upon the satisfactory performance of the cable under test. Do not energize cable until recorded test data has been approved by the Engineer and the USPS Project Manager/Contracting Officer.

J. Recording of Test Results:

1. The test data shall be recorded for future reference. Such data shall include the date, time of day, location, ambient temperature, relative humidity or weather condition, cable description, phase, and circuit identification, as well as the name of the test operator and the test equipment used.

a. The test schedule used shall include the time of voltage application as well as the voltage and current readings. The name of the manufacturer of the cable, its terminations, and its date of installation shall be included.

40.2. Provide final test reports to the USPS Project Manager/Contracting Officer. Provide reports with a cover letter/sheet clearly marked with the System name, Date, and the words "Final Test Report - Forward to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database."

Formatted: USPS5

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018  
Last revised: ~~9/6/2018~~6/47/2014

*[This page intentionally left blank.]*

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

***\*\*REQUIRED PARTS OR ARTICLES ARE INCLUDED IN THIS SECTION. DO NOT REVISE WITHOUT AN APPROVED DEVIATION FROM USPS HEADQUARTERS, FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.***

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

- 1. Building wire and cable.
- 2. Branch-circuit cable.
- 3. Wiring connectors and connections.
- 4. Drop cords.
- 5. Busways.

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.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.*  
\*\*\*\*\*

PART 2 - PRODUCTS

2.1 BUILDING WIRE AND CABLE

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Alcan Cable, Atlanta, GA (770) 392-2376.
  - 2. Anixter, Inc., Skokie, IL (800) ANIXTER.
  - 3. General Cable, Highland Heights, KY (800) 526-4391.
  - 4. General Electric, Plainville, CT (860) 747-7111.
  - 5. Okonite, Ramsey, NJ (201) 825-0300.
  - 6. Southwire Company, Carrollton, GA (800) 444-1700.
  - 7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: Single conductor insulated wire.
- C. Conductor: Copper, except conductors #1/0 AWG and larger may be compact stranded aluminum if equipped with compression lugs and installed per manufacturer's recommendations and the National Electrical Code.
- D. Insulation Voltage Rating: 600 Volts.
- E. Insulation: NFPA 70, Type THHN/THWN or Type XHHW-2.
- F. Multiconductor cable: Metal clad cable, Type MC with ground wire.
  - 1. Type "MC" cable shall be permitted for use in exposed or accessible ceiling spaces only. Type "MC" cable shall not be utilized above inaccessible hard ceilings or in damp locations. Cable shall be supported and secured where such support does not exceed 3 ft. intervals and shall be properly color coded to identify phase, neutral, ground and switch legs.

2.2 WIRING CONNECTORS

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

1. Buchanan: 2006S or 2011S.
2. Thomas and Betts: [\_\_\_\_\_].
3. 3M; [\_\_\_\_\_].

### 2.3 DROP CORDS

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

### 2.4 BUSWAYS

- A. Basis of Design: General Electric "Spectra" series.
- B. Manufacturers: Subject to compliance with project requirements, manufacturers offering products which may be incorporated in the Work include the following:
  1. Eaton Corporation, Cutler-Hammer Products, Pittsburg, PA (800) 525-2000.
  2. General Electric Company (800) 626-2000.
  3. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
  4. Square D Company, Palatine, IL (800) 392-8781.
  5. No substitutions permitted.
- C. Provide factory shop drawing submittals for each type of busway.
  1. Show fabrication and installation details of busway, including plans, elevations and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths and fittings.
  2. Seismic-Restraint Details: Signed and sealed by a qualified Professional Engineer, licensed in the state where Project is located, who is responsible for their preparation.
    - a. Design Calculations: Calculate requirements for selecting seismic restraints.
    - b. Detail fabrication, including anchorages and attachments to structure and to supported busways.
- D. Furnish and install a totally enclosed, low-impedance 5 wire, copper, busway system of the indicated ratings with all necessary fittings, power takeoffs, hanging devices and accessories.
  1. Materials and installation shall comply with applicable codes, recommended practices and standards of ANSI, IEEE, NEMA and UL. All components of the busway shall be UL listed. Arrangements, details and locations shall be as shown on the drawings and specified herein. The housing shall be of extruded aluminum and all hardware shall be painted to prevent corrosion.
  2. Joints shall be of the one-bolt removable/isolatable type with through-bolts that can be checked for tightness without de-energizing the system. The means of visual indication shall be a color change in the head of the bolt. It shall be possible to make up a joint from one side in the event the busway is installed against a wall or ceiling. The joint shall be so designed as to allow



- removal of any length without disturbing adjacent lengths. Belleville springs shall be provided to give positive pressure over complete contact area.
3. Plug-in and feeder busway shall use identical parts and all multi-stacks shall be phase collected.
  4. The maximum hot-spot temperature rise at any point in the busway at continuous rated load shall not exceed 55 degrees C above a maximum ambient temperature of 40 degrees C in any position.
- E. Furnish and install busway plugs of the types and ratings indicated. Plugs shall be UL labeled. Housing shall completely enclose the switching device and shall be of sheet steel furnished in ASNI-61 grey enamel over a rust inhibitor. Provide stab shields that protect ground plug body to busway housing before stabs make power contact. Provide grounding terminal inside plug body and adequate shielding to prevent access to live parts when cover is open. A ground stab to engage grounding tab on busway and internal ground bus shall be provided. Provide means for padlocking cover and operating handle in "off" position. The operating handle shall be easily moved from end to side of vice versa so that it will be in the correct position to operate from the floor.
1. Circuit breaker type plugs shall have an interrupting rating as indicated on the drawings. They shall have a releasable cover interlock that prevents opening of cover except with the breaker in "off" position. An interlock to prevent insertion or removal from busway when in "on" position shall be provided, as well as an interlock (releasable) to prevent closing circuit breaker with cover open.
  2. Plug assists shall be furnished on all plugs over 100 Amps that will mechanically engage or disengage the plug from the busway, but only when the plug is in the "off" position.

## 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 or MC multiconductor cable.
  2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
  3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN or Type XHHW-2 insulation in metallic raceway or MC multiconductor cable.
  4. Wet or Damp Interior Locations: Use only building wire, Type THW or THWN or Type XHHW-2 insulation in raceway.
- B. Install products in accordance with manufacturers published instructions and NECA SI.
- C. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- D. Use stranded conductors for control circuits and final connections to all vibration equipment.
- E. Use conductor not smaller than 12 AWG for power and lighting circuits.

- F. Use conductor not smaller than 14 AWG for control circuits.
- G. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- H. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
- I. Pull all conductors into raceway at same time.
- J. Use approved wire pulling lubricant for all building wire.
- K. Protect exposed cable from damage.
- L. Neatly train and lace wiring inside boxes, equipment, and panelboards in accordance with NECA Standards.
- M. Clean conductor surfaces before installing lugs and connectors.
- N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- O. For splices and taps, use only compression connectors for copper conductors, 6 AWG and larger or aluminum conductors 1/0 and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- P. Use solderless pressure compression connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- Q. Use conductors rated 90 degrees C, inside a ballast compartment or within 6 inches of any ballast.
- R. Conductor Sizes #8 and Larger: Class B stranding.
- S. Install Drop Cords to building structure at locations indicated on Drawings as indicated on Drawings.
- T. The sharing of neutral conductors for multiwire branch circuits is prohibited. All branch circuits shall contain individual neutral conductors.

#### 3.4 INSTALLATION – BUSWAYS

- A. Horizontal runs of busway shall be UL listed for hanging on 10-foot centers in any position. Vertical riser runs of busway shall be supported with rigid and/or spring hangers. (Max. 16 ft. centers).
- B. Final field measurements shall be made by the contractor prior to release for manufacture to assure coordination with other trades. Contractor shall coordinate routing of busways with field conditions.
- C. Contractor shall provide all necessary mounting hardware as recommended by the manufacturer. Utilize trapeze hangers, spring isolators, and ½ inch all-thread on 10 foot centers. Installation shall comply with local seismic zone requirements.
  - 1. Provide approved manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, expansion joints and connectors. Obtain busway components from a single manufacturer.
- D. Engraved nameplates: ½ inch high black letters on yellow laminated plastic nameplate, engraved with the following wording: WARNING! DO NOT USE BUSWAY AS WALKWAY, LADDER OR SUPPORT.

3.5 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.

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Edit WIRING COLOR CODE below for voltage systems used for this Project.*

\*\*\*\*\*

3.6 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. 240/120 Volt System:

1. Phase A - Black.
2. Phase A Switch Leg - Black with "S" tag.
3. Phase B - Orange (High-Leg).
4. Phase C - Blue.
5. Phase C Switch Leg - Blue with "S" tag.
6. Travelers - Yellow.
7. Neutral - White.
8. Equipment Ground - Green.

D. 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.

E. Use same color for same phase throughout. Use same colors for switch legs. Travelers shall be yellow. Phase rotation shall be same in all panels. Identify large cables with colored tape.

F. Provide identification tags on each conductor entering panel, switch, junction box and pull box to identify conductor.

### 3.7 FIELD QUALITY CONTROL

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

END OF SECTION

USPS Mail Processing Facility Specifications issued: 10/1/201~~8~~  
Last revised: 9/4/2013

*[This page intentionally left blank.]*

SECTION 260533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduit.
2. Flexible metal conduit.
3. Liquidtight metal conduit.
4. Electrical metallic tubing.
5. Fittings and conduit bodies.
6. Wall and ceiling outlet boxes.
7. Pull and junction boxes.
8. Cable trays.
9. Floor boxes with covers (other uses.)

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

C. Related Sections:

1. Section 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 283100 – Fire ~~Emergency Voice/Detection and Alarm~~ Communication System (EVACS).
5. Section 230500 – Common Work Results for HVAC.
6. Section 260500 – Common Work Results for Electrical.
7. Section 262726 – Wiring Devices.
8. Section 270500 – Common Work Results for Communication.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 123 - Specification for Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.

B. American National Standards Institute (ANSI):

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
3. ANSI C80.5 - Rigid Aluminum Conduit.

- C. National Electrical Contractors Association (NECA):
  - 1. NECA "Standard of Installation."
- D. National Electrical Manufacturers Association (NEMA):
  - 1. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
  - 2. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
  - 3. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
  - 4. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
  - 5. NEMA VE 1 - Metallic Cable Tray Systems.
- E. National Fire Protection Association (NFPA):
  - 1. NFPA 70 - National Electrical Code.

### 1.3 SYSTEM DESCRIPTION

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

### 1.4 QUALITY ASSURANCE

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

### 1.5 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 CONDUIT REQUIREMENTS

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

### 2.2 METAL CONDUIT

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

### 2.3 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
  - 1. Hubbell, Millford, CT (203) 882-4800.
  - 2. Electriflex, Roselle, IL (800) 323-6174.
  - 3. 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.

## 2.6 NONMETALLIC CONDUIT

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

## 2.7 FITTINGS

- A. Manufacturer: Raco, Inc., South Bend, IN (219) 234-7151.
  - 1. Subject to compliance with project requirements, one of the following manufacturers may also be provided:
    - a. Steel City.
    - b. 0-Z/Gedney.
  - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Conduits 1/2 inch thru 1 inch enter junction boxes, pull boxes, panels, cabinets, and gutters, provide the following:
  - 1. Rigid Conduit: Raco 1222, 1223, 1224.
  - 2. Flexible Metal Conduit: Raco 3302, 3303, 3304, 3305, 3306, 3308.
  - 3. Liquidtight Flexible Metal Conduit: Raco 3511, 3512, 3513, 3541, 3542, 3543.
- C. Conduits 1-1/4 inch and larger entering junction boxes, pull boxes, panels, cabinets, and gutters, provide Insulated throat type bushings; Raco 1225, 1226, 1228, 1230, 1232, 1234, 1236.
- D. Provide threaded joint connectors and malleable iron no thread compression box connectors on rigid conduit. Do not provide fittings requiring set screws or indenter type applications including BM connectors.
- E. Provide only steel set-screw couplings and connectors on EMT conduit.

## 2.8 CONDUIT STRAPS AND HANGERS

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

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

## 2.9 SEAL-OFF AND EXPANSION FITTINGS

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

## 2.10 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
- 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.

2. Receptacle and Device Boxes - 4 inch square x 2-1/8 inch deep with raised, single gang, plaster ring unless indicated otherwise.
  3. Switch Boxes: 2 inch x 4 inch x 2-1/8 inch deep, unless indicated otherwise.
  4. Communication Boxes: 4 inch square x 3 inch deep with raised gang plaster ring unless indicated otherwise.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.

C. Wall Plates for Finished Areas: Specified in Section 262726.

## 2.11 PULL AND JUNCTION BOXES

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

## 2.12 CABLE TRAY

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

1. Chalfant Cable Trays, Cleveland, OH (216) 521-7922.
2. Cable Management Solutions, Incorporated, Deer Park, NY (800) 308-6788.
3. GS Metals Corporation, Pinckneyville, IL (800) 851-9341.
4. Southwire Co., Carrollton, GA (800) 444-1700.
5. Mono-Systems, Inc., Rye Brook, N.Y. (914) 934-2075.
6. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

B. Provide factory shop drawing submittals for each type of cable tray.

1. Show fabrication and installation details of cable tray, including plans, elevations and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths and fittings.
2. Seismic-Restraint Details: Signed and sealed by a qualified Professional Engineer, licensed in the state where Project is located, who is responsible for their preparation.
  - a. Design Calculations: Calculate requirements for selecting seismic restraints.
  - b. Detail fabrication, including anchorages and attachments to structure and to supported cable trays.

C. Description: NEMA VE 1, ladder tray, wire mesh tray or solid bottom tray as indicated on drawings.

D. Material: Steel or aluminum.

E. NEMA Load/Span Class: 20C

F. Finish: ASTM A 525, pre-galvanized or clear aluminum.

G. Inside Width and Depth: Indicated on Drawings. Inside Radius of Fittings: 24 inches (minimum).

H. Provide with compartment dividers as indicated on drawings. Same materials and finish as tray.

I. Straight Section Rung Spacing: 9 inches on center (ladder tray only).

- J. Provide approved manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps. Obtain cable tray components from a single manufacturer.
- K. Engraved Nameplates: 1/2 inch high black letters on yellow laminated plastic nameplate, engraved with the following wording:

WARNING! DO NOT USE CABLE TRAY AS WALKWAY, LADDER, OR SUPPORT. USE ONLY AS MECHANICAL SUPPORT FOR CABLES AND TUBING!

## 2.13 FLOOR BOXES

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION - RACEWAYS

- A. Install in accordance with the following schedule, unless indicated otherwise on Drawings: Plastic flexible PVC conduit shall not be permitted. Flexible metal conduit shall be permitted for electrical power and security wiring only and not permitted for fire alarm cables. Intermediate grade rigid conduit permitted where indicated below.
  - 1. Above suspended ceilings: Galvanized or sherardized thick wall rigid steel (GRC), or intermediate grade rigid steel (IMC), or electrical metallic tubing (EMT).
  - 2. Metal stud walls: Galvanized or sherardized thick wall rigid steel (GRC), intermediate grade rigid steel (IMC), or electrical metallic tubing (EMT).
  - 3. Exposed interior areas: Galvanized or sherardized thick wall rigid steel (GRC), intermediate grade rigid steel (IMC), electrical metallic tubing (EMT).

4. Exposed exterior areas: Galvanized or sherardized thick wall rigid steel (GRC).
  5. Underground or below slab areas: Rigid polyvinyl chloride conduit (PVC-Sched. 40).
- B. Install conduit in accordance with NECA "Standard of Installation."
  - C. Install nonmetallic conduit in accordance with manufacturer's instructions. Nonmetallic conduit shall only be used under slabs or direct buried in earth. Conduit penetrations through slab including elbows shall be galvanized rigid conduit.
  - D. Conduit routing indicated on Drawings are approximate locations unless dimensioned. Route parallel and perpendicular to building construction for complete wiring system regardless whether exposed or concealed.
  - E. Arrange supports to prevent misalignment during wiring installation.
  - F. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
  - G. Group related conduits; support using conduit rack. Construct rack using approved steel channel and provide space on each rack for 25 percent additional conduits.
  - H. Fasten conduit supports to building structure and surfaces under provisions of this section.
  - I. Do not support conduit with wire or perforated pipe straps in any type structure. Remove wire used for temporary supports. Steel tie wire may be used to anchor conduit down to reinforcing rods in concrete encasement only.
  - J. Do not attach conduit or boxes to ceiling support wires. Boxes shall be independently supported.
  - K. Arrange conduit to maintain headroom and present neat appearance. Maintain required clearance between conduit and piping.
  - L. Route all conduit, whether exposed or concealed, parallel and perpendicular to walls, ceilings, building structures, etc.
  - M. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
  - N. Cut EMT conduit square using saw or pipe cutter; de-burr cut ends and ream. Bring conduit to shoulder of fittings; fasten securely.
  - O. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
  - P. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes. Use Myers hub connectors on all conduit entering top or sides of all junction boxes, pull boxes, wiring gutters, exposed to weather.
  - Q. The number of conduit bends per box shall comply with NFPA 70, Article 360. Conduit bends for "SCS" installation shall not exceed two 90 degree bends or exceed a total of 180 degrees of bend between pull boxes or conduit ends. Pull boxes shall be sized per NEC codes per conduit installed. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or use factory elbows for bends in metal conduit larger than 2 inch size.
  - R. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

- S. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- T. Provide suitable nylon pull string or #14 AWG steel wire in each conduit excluding sleeves and nipples.
- U. Ground and bond conduit per NFPA 70.
- V. Coat all metallic conduit with "General Electric" RTV silicone sealer where conduit is installed in exterior areas or in contact with concrete or earth.
- W. Conduits shall be sized as indicated on Drawings. Where sizes are not indicated, conduit shall be sized per NFPA 70.
- X. Cap all upturned conduits during construction rough-in to prevent moisture or debris from entering. Pull through each and every conduit a dry swab of sufficient size to remove any and all moisture.
- Y. Maximum length of flexible metal conduit (Greenfield), or flexible liquidtight shall be 5 feet.
- Z. Assure ground continuity on all branch circuitry conduits with two locknuts, one inside and one outside of all boxes, cabinets and gutters for rigid conduit. One locknut inside of all boxes, cabinets, and gutters for EMT.
- AA. Provide conduit supports as follows:
  1. Galvanized rigid thick wall conduit (GRC), intermediate grade rigid conduit (IMC) and electrical metallic conduit (EMT) within three feet of all outlet boxes, junction boxes, cabinets, gutters, or fittings. Horizontally anchored at 10 foot maximum intervals. Other spacings indicated on Drawings.
  2. Flexible metal conduit (Greenfield) and liquid-tight flexible metal conduit (Sealtite), within 12 inches of all outlet boxes, junction boxes, cabinets, gutters, or fittings and bends or turns. Horizontally anchored at 4-1/2 foot intervals. 1/2 inch minimum size permitted.

### 3.3 INSTALLATION - BOXES

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with NFPA 70.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated or as required for specific project requirements. Orient boxes to accommodate wiring devices as specified in Section 262726.
- D. Electrical boxes are indicated on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose with no additional cost to contract. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- E. Maintain headroom and present neat mechanical appearance.
- F. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. Install pull boxes in freezer and dock area above bottom chord of structural joist. Pullboxes sized in excess of 12 inches shall be equipped with hinged and hasped covers.
- G. Install outlet and junction boxes within inaccessible ceiling areas, no more than 6 inches from ceiling access panel or from removable recessed luminaire.

- H. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
- I. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- J. Locate flush mounted box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening. Use approved raised gang covers in masonry and stud walls.
- K. Flush mounted boxes shall not be mounted back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
- L. Secure flush mounted box to interior wall and partition studs. Accurately position to allow for surface finish thickness. Use approved stamped steel bridges to fasten box between studs.
- M. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- N. Use approved adjustable steel channel fasteners spanning joist for hung ceiling outlet box.
- O. Provide factory sectioned multi-gang boxes where more than one adjacent device is to be mounted. Sectional boxes shall not be permitted.

#### 3.4 INSTALLATION - CABLE TRAYS

- A. Install trays level and plumb in accordance with manufacturer's published instructions.
- B. Install metallic cable tray in accordance with NEMA VE 2.
- C. Support cable trays as follows:
  1. Use anchors and fasteners as specified in Section 260500.
  2. Provide supports at each connection point and at the end of each run.
  3. Design supports including attachment to structure to carry the greater of calculated load multiplied by a factor of four or the calculated load plus 200 lb.
- D. Locate cable tray with sufficient space to permit access for installing cables.
- E. Make changes in directions and elevations using standard fittings. Use expansion connectors where required.
- F. Ground and bond cable tray under provisions of Section 260500.
- G. Provide continuity between tray components.
- H. Use anti-oxidant compound to prepare aluminum contact surfaces before assembly.
- I. Provide #2 AWG bare copper equipment grounding conductor through entire length of tray; bond to each section.
- J. Connections to tray may be made using mechanical connectors.
- K. Install warning signs at 50 feet on center along cable tray, located to be visible.

#### 3.5 FIELD QUALITY CONTROL

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

### 3.6 ADJUSTING

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

### 3.7 CLEANING

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

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~<sup>7</sup>  
Last revised: ~~8/21/2018~~<sup>8/5/2016</sup>



*[This page intentionally left blank.]*

SECTION 260623

LIGHTING CONTROL DEVICES

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Section for Mail Processing Facilities where lighting controls are part of the work or where illuminated exterior signage is used.*

*Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

***\*\*REQUIRED PARTS OR ARTICLES ARE INCLUDED IN THIS SECTION. DO NOT REVISE THIS SECTION WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.***

\*\*\*\*\*

\*

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lighting control system for Workroom.
2. Control of Interior/Exterior Lighting.
3. Control of Administrative Area Lighting.
4. [Daylighting controls.]
5. Occupancy [and Photo] sensors

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

C. Related Sections:

1. Section 019113 - General Commissioning Requirements.
2. Section 260500 - Common Work Results for Electrical.
3. Section 260800 - Commissioning of Electrical Systems.

1.2 REFERENCES

A. National Electrical Manufacturers Association (NEMA):

1. NEMA ICS 1 - General Standards for Industrial Control and Systems.

B. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code.
2. NFPA 101 - Life Safety Code

C. Codes and Standards:

1. International Building Code / National Electrical Code.
2. Occupational Safety and Health Agency Standards.
3. Illuminating Engineering Society Handbook.
4. ASHRAE Standard 90.1—~~2010~~.

5. The International Energy Conservation Code.

D. U.L. Standards:

1. UL 916 Energy Management Equipment.

### 1.3 SUBMITTALS

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

1. Product Data: Data for each component of the lighting control system indicating electrical characteristics and connection requirements.
  - a. Lighting Control Components.
  - b. Digital Interval Timer.
  - c. Digital Time Switches.
  - d. Exterior Photo-Sensor.
  - e. Occupancy Sensors.
  - f. [\[Daylighting Controls.\]](#)
2. Shop Drawings: Indicate electrical characteristics and connection requirements, including layout of completed assemblies, interconnecting cabling, dimensions, and power requirements.
3. Assurance/Control Submittals:
  - a. Certificates: Manufacturer's certificate that Products and components meet or exceed specified requirements.
  - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

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

1. Project Record Documents: Accurately record the actual locations of Products.
2. Operating Instructions: Document training by furnishing a sign-in sheet with a description on the training provided, instructors name and organization and those who received training. Refer to 017704 1.3, 1.4 and 1.5 for more specific training.

### 1.4 SYSTEM DESCRIPTION

A. Each space enclosed by walls or floor-to-ceiling height partitions must be equipped with at least one automatic control device to independently control the general lighting within the space. This control device must automatically de-energize the space lighting within 30 minutes of all occupants leaving the space. Interior lighting for all spaces must utilize automatic occupancy sensors to turn off lighting in all spaces without occupant intervention.

B. The workroom and enclosed platform lighting systems shall be provided to achieve the required light levels for the four lighting groups as shown on the drawings.

1. Task Light Group (TLG): The lights in this group provide 50 fc of Task lighting for 1) Equipment operator stations and/or 2) Areas within a zone that require a higher light level for visual acuity. The TLG lighting is provided by luminaires located in task-specific areas apart from the normal Ambient Light Group grid pattern.
2. Ambient Light Group (ALG): This illumination group shall provide 25 fc for operational zones where work is performed that requires less visual acuity than that needed for Task lighting. This will be the primary lighting provided for workroom activities.
3. Area of Travel Light Group (AOTLG): This illumination lighting group requires a minimum average of 12.5 fc for areas of travel such as aisles and walkways when all other lights are turned off. Maintain the minimum average of 12.5 fc's at all times. Luminaires within the "AOTLG" shall not be automatically controlled and shall be energized 24 hours/day.
4. Egress Lighting Group (ELG): This is a condition in which power to the facility or the lighting circuitry is interrupted. During these conditions, an average of 1 fc must be maintained along all emergency egress routes in accordance with the National Fire Protection Agency 101 Life Safety

code. The column mounted, emergency battery units within the workroom must provide this emergency egress lighting.

- C. The functional characteristic of each luminaire within the workroom and enclosed platform shall be as follows:
  - 1. All luminaires shall be automatically controlled by luminaire mounted occupancy sensors, unless otherwise indicated. The occupancy sensors must be appropriate for the luminaire mounting height within the workroom or platform.
  - 2. The occupancy sensors shall be luminaire mounted, passive infra-red type and must automatically turn the "TLG" and "ALG" lighting groups off within 20 minutes of the last detected presence within the Workroom.
- D. The lighting within exterior, open platform and canopies must be provided with bi-level control (0%, 50% to 100%). The lower output illumination level of 12.5 footcandles shall be automatically controlled by photo-sensor(s) and the higher output level of 25 footcandles must be both automatically and countdown timer controlled utilizing photo-cells with countdown timers fed downstream of the photo-sensor(s).
- E. Exterior lighting shall be energized by photo-sensor(s) and de-energized by time control functions.
  - 1. The control of the exterior and building mounted signs shall operate similar to the exterior lighting control scheme, but shall utilize independent time schedules.

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Include paragraph 1.4 J. below for applications requiring automatic Daylighting Control.*

\*\*\*\*\*

- F. Daylighting automatic controls shall be provided for the rooms and spaces indicated on the drawings and provided as specified herein.

1.5 QUALITY ASSURANCE

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

3. Functional testing of the lighting control system shall be provided by an independent commissioning authority in accordance with ASHRAE 90.1 - 2010. Refer to Section 260800 - Commissioning of Electrical Systems.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Verify manufacturer information, product numbers, and availability at time of Project Manual preparation for Project.*

\*\*\*\*\*

2.1 MANUFACTURERS

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

\*\*\*\*\*

\*

**NOTE TO SPECIFIER**

*Interval countdown timer switches are required for the control of the "high level" illumination within the exterior platforms/canopies of Mail Processing Facilities. Choose the appropriate paragraph 2.2 A. for the interval countdown timer to be specified based on the required voltage and load rating.*

\*\*\*\*\*

\*

2.2 [DIGITAL (INTERVAL) TIMER SWITCH

- A. Provide flush wall mounted line voltage, digital, countdown timer switch with the following features:
  1. The timer switch shall be preset to turn loads "off" after a preset interval time of (4) hours maximum. Switch shall be equipped with manual on/off pushbutton.

2. Timer switch shall mount in a standard single gang wall box and shall fit behind a decorator style face plate. The control switches shall not protrude more than 1/8 inch from the wall.
3. Timer switch shall have no minimum load requirement and shall be capable of switching all solid-state LED or electronic fluorescent ballast loads: from 0 to 800 Watt @ 120 VAC - 60 Hz, and 0-1200 Watt @ 277 VAC - 60 Hz.
4. Optional flash and beep warnings shall notify occupants when the interval countdown reaches one minute.
5. The switch shall not require a neutral, simplifying installation and shall feature terminal style wiring, which makes installation easier.
6. Basis of Design:
  - a. Sensor Switch #PTS-720 (4 hour max.)
  - b. Intermatic #EI215 (1800W @ 120 VAC).]

## 2.2 [LOW VOLTAGE-DIGITAL (INTERVAL) TIMER SWITCH

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

## 2.3 DIGITAL TIME SWITCH

- A. Provide 365/7 day, digital time switch with astronomical clock, holiday scheduling and automatic daylight savings time adjustment. Time switch shall have the following features:
  1. Provide maximum (2) hour manual override switch and capacitor carry-over (minimum 100 hours).
  2. Switch shall be compatible with all solid-state LED and electronic fluorescent ballast loads rated 20 Amps at 120 or 277 VAC, DPST.
  3. Provide indoor/outdoor plastic enclosure.
  4. Basis of Design:
    - a. Tork/NSI #DG100A Series.
    - b. Intermatic #ET2000 Series.

## 2.4 DIGITAL MULTI-CHANNEL TIME SWITCH

- A. Provide 365/7 day, multi-channel, programmable, digital time switch with astronomical clock, holiday scheduling and automatic daylight savings time adjustment. Time switch shall have the following features:
  - 1. Provide maximum (2) hour manual override switch and capacitor carry-over (minimum 2 days) with lithium battery back-up for (1) year.
  - 2. Switch shall be compatible with all solid-state LED and electronic fluorescent ballast loads rated 20 Amps per channel at 120 or 277 VAC, SPST.
  - 3. Switch shall contain "LCD" screen for all programming and shall be [4] [8] [12] channel type.
  - 4. Provide indoor metal enclosure.
  - 5. Basis of Design:
    - a. Tork/NSI #ELC Series.
    - b. Intermatic #ET70000 Series.

## 2.5 EXTERIOR PHOTOCONTROL SENSOR

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

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

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

12. Device shall mount in a single gang wallbox and be gangable with other designer-style electrical devices and faceplates.
13. The Sensor shall be UL Listed to U.S. and Canadian standards for 120VAC to 277VAC capacity.
14. Basis of Design:
  - a. Sensor Switch #WSD-PDT Series.
  - b. WattStopper #PW-100 Series.

## 2.7 ANALOG DUAL TECHNOLOGY, DUAL RELAY, WALL BOX OCCUPANCY SENSOR

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



\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Certain room configurations or functions may require "ultrasonic sensing" in lieu of the preferred "dual technology detection". Edit paragraph 2.8 below, accordingly.*  
\*\*\*\*\*

2.8 CEILING MOUNTED OCCUPANCY SENSOR

- A. Provide low voltage ceiling mounted, 360 degree, [dual technology] [ultrasonic] occupancy sensor with the following features.
  - 1. The sensor shall be capable of detecting presence in the control area by detecting doppler shifts in transmitted ultrasound [and passive infrared heat] changes.
  - 2. [Sensor shall utilize Dual Sensing Verification Principle for coordination between ultrasonic and PIR technologies. Detection verification of both technologies must occur in order to activate lighting systems. Upon verification, detection by either shall hold lighting on.]
  - 3. Sensor shall have a retrigger feature in which detection [by either technology] shall retrigger the lighting system on within 5 seconds of being switched off.
  - 4. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing that automatically adjusts the detection threshold dynamically to compensate for changing levels of activity and airflow throughout controlled space.
  - 5. [The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material to offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.]
  - 6. To avoid false ON activations and to provide immunity to RFI and EMI, Detection Signature Analysis shall be used to examine the frequency, duration, and amplitude of a signal, to respond only to those signals caused by human motion.
  - 7. Sensors shall utilize SmartSet™ technology to optimize time delay and sensitivity settings to fit occupant usage patterns. The use of SmartSet shall be selectable with a DIP switch. Sensors shall have a time delay that is adjusted automatically (with the SmartSet setting) or shall have a fixed time delay of 5 to 30 minutes.
  - 8. Sensors shall feature a walk-through mode, where lights turn off 3 minutes after the area is initially occupied if no motion is detected after the first 30 seconds.
  - 9. Sensor shall have an LED indicator that remains active at all times in order to verify detection within the area to be controlled. The LED can be disabled for applications that require less sensor visibility.
  - 10. Sensor shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1%. Sensors shall have standard 5 year warranty and shall be UL and CUL listed.
  - 11. Basis of Design: WattStopper [#DT-305] [#WT-2200].
  - 12. Provide universal voltage, power pack for 24 VDC operating voltage to the occupancy sensors. Power pack shall enable manual on, hold on, hold off and load shed for bi-level switching applications. Basis of Design: WattStopper BZ-150.

2.9 LUMINAIRE INTEGRATED OCCUPANCY SENSOR

- A. Provide line voltage, low profile, luminaire integrated occupancy sensor with the following features.
  - 1. Sensor shall be factory or field installed within each luminaire and shall utilize passive infra-red technology to detect presence.
  - 2. Sensor shall be line voltage rated 0-800 Watts @ 120VAC and 0-1200 Watts @ 277VAC for all solid-state LED and electronic fluorescent lighting loads.

3. Sensor shall be rated for indoor/outdoor installation, shall be UL listed and shall have a standard five (5) year warranty.
4. Sensor shall be available with different lens choices to provide flexibility for varying luminaire mounting heights of 8 ft. to 40 ft. AFF.
5. Sensor shall have adjustable time delay from 30 seconds to 30 minutes; set to 20 minutes.
6. Basis of Design:
  - a. WattStopper #FS-355.
  - b. Leviton #OSFHP Series.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Utilize single zone, analog, light level controllers for applications requiring minimal daylight control. Include paragraph 2.10 below for daylight harvesting applications requiring single zone control.*  
 \*\*\*\*\*

2.10 ANALOG DAYLIGHTING CONTROLLER

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

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Large daylighting control projects may require a multi-zone, digital lighting management control system networked using CAT-5e cabling. Utilize paragraphs 2.11 thru 2.17 for projects where a digital, lighting management, control system has been justified by a Net Present Value (NPV) calculation.*  
 \*\*\*\*\*

2.11 DIGITAL WALL SWITCH OCCUPANCY SENSOR

- A. Provide wallbox mounted, dual technology, digital occupancy sensor with 1 or 2 switch buttons. Available in white, light almond, ivory, grey, red and black; compatible with decorator style, wall plates.
- B. Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:
  1. Digital calibration and pushbutton programming for the following variables:
    - a. Sensitivity – 0-100% in 10% increments
    - b. Time delay – 1-30 minutes in 1 minute increments
    - c. Test mode – Five second time delay
    - d. Detection technology – PIR, ultrasonic or dual technology activation and/or re-activation.

- e. Walk-through mode
  - f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photo sensors are included in the local management network.
  - 2. Two RJ-45 ports for connection to local management network.
  - 3. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool.
  - 4. Device Status LEDs to include:
    - a. PIR detection
    - b. Ultrasonic detection
    - c. Configuration mode
    - d. Load binding
  - 5. Assignment of occupancy sensor to a specific load within the room without the need for wiring or special tools.
  - 6. Assignment of local buttons to specific loads within the room without the need for wiring or special tools.
  - 7. Manual override of controlled loads.
- C. Low voltage momentary pushbuttons shall include the following features:
- 1. Load/Scene Status LED on each switch button with the following characteristics:
    - a. Bi-level LED
      - 1) Dim locator level indicates power to switch.
      - 2) Bright status level indicates that load or scene is active.
  - 2. The following button attributes may be changed or selected using a wireless configuration tool:
    - a. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
    - b. Individual button function may be configured to Toggle, On only or Off only.
    - c. Switch buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.
- D. Basis of Design: WattStopper LMDW-100 Series.

## 2.12 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR

- A. Provide ceiling mounted, dual technology, digital occupancy sensor. Furnish the manufacturer's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.
- B. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features to include the following:
  - 1. Digital calibration and pushbutton programming for the following variables:
    - a. Sensitivity – 0-100% in 10% increments.
    - b. Time delay – 1-30 minutes in 1 minute increments.
    - c. Test mode – Five second time delay.
    - d. Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
    - e. Walk-through mode.
    - f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photo sensors are included in the local management network.
  - 2. One or two RJ-45 port(s) for connection to local management network.
  - 3. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool.
  - 4. Device Status LEDs including:
    - a. PIR detection
    - b. Ultrasonic detection
    - c. Configuration mode

- d. Load binding
  - 5. Assignment of occupancy sensor to a specific load within the room without the need for wiring or special tools.
  - 6. Manual override of controlled loads.
- C. Basis of Design: WattStopper LMDC-100 Series.

## 2.13 DIGITAL WALL SWITCHES

- A. Provide low voltage, momentary, pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration; available in white, light almond, ivory, grey, red and black; compatible with decorator style, wall plates. Wall switches shall include the following features:
- 1. Two-way infrared (IR) transceiver for use with configuration remote controls.
  - 2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
  - 3. Configuration LED on each switch that blinks to indicate data transmission.
  - 4. Load/Scene Status LED on each switch button with the following characteristics:
    - a. Bi-level LED
      - 1) Dim locator level indicates power to switch
      - 2) Bright status level indicates that load or scene is active
      - 3) Two RJ-45 ports for connection to local management network.
- B. The following switch attributes may be changed or selected using a wireless configuration tool:
- 1. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
  - 2. Individual button function may be configured to Toggle, On only or Off only.
  - 3. Switch buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.
- C. Basis of Design: WattStopper LMSW-100 Series.

## 2.14 DIGITAL ON/OFF ROOM CONTROLLERS

- A. Room Controllers automatically bind the room loads to the connected devices in the space without the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers shall be simple to install and will not be equipped with, dip switches, potentiometers or require special configuration. The control units shall include the following features:
- 1. Simple replacement – Using the default, automatic configuration capabilities, a room controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.
  - 2. Device Status LEDs to indicate:
    - a. Data transmission
    - b. Device has power
    - c. Status for each load
    - d. Configuration status
  - 3. Quick installation features including:
    - a. Standard junction box mounting.
    - b. Quick low voltage connections using standard RJ-45 patch cable.
  - 4. Controller shall be plenum rated.
  - 5. Manual override and LED indication for each load.
  - 6. Dual voltage (120/277 VAC, 60 Hz).
  - 7. Zero cross circuitry for each load.
- B. On/Off Room Controllers shall include:
- 1. One or two relay configuration

2. Efficient 150 mA switching power supply
3. Three RJ-45 local management network ports
4. Basis of Design: WattStopper LMRC-100 Series.

## 2.15 DIGITAL PHOTO SENSORS

- A. Digital photo sensors work with room controllers to provide automatic switching, bi-level, or tri-level daylight harvesting capabilities for any load type connected to a room controller. Closed loop photo sensors measure the ambient light in the space and control a single lighting zone. Open loop photo sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones. Photo sensors shall be interchangeable without the need for rewiring.
- B. Digital photo sensors shall include the following features:
1. An internal photodiode that measures only within the visible spectrum, and has a response curve that closely matches the photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers.
  2. Sensor light level range shall be from 1-6,553 footcandles (fc).
  3. The capability of ON/OFF, bi-level or tri-level switching, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).
  4. For switching daylight harvesting, the photo sensor shall provide a field-selectable deadband, or a separation, between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling excessively after they turn off.
  5. Optional wall switch override to allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise lighting levels for a selectable period of time or cycle of occupancy.
  6. Infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool.
  7. Configuration LED that blinks to indicate data transmission.
  8. Status LED indicates test mode, override mode and load binding.
  9. Recessed switch to turn controlled load(s) ON and OFF.
  10. One RJ-45 port for connection to local management network.
  11. Any load or group of loads in the room can be assigned to a daylighting zone
  12. Each load within a daylighting zone can be individually enabled or disabled for discrete control.
- C. Closed loop digital photo sensors shall include the following additional features:
1. An internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from bright sources outside of this cone.
  2. Automatic self-calibration, initiated from the photo sensor, a wireless configuration tool or a PC with appropriate software.
  3. Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling.
  4. Basis of Design: WattStopper LMLS-400 Series.
- D. Open loop digital photo sensors include the following additional features:
1. An internal photodiode that measures light in a 60 degree angle cutting off the unwanted light from the interior of the room.
  2. Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling.
  3. Each of the three discrete daylight zones can include any non overlapping group of loads in the room.
  4. Basis of Design: WattStopper LMLS-500 Series.

## 2.16 ROOM NETWORK (LOCAL MANAGEMENT NETWORK)

- A. The local management network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building. Digital room devices connect to the network using CAT-5e cables with RJ-45 connectors which provide both data and power to room devices. Features of the management network include:
  - 1. Plug n' Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
  - 2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
  - 3. Push n' Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
  - 4. Two-way infrared communications for control configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.
- B. Basis of Design: Wattstopper DLM System.

## 2.17 CONFIGURATIONS TOOL

- A. A configuration tool facilitates optional customization of local management networks, and is used to set up open loop daylighting sensors. The wireless configuration tool shall feature infrared communications.
- B. Features and functionality of the wireless configuration tool shall include:
  - 1. Two-way infrared (IR) communication with network enabled devices, within a range of approximately 30 feet.
  - 2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
  - 3. Read, modify and send parameters for occupancy sensors, daylighting sensors, room controllers and buttons on digital wall switches.
  - 4. Save up to nine occupancy sensor setting profiles, and apply profiles to selected sensors.
  - 5. Adjust or fine-tune daylighting settings established during auto-commissioning, and input light level data to complete commissioning of open loop daylighting controls.
- C. Basis of Design: WattStopper LMCT-100 Series.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION

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

### 3.3 FIELD QUALITY CONTROL

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

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

END OF SECTION

USPS Mail Processing Facility Specifications issued: 10/1/201~~87~~  
Last revised: 8/~~4298~~/201~~85~~

SECTION 260800

COMMISSIONING OF ELECTRICAL SYSTEMS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities only. This Specification is intended as a guide to the Architect/Engineer preparing the Construction Documents. The degree of electrical commissioning that will be required for the project shall be specified by the USPS Headquarters Facilities Program Management through the USPS Project Manager. Interior and exterior lighting systems and controls for Mail Processing Facilities is a standard commissioning requirement. Other mission critical systems may be commissioned if required by the USPS Project Manager.*

\*\*\*\*\*

**NOTE TO SPECIFIER**

**\*\*REQUIRED PARTS OR ARTICLES ARE INCLUDED IN THIS SECTION. DO NOT REVISE THIS SECTION WITHOUT AN APPROVED, WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT THROUGH THE USPS PROJECT MANAGER.**

*Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location. Drawing Coordination Items listed at end of Section.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.2 SCOPE

\*\*\*\*\*

**NOTE TO SPECIFIER**

*The following electrical systems shall be customized and/or selected for each specific project. Select the applicable system and submit to USPS Headquarters Facilities through the Contracting Officer's Representative.*

\*\*\*\*\*

- A. The following equipment and/or systems shall be commissioned if in compliance with the guidelines provided in Specification 019113, or with Contracting Officer approval:
  - 1. Interior And Exterior Lighting Systems And Control – Per ASHRAE 90.1—2010, [Table 9.4.34](#).
  - 2. [\[Fire Alarm System\]](#)
  - 3. [\[Electrical Distribution System Wiring\]](#)
  - 4. [\[Electrical Advanced Metering\]](#)
  - 5. [\[Paging System\]](#)
  - 6. [\[Security/Access Control CCTV System\]](#)
  - 7. [\[Medium Voltage Switchgear And Unit Substations\]](#)



8. [Generators And Emergency Power Distribution System]
9. [Automatic Transfer Switches]
10. [Physical Access Control System]
11. [Uninterruptible Power Systems (UPS) for CCR]

### 1.3 GENERAL DESCRIPTION

- A. Commissioning (Cx) is the process of ensuring that all building systems are installed and perform interactively according to the design intent; that systems are efficient and cost effective and meet the USPS's operational needs; that the installation is adequately documented; and that the Operators are adequately trained. It serves as a tool to minimize post-occupancy operational problems. It establishes testing and communication protocols in an effort to advance the building systems from installation to full dynamic operation and optimization.
- B. The USPS shall arrange to retain an independent Commissioning Authority (CxA) to provide Commissioning Services ~~through their preapproved vendors.~~
- C. Commissioning Authority (CxA) shall work with the Contractor and Engineer to direct and oversee the Cx process and perform functional performance testing.
- D. This Section outlines the Cx procedures specific to the Contractor's electrical responsibilities. Requirements common to all work are described in Specification section 019113.

### 1.4 RELATED WORK AND DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section
- B. Commissioning Plan: The Cx Plan shall be available for reference as it outlines responsibilities outside of the Construction Contract. It provides the Contractor and the USPS an understanding of the planned commissioning activities for that project.
- C. Section 013300 - Submittal Procedures: Stipulates additional copies of submittals to be submitted and refers to other sections for additional submittal requirements related to Cx.
- D. Section 017704 - Closeout Procedures and Training: Defines the milestones in completion incorporating the Cx process.
- E. Section 019113 – General Commissioning Requirements: Specifies the general facility commissioning procedures common across all Divisions and the Contractor's responsibilities for the commissioning process.
- F. Individual Specification Sections: Individual sections stipulate installation, start-up, warranty, O&M documentation, and training requirements for the system or device specified in the Section.
- G. Section 250804 – Building Automation System Commissioning: Details the commissioning procedures specific to the BAS.

### 1.5 REFERENCE STANDARDS

- A. AABC Commissioning Group (ACG)
- B. NEBB – Procedures for Building Systems Commissioning
- C. National Electric Code (NEC)

- D. American Society for Testing and Materials (ASTM)
- E. Electronics Industry Association/Telecommunications Industry Association (EIA/TIA)
- F. Illuminating Engineering Society (IES)
- G. Institute of Electrical and Electronics Engineers (IEEE)
- H. International Electrical Testing Association (NETA)
- I. National Electrical Manufacturers Associates (NEMA)
- J. National Fire Protection Association (NFPA)
- K. Underwriters Laboratory, Inc. (UL)

#### 1.6 RELATED WORK AND DOCUMENTATION

- A. As required in Specification 019113 and the following as they apply to the commissioning of equipment:
  1. Factory Test Reports: Contractor shall provide any factory testing documentation or certified test reports required by the specifications. These shall be provided prior to Acceptance Phase. Factory Test Reports should be provided in pdf electronic format. These include but are not limited to:
    - a. Field Testing Agency Reports: Provide all documentation of work done by independent testing agencies required by the contract documents. These shall be provided prior to Acceptance Phase. Field Testing Agency Reports should be provided in pdf electronic format.

#### 1.7 COORDINATION MANAGEMENT PROTOCOLS

- A. Coordination responsibilities and management protocols relative to Cx are initially defined in Section 019113 and the Commissioning Plan, but shall be refined and documented in the Construction Phase Cx Kick-Off meeting. Contractor shall have input in the protocols and all Parties will commit to scheduling obligations. The CxA will record and distribute.

#### 1.8 CONTRACTOR RESPONSIBILITIES

- A. Refer to Section 019113: Detailed Contractor responsibilities common to all Divisions are specified in Section 019113. The following are additional responsibilities or notable responsibilities specific to the electrical systems.
- B. Construction Phase
  1. Coordinate the work of the Electrical Testing Agency and the Cx requirements, as required.
  2. Provide skilled technicians qualified to perform the work required.
  3. Provide factory-trained and authorized technicians where required by the Contract Documents.
  4. Prepare and submit required draft Start-Up Procedures and submit along with the manufacturer's application, installation and start-up information.
  5. Provide assistance to the CxA in preparation of the specific Functional Performance Test (FPT) procedures. Contractors, subcontractors and vendors shall review FPT procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
  6. Thoroughly complete and inspect installation of systems and equipment as detailed throughout Contract Documents, as required by reference or industry standards, and as specifically indicated elsewhere this Section.

7. Record Start-up Procedures on start-up procedure forms and certify that the systems and equipment have been started and or tested in accordance with the requirements specified above. Each task or item shall be indicated with the Party actually performing the task or procedure.

C. Acceptance Phase

1. Assist CxA in functional performance testing. Assistance will generally include the following:  
a. Manipulate systems and equipment to facilitate testing (as dictated in Section 019110 and the Cx Plan; in some cases this will entail only an initial sample).

D. Warranty Phase

1. Maintain record documentation of any configurations, set ups, parameters etc, that change throughout the period.  
a. Provide representative for off season testing as required by CxA.  
b. Respond to Warranty issues as required by Division 1 and the General Conditions.

1.9 START-UP PROCEDURES AND DOCUMENTATION

A. Refer to Section 019113 and as detailed in Part 3 – Execution.

1.10 INDEPENDENT ELECTRICAL TESTING AGENCY

A. The Independent Electrical Testing Agency shall be provided under the construction specifications and therefore included with the bid. Many of the aspects of the start-up and functional performance testing indicated herein will be accomplished under the respective section and witnessed by the CxA at the indicated sample rate. CxA will include applicable test results in the functional performance testing record.

1.11 FUNCTIONAL PERFORMANCE TESTING

A. For applicable systems and equipment, Contractor shall participate in the initial samples of Functional Performance Testing as stipulated in Section 019113 and the Commissioning Plan.

1.12 FPT ACCEPTANCE CRITERIA

A. Acceptance criteria for tests are indicated in the specification Sections applicable to the systems being tested. Generally, unless indicated otherwise, the criteria for acceptance will be that specified with the individual system, equipment, component, or device, which in general conform to NFPA 70B and International Electrical Testing Association (NETA) testing specifications NETA ATS-2003.

1.13 TRAINING

A. Contractors, subcontractor, vendors, and other applicable Parties shall prepare and conduct training sessions on the installed systems and equipment they are responsible for per the requirements of Section 019113 and the individual Specifications.

1.14 O&M MANUAL CONTENT - PREPARATION AND LOGISTICS

A. Refer to Section 019113 and the individual Specifications.

PART 2 - PRODUCTS

2.1 INSTRUMENTATION

- A. All testing equipment used by any Party shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply: All equipment shall be calibrated according to the manufacturer’s recommended intervals. Calibration tags shall be affixed or certificates readily available.
- B. Testing Instrumentation: Contractor shall provide all instrumentation necessary for tests for which they are responsible. CxA will provide standard instrumentation for measuring medium and low voltage electrical voltage, current, power factor, power, and THD. CxA will provide receptacle testers for normal and GFI receptacle tests. Contractor shall provide all other instrumentation required to accomplish the specified testing.
- C. Contractor shall provide infrared scanning equipment when required by the contract documents. Infrared scanning equipment shall be an AGA (or approved equal) thermovision set capable of viewing an entire bus or equipment assembly at one time and have a sensitivity of 0.2 degree C with a liquid nitrogen reference.
- D. Contractor shall provide Amprobe DM-III Multitest F power quality recorder/data logger or approved equal.

PART 3 - EXECUTION

3.1 START-UP PROCEDURES

- A. This Section outlines ‘generic’ or minimally acceptable Start-Up Procedures. These items shall provide a minimum or guideline for required Contractor development of Start-Up Procedures. Contractor shall synthesize these minimum requirements along with their own internal quality control practices, those of the manufacturer, and any applicable codes and standards to develop specific and itemized Start-Up Procedures specific to the equipment and systems installed on this project.
- B. Refer to NETA which is referenced in several Division 26 sections which outline electrical related testing required.

\*\*\*\*\*

**NOTE TO SPECIFIER**

*The following procedures must be customized and/or selected for each specific project.*

\*\*\*\*\*

- C. The following start up verifications/procedures are common to all systems
  1. Checkout shall proceed from devices to the components to the systems.
  2. Verify labeling is affixed per spec and visible
  3. Verify prerequisite procedures are done.
  4. Inspect for damage and ensure none is present.
  5. Verify system is applied per the manufacturer’s recommendations
  6. Verify system has been started up per the manufacturer’s recommendations
  7. Verify that access is provided for inspection, operation and repair
  8. Verify that access is provided for replacement of the equipment
  9. Verify the record drawings, submittal data and O&M documentation accurately reflect the installed systems
  10. Verify all gages and test reports are provided as required by contract documents and manufacturer’s recommendations
  11. Verify all recorded nameplate data is accurate

12. Installation is done to ensure safe operation and maintenance.
13. Verify specified replacement material/attic stock has been provided as required by the Construction Documents
14. Verify all rotating parts are properly lubricated
15. Verify all monitoring and ensure all alarms are active and set per USPS's requirements

### 3.2 LIGHTING AND LIGHTING CONTROLS

- A. General: Refer to the quality control requirements listed in section 019113 – General Commissioning Requirements for additional checks and tests. These shall be included in the tests used for this project.

\*\*\*\*\*

**NOTE TO SPECIFIER**

*The following procedures must be customized and/or selected for each specific project.*

\*\*\*\*\*

- B. Functional Testing: Lighting control components shall be tested to ensure that they are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. When occupant sensors, time switches, or photo sensors are installed, at a minimum, the following procedures shall be performed:
1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance, lights turn off only after space is vacated and do not turn on unless space is occupied.
  2. Confirm that the time switches are programmed to turn the lights off.
  3. Confirm that interior photo sensor controls reduce electric light levels based on the amount of usable daylight in the space as specified.
  4. Check the lighting systems and ensure that the all luminaries and lamps are operational and luminaires are clean.
  5. Measure lighting levels after lamps have been 'burned in' for at least 100 hours. Check lighting levels to ensure compliance with the design requirements for the respective zones, if applicable.
  6. Check operation of countdown timers to ensure the proper operation of timing control.
  7. Measure the connected loads in current and watts on each controlled circuit.
  8. Check full load current on all breakers serving controlled lighting to ensure that the breaker is properly sized.
  9. Verify the correct operation of all control devices (contactors, relays, time clocks, control interface relays, etc.).
  10. Check full load current on all control device contacts serving controlled lighting to ensure that the contact rating is properly sized.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018  
 Last revised: ~~9/16/2015~~ ~~89/344/2018~~

SECTION 261116

SECONDARY UNIT SUBSTATIONS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [-\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

*This specification shall be utilized only upon written approval from USPS Headquarters, submitted through the Contracting Officer.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification provides the technical requirements for an indoor secondary unit substation complete from the incoming line terminals to the outgoing feeder terminals. The contractor shall provide and install all components as specified herein and shown on related electrical drawings.
- 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 Section include the following:
  - 1. Section 019113 - General Commissioning Requirements.
  - 2. Section 260500 - Common Work Results for Electrical.
  - 3. Section 260800 - Commissioning of Electrical Systems.
  - 4. Section 261216 - Dry-Type Medium-Voltage Transformers
  - 5. Section 261313 - Medium Voltage Circuit Breaker Switchgear.
  - 6. Section 261317 - Medium-Voltage Interrupter Switchgear.
  - 7. Section 261414 - Infrared Viewing Panes (IR Windows)
  - 8. Section 262413 - Switchboards.
  - 9. Section 337173 - Electrical Utility Services.

1.2 SUBMITTALS

- A. Submit shop drawings and product data for approval and final documentation in the quantities listed according to the Conditions of the Contract. All transmittals shall be identified by customer name, customer location and customer order number.
- B. Documents for Approval: One-line diagrams, dimensioned plans, sections and elevations showing minimum clearances, installed devices, major features, nameplate legends and bills of material.

- C. Final Documents: Record documentation to include those in 1.4B and wiring diagrams, single-line and three-line diagrams of switchgear bus and component connections, product data of accessories or parts not previously described in the drawings, list of recommended spare parts and instruction and installation manuals
- D. Product Data: Include features, characteristics and ratings of switches, fuses and other components, time-current characteristic curves for power fuses and any overcurrent devices.
- E. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components and location and size of each field connection. Include the following:
  - 1. Enclosure type and details.
  - 2. Nameplate legends.
  - 3. Bus configuration with size and number of conductors in each bus run, including phase, neutral and ground conductors of main and branch buses.
  - 4. Current ratings of buses.
  - 5. Short-time and short-circuit ratings of switchgear assembly.
  - 6. Mimic bus diagram.
  - 7. Wiring Diagrams: Detail wiring for power, signal and control systems and differentiate between manufacturer-installed and field-installed wiring. Submit shop drawings and product data for approval and final documentation in the quantities listed according to the Conditions of the Contract. All transmittals shall be identified by customer name, customer location and customer order number.

### 1.3 RELATED STANDARDS

- A. Comply with requirements of latest revisions of applicable industry standards, specifically including the following:
  - 1. ANSI/IEEE
  - 2. NEMA
  - 3. UL

### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a firm with at least 10 years experience in manufacturing switchgear.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from potential damage from weather and construction operations. Store so condensation will not form on or in switchgear and if necessary, apply temporary heat where required to obtain suitable service conditions.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
  - 1. Eaton Corporation, Cutler-Hammer Products, Pittsburg, PA (800) 525-2000.

2. General Electric Company (800) 626-2000.
3. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
4. Square D Company, Palatine, IL (800) 392-8781.
5. No substitutions permitted.

## 2.2 GENERAL REQUIREMENTS

### A. Construction/Components:

1. The unit substation shall consist of:
  - a. Medium Voltage Interrupter Switch per Specification Section 261317
  - b. Cast Coil Unit Substation Transformer per Specification Section 261216.
  - c. Low Voltage Switchboard per Specification Section 262413.

## 2.3 INFRARED VIEWING PANES (IR WINDOWS)

- ### A.
- Infrared viewing panes (windows) shall be provided for the medium voltage interrupter switches, switchboard and transformers. Refer to specification sections 261414, 261317, 262413 and 261216, respectively.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- #### A.
- General: Electrical contractor to install metal-clad switchgear in accordance with manufacturer's written instructions and the following specifications.
- #### B.
- Install and anchor switchgear in accordance with manufacturer's instructions.
- #### C.
- Tighten bus joints, electrical connectors and terminals according to manufacturer's published torque-tightening values. Install equipment grounding conductors for switchgear with ground continuity to main electrical ground bus.
- #### D.
- Provide 4" high concrete housekeeping pad below unit substation.

### 3.2 ADJUSTMENTS AND CLEANING

- #### A.
- Manufacturer's Field Services: Engage a factory-authorized service representative to inspect field-assembled components, installation and connection of switchgear; and to pretest and adjust switchgear components. Report results in writing.
- #### B.
- Set field-adjustable, protective-relay trip characteristics.
- #### C.
- Clean exposed surfaces using manufacturer recommended materials and methods. Touch-up damaged coating and finishes using non-abrasive materials and methods recommended by manufacturer. Eliminate all visible evidence of repair.

### 3.3 TESTING

- #### A.
- Testing: After installing switchgear and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.



- B. Procedures: Perform inspections and tests specified below. Report values that do not meet manufacturer's written recommendations. Certify compliance with test parameters.
  - 1. Switchgear: Perform inspections and tests stated in NETA ATS, Section 7.1.
  - 2. Instrument Transformers: Perform inspections and tests stated in NETA ATS, Section 7.10.
  - 3. Metering and Instrumentation: Perform inspections and tests stated in NETA ATS, Section 7.11.
  - 4. Ground-Fault Systems: Perform inspections and tests stated in NETA ATS, Section 7.14.
  - 5. Battery Systems: Perform inspections and tests stated in NETA ATS, Section 7.18.
  - 6. Surge Arresters: Perform inspections and tests stated in NETA ATS, Section 7.19.
  - 7. Remove and replace malfunctioning units with new units and retest.

### 3.4 WARRANTY

- A. Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for [12 months] [18 months] from date of initial operation.

### 3.5 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.
- B. Train Owner's maintenance personnel on procedures and schedules for energizing and de-energizing, troubleshooting, servicing and maintaining equipment and schedules.
- C. Verify that switchgear is installed and connected according to the Contract Documents.
- D. Verify that electrical control wiring installation complies with manufacturer's submittal by means of point-to-point continuity testing.
- E. Complete installation and startup checks according to manufacturer's written instructions.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018~~7~~  
Last revised: 9/4/2013

SECTION 261216

DRY-TYPE, MEDIUM-VOLTAGE TRANSFORMERS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

*This specification shall be utilized only upon written approval from USPS Headquarters, submitted through the Contracting Officer.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification provides the technical requirements for the design, manufacture and test of cast coil-type secondary unit substation transformers. Provide all accessories and equipment as described herein and shown on Project Drawings as necessary for a complete installation.
- 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 Section include the following:
  - 1. Section 019113 - General Commissioning Requirements.
  - 2. Section 260500 - Common Work Results for Electrical.
  - 3. Section 260800 - Commissioning of Electrical Systems.
  - 4. Section 261116 - Secondary Unit Substations.
  - 5. Section 261313 - Medium Voltage Circuit Breaker Switchgear.
  - 6. Section 261317 - Medium-Voltage Interrupter Switchgear.
  - 7. Section 261414 - Infrared Viewing Panes (IR Windows).
  - 8. Section 262413 - Switchboards.
  - 9. Section 337173 - Electrical Utility Services.

1.2 SUBMITTALS

- A. The manufacturer shall provide the following information for review and evaluation by the Engineer:
  - 1. Shop Drawings showing outline nameplate and connection diagrams.
- B. Manufacturer shall provide final, as- built drawings, recording the actual circuiting of panels. Installation, Operation and Maintenance manuals shall also be supplied.

### 1.3 RELATED STANDARDS

- A. The ventilated dry-type transformers and protection devices in this specification are designed and manufactured according to latest revision of the following standards.
  - 1. ANSI C57.12.01, General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid Cast and / or Resin-Encapsulated Windings
  - 2. ANSI C57.12.91, Test Code for Dry-Type Distribution and Power Transformers
  - 3. ANSI N45.2-1977
  - 4. CSA Z 299.3
  - 5. ISO 9001
  - 6. NRC 10CFR50 Appendix B
  - 7. MIL-I-45208A
  - 8. NEMA ST 20, Dry Type Transformers for General Applications
  - 9. UL 1561 and 1562

### 1.4 QUALITY ASSURANCE

- A. The manufacturer shall have a well-documented quality assurance program, which includes procedures for all activities in order entry, design, material procurement, manufacturing processes, testing, shipping and post shipment. The manufacturer shall have specialized in the design, manufacture and assembly of dry-type distribution transformers for a minimum of 10 years. The transformer shall be manufactured by a company, which is certified ISO 9001, for design and manufacture of Power Cast Coil Dry-Type Transformers.
- B. The test floor shall have documented calibration program. All equipment shall receive regular calibrations. Calibration standards shall be traceable to National Bureau of Standards. Records of all equipment calibration shall be made available to the Buyer upon request. Measured values of electric power, voltage, current, resistance and temperatures are used in the calculations of reported data. To ensure sufficient accuracy in the measured and calculated date the test system accuracy requirements listed in ANSI C57.12.01 Table 3 shall be met as a minimum.

### 1.5 DELIVERY, STORAGE AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
  - 1. Eaton Corporation, Cutler-Hammer Products, Pittsburg, PA (800) 525-2000.
  - 2. General Electric Company (800) 626-2000.
  - 3. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
  - 4. Square D Company, Palatine, IL (800) 392-8781.
  - 5. No substitutions permitted.

## 2.2 TECHNICAL REQUIREMENTS

### A. Construction

1. The transformer shall be vacuum cast epoxy resin construction and shall be mounted in a suitably ventilated indoor enclosure.
2. The transformer shall be rated \_\_\_\_\_ kVA with a primary voltage of \_\_\_\_\_ kV [delta] [wye] connected and have a BIL rating of \_\_\_\_\_ kV and a secondary voltage of 277/480V wye connected and have a BIL rating of \_\_\_\_\_ kV.
3. The transformer is to have an impedance of \_\_\_\_\_ %IZ (per manufacture's standards.)
4. Primary terminations shall be bus connection inside transformer enclosure for close-coupling to high voltage load interrupter switch.
5. Secondary terminations shall be bus connection inside transformer enclosure for close-coupling to the low voltage switchgear.
6. Primary and secondary coordination bus assemblies, as required for connection to associated switchgear are to be of bolted construction.

### B. Core Design

1. The transformer core shall be constructed of high-grade non-aging silicon steel laminations with high magnetic permeability and low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point. A step-lap mitered core joint shall be used to minimize losses, exciting currents and sound levels. The core laminations shall be clamped together with heavy steel members. The finished core and clamping structure shall be coated to protect against corrosion.

### C. Temperature Rise

1. The average temperature rise of the transformer windings shall be rated at 80 degree C and shall be built utilizing Class 180 degree C turn insulations, regardless of the temperature rise specified. The insulating system used, including epoxy, shall be rated 180 degree C or higher. The transformer shall not exceed the specified temperature rise when the unit is operated continuously at full nameplate rating. The transformer shall be capable of carrying 100% of the nameplate rating in a 30 degree C average, not to exceed 40 degree C maximum ambient in any 24 hour period.
2. The transformer shall be capable of continuous operation at 17% above nameplate rating. This overload capability shall be achieved on the AA and FA rating and will be accomplished by allowing the transformers' ultimate rise to be 115 degree C. Customer specification must define the high capacity overloads.

### D. Coil Design

1. The high voltage and low voltage windings shall be constructed using copper conductors. The high voltage and low voltage windings shall be vacuum cast in epoxy in a metal mold utilizing a proven casting process that insures the absence of voids. The vacuum cast coils shall also be reinforced with fiberglass mat.
2. The transformer shall be constructed of individually cast primary and secondary coils, coaxially mounted. The low voltage windings shall be wound separately and of pressure injected, vacuum cast or hermetically sealed construction with foil or sheet conductors. The low voltage coils shall be hermetically sealed with epoxy and the coil shall be blocked radially to the core to ensure short circuit integrity.
3. The finished primary and secondary coil must be hermetically sealed in epoxy utilizing a proven manufacturing system that demonstrates its ability to minimize hot spots and partial discharge. An induced partial discharge test shall be performed on each winding. The induced partial discharge test shall be performed by measuring partial discharge levels beginning at 80% rated voltage and continuing in 10% step increments through 200% rated voltage. Partial discharge inception and extinction levels are defined as levels above 10 Pico-Coulombs and shall be recorded. Acceptance criteria is Partial discharge extinction at or above 120% rated voltage. The low voltage windings shall be wound separately and if not vacuum cast like the high voltage winding, shall be hermetically sealed in epoxy.

4. Taps
  - a. Transformer primary winding shall have four 2-1/2 percent full capacity taps; two above and two below rated nominal voltage. No load tap connections shall be made by re-connectable links on the face of the primary winding and shall be located behind removable panels on the front of transformer enclosure. Taps shall be for de-energized operation only.
  
- E. Dielectric Withstand
  1. The impulse rating of the transformer must equal or exceed the basic impulse level specified by ANSI for the applicable voltage class. The basic impulse level shall be inherent to the winding design and is to be obtained without the use of supplemental surge arrestors.
  
- F. Vibration Isolation
  1. The transformer shall have vibration isolation pads installed between core and coil assembly and enclosure base structures to prevent the transmission of structure borne vibration.
  
- G. Enclosure
  1. The enclosure shall be constructed of heavy gauge sheet steel and shall be finished in ANSI 61 paint color, applied using an electrostatically deposited dry powder paint system. All ventilating openings shall be in accordance with NEMA and NEC standards for ventilated enclosures. The base of the enclosure shall be furnished with ground pads located on opposite diagonal corners. The base shall have jacking pads and shall be constructed of heavy steel members to permit skidding or rolling in any direction. The core shall be visibly grounded to the enclosure frame by means of a flexible grounding strap.
  2. Transformer shall be certified to meet Uniform Building Code (UBC) Zone [\[1\]](#) [\[2\]](#) [\[3\]](#) [\[4\]](#) seismic requirements with seismic table validation.
  
- H. Nameplate
  1. Transformer shall be furnished with a non-corrosive diagrammatic nameplate per ANSI C57.12.01, permanently attached with non-corrosive hardware. The diagrammatic nameplate shall include the name of the transformer supplier as well as the location where the transformer was manufactured and tested.
  
- I. Forced Air Cooling
  1. Forced air cooling, when required, shall increase the continuous self-cooled rating of the transformer by 33 1/3%. The FA increase shall be possible with forced cooling without exceeding the specified maximum temperature rise. The forced air cooling shall be regulated automatically by sensors placed in the low voltage winding's air ducts. Forced air cooling shall include: three phase electronic digital temperature monitor, fans, control wiring, control panel with test switch, indicating lights, alarm and alarm silencing switch.

### 2.3 FACTORY TESTING

- A. After completion, each transformer shall undergo the following routine production tests per ANSI C57.12.01 and ANSI C57.12.91. Testing shall be accomplished using calibrated test equipment, which have recorded accuracy traceable to National Institute of Standards Technologies (NIST). Certification of Calibration shall be provided with test reports if requested.
  
- B. In addition to routine testing a 100% QC Impulse Test shall be performed on each transformer furnished.
  
- C. Routine Tests:
  1. Megger
  2. Ratio
  3. Resistance

4. Phase relation
5. Load Loss, Impedance and Regulation
6. No Load Loss and Excitation Current
7. Applied Potential Test
8. Induced Potential Test

- D. A temperature rise test shall be performed on the first unit of each new design. The core and coil design and construction techniques shall be verified by a full short circuit test on similar or larger units in accordance with applicable ANSI standards.
- E. Provide certified production test reports for all manufactured transformers.

## 2.4 INFRARED VIEWING PANES (IR WINDOWS)

- A. Typically, the high voltage and primary tap connections are located on the high voltage side of a power transformer. A single, opaque, rectangular window (9 inch W x 5 inch H) shall be provided to view the high voltage power and tap connections on this side of the transformer. The secondary (low voltage) connections are typically made by bolted connections at the low voltage end of the transformer. A single, opaque, rectangular window (9 inch W x 5 inch H) shall be provided at the secondary side of the transformer to view these bolted connections. Refer to specification section 261414.
- B. Acceptable installers:
1. IR viewing panes shall be factory installed by the switchgear manufacturer or field installed by a certified installer, as recommended by the IR viewing pane manufacturer.
  2. Installer shall be factory certified and trained by the IR viewing pane manufacturer.

## 2.5 ACCESSORIES

- A. Standard transformer accessories shall include:
1. Diagrammatic aluminum nameplate
  2. Step-lap mitered core
  3. Provisions for lifting core and coil assembly
  4. Base equipped with jacking pads and designed for rolling or skidding enclosure in any direction
  5. NEMA 1 heavy-gauge ventilated enclosure with removable panels front and rear
  6. Four (4) full-capacity taps on HV winding, rated 2 ½%, 2-FCAN and 2-FCBN
- B. Documentation for Owner's review:
1. Outline, nameplate and connection diagram drawings.
  2. Installation/Operation/Maintenance Manual
  3. Certified Production Test Report(s) containing minimum information per ANSI C57.12.91

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install transformer as shown on Project Drawings and in accordance with manufacturer's Instruction/Installation Manual.
- B. Provide concrete pad with sufficient structural support and in accordance with local codes and standards. Concrete pad requirements should be coordinated with transformer manufacturer.

- C. Grounding shall be per Project Drawings and in accordance with codes and standards and in compliance with the NEC.

### 3.2 ADJUSTMENTS AND CLEANING

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

### 3.3 TESTING

- A. Field-testing will be conducted at the expense of the Contractor for final acceptance.

### 3.4 WARRANTY

- A. Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for [12 months] [18 months] from date of initial operation.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~7  
Last revised: 8/29/2013

SECTION 261313

METAL-CLAD MEDIUM VOLTAGE CIRCUIT BREAKER SWITCHGEAR

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

*This specification shall be utilized only upon written approval from USPS Headquarters, submitted through the Contracting Officer.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes medium voltage metal-clad circuit breaker switchgear and its associated auxiliary equipment. The equipment shall consist of indoor switchgear with horizontal drawout, vacuum circuit breakers.
- B. Related Documents: The Contract Documents, as defined in Section 011000 – Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
  - 1. Section 260500 - Common Work Results for Electrical.
  - 2. Section 261414 - Infrared Viewing Panes (IR Windows).
  - 3. Section 337173 - Electrical Utility Services.
  - 4. Section 260800 - Commissioning of Electrical Systems.
  - 5. Section 019113 - General Commissioning Requirements.

1.2 REFERENCES

- A. The metal-clad switchgear and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA SG-4 and SG-5, including, but not limited to, ANSI/IEEE 37.20.2.

1.3 SUBMITTALS

- A. Submit shop drawings and product information for approval and final documentation in the quantities listed according to the Conditions of the Contract. All transmittals shall be identified by purchaser name, purchaser location and purchaser's order number.



- B. Approval documents shall include:
  1. General arrangement drawing showing dimensioned elevation and floor plan, foundation details and one-line diagram
  2. Panel arrangement drawing showing layout of devices on the panel doors
  3. Three-line diagrams
  4. Schematics
  5. Nameplate engraving drawings
  6. Electrical bill of material
- C. Final documents shall include:
  1. Documents listed in 1.03.B above
  2. Wiring diagrams
  3. Recommended spare parts list for start-up support
  4. Instruction manual

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer qualifications: The bidder must have at least 15 years experience in manufacturing medium voltage metal-clad switchgear and circuit breakers. The manufacturer of the metal-clad switchgear assembly shall also be the manufacturer of the circuit breakers.
- B. Comply with requirements of latest revisions of applicable industry standards, specifically including the following:
  1. ANSI/IEEE C37.20.2 - Metal-Clad Switchgear
  2. ANSI/IEEE C37.04 - Rating Structure for High Voltage Circuit Breakers
  3. ANSI/IEEE C37.06 - Preferred Ratings for High Voltage Circuit Breakers
  4. ANSI/IEEE C37.90 - Relays and Relay Systems
- C. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- D. The equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of Uniform Building Code (UBC) for zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the switchgear manufacturer and based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, UBC a peak of 2.15g's (3.2-11 Hz), and a ZPA of 0.8g's applied at the base of the equipment. The tests shall fully envelop this response spectrum for all equipment natural frequencies up to at least 35 Hz.
- E. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above references standards.
  1. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision. Mounting recommendations shall be provided by the manufacturer based upon approved shake table tests used to verify the seismic design of the equipment.
  2. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
  3. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver in convenient shipping groups. Shipping groups shall not exceed fifteen feet in length.

- B. Circuit breakers shall be shipped inside their respective cells.
- C. The accessory cabinet shall be shipped attached to the switchgear.
- D. Bus bars with associated hardware for connections between shipping groups shall be shipped inside one of the units in which shall be installed.
- E. Contractor shall store the equipment in accordance with manufacturer's recommendations.
- F. Contractor shall install temporary heaters, if necessary, to prevent condensation during storage.
- G. Contractor shall handle and move the switchgear in accordance with manufacturer's recommendations.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
  1. Eaton Corporation, Cutler-Hammer Products, Pittsburg, PA (800) 525-2000.
  2. General Electric Company (800) 626-2000.
  3. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
  4. Square D Company, Palatine, IL (800) 392-8781.
  5. No substitutions permitted.

### 2.2 RATINGS

- A. System configuration: The switchgear shall be suitable for application in three-phase, 60 Hz, grounded-neutral system.
- B. Electrical ratings:
  1. Circuit breaker and switchgear ratings shall be based on [MVA class and ANSI/IEEE C37.04-1979] or ["constant kA" ratings and ANSI/IEEE C37.04-1999]. [The first six are MVA class and the second eight are constant kA rated.] [Choose one of the 14 categories. Delete the other 13.]
    - a. [Interrupting class: 250 MVA
      - 1) Maximum design voltage (V): 4.76 kV
      - 2) Impulse withstand voltage: 60 kV
      - 3) Interrupting current (I) at maximum design voltage: 29 kA
      - 4) Voltage range factor (K): 1.24
      - 5) Maximum design voltage divided by K: 3.85 kV
      - 6) Interrupting current (IK) at V/K: 36 kA
      - 7) Short-time withstand current: 36 kA
      - 8) Momentary withstand and closing and latching current: 58 kA rms and 97 kA peak]
    - b. [Interrupting class: 350 MVA
      - 1) Maximum design voltage (V): 4.76 kV
      - 2) Impulse withstand voltage: 60 kV
      - 3) Interrupting current (I) at maximum design voltage: 41 kA
      - 4) Voltage range factor (K): 1.19
      - 5) Maximum design voltage divided by K: 4.0 kV
      - 6) Interrupting current (IK) at V/K: 49 kA
      - 7) Short-time withstand current: 49 kA
      - 8) Momentary withstand and closing and latching current: 78 kA rms and 132 kA peak]
    - c. [Interrupting class: 500 MVA

- 1) Maximum design voltage (V): 8.25 kV
  - 2) Impulse withstand voltage: 95 kV
  - 3) Interrupting current (I) at maximum design voltage: 33 kA
  - 4) Voltage range factor (K): 1.25
  - 5) Maximum design voltage divided by K: 6.6 kV
  - 6) Interrupting current (IK) at V/K: 41 kA
  - 7) Short-time withstand current: 41 kA
  - 8) Momentary withstand and closing and latching current: 66 kA rms and 111 kA peak]
- d. [Interrupting class: 500 MVA
- 1) Maximum design voltage (V): 15 kV
  - 2) Impulse withstand voltage: 95 kV
  - 3) Interrupting current (I) at maximum design voltage: 18 kA
  - 4) Voltage range factor (K): 1.3
  - 5) Maximum design voltage divided by K: 11.5 kV
  - 6) Interrupting current (IK) at V/K: 23 kA
  - 7) Short-time withstand current: 23 kA
  - 8) Momentary withstand and closing and latching current: 37 kA rms and 62 kA peak]
- e. [Interrupting class: 750 MVA
- 1) Maximum design voltage (V): 15 kV
  - 2) Impulse withstand voltage: 95 kV
  - 3) Interrupting current (I) at maximum design voltage: 28 kA
  - 4) Voltage range factor (K): 1.3
  - 5) Maximum design voltage divided by K: 11.5 kV
  - 6) Interrupting current (IK) at V/K: 36 kA
  - 7) Short-time withstand current: 36 kA
  - 8) Momentary withstand and closing and latching current: 58 kA rms and 97 kA peak]
- f. [Interrupting class: 1000 MVA
- 1) Maximum design voltage (V): 15 kV
  - 2) Impulse withstand voltage: 95 kV
  - 3) Interrupting current (I) at maximum design voltage: 37 kA
  - 4) Voltage range factor (K): 1.3
  - 5) Maximum design voltage divided by K: 11.5 kV
  - 6) Interrupting current (IK) at V/K: 48 kA
  - 7) Short-time withstand current: 48 kA
  - 8) Momentary withstand and closing and latching current: 77 kA rms and 130 kA peak]
- g. [Interrupting class: 40 kA
- 1) Maximum design voltage (V): 4.76 kV
  - 2) Impulse withstand voltage: 60 kV
  - 3) Interrupting current (I) at maximum design voltage: 40 kA
  - 4) Voltage range factor (K): 1.0
  - 5) Short-time withstand current: 40 kA
  - 6) Momentary withstand and closing and latching current: 62 kA rms and 104 kA peak]
- h. [Interrupting class: 50 kA
- 1) Maximum design voltage (V): 4.76 kV
  - 2) Impulse withstand voltage: 60 kV
  - 3) Interrupting current (I) at maximum design voltage: 50 kA
  - 4) Voltage range factor (K): 1.0
  - 5) Short-time withstand current: 50 kA
  - 6) Momentary withstand and closing and latching current: [78 kA] rms and [130 kA] peak]
- i. [Interrupting class: 63 kA
- 1) 1.) Maximum design voltage (V): 4.76 kV
  - 2) 2.) Impulse withstand voltage: 60 kV
  - 3) 3.) Interrupting current (I) at maximum design voltage: 63 kA
  - 4) 4.) Voltage range factor (K): 1.0

- 5) 5.) Short-time withstand current: 63 kA
- 6) 6.) Momentary withstand and closing and latching current: 98 kA rms and 164 kA peak]
- j. [Interrupting class: 40 kA
  - 1) Maximum design voltage (V): 8.25 kV
  - 2) Impulse withstand voltage: 95 kV
  - 3) Interrupting current (I) at maximum design voltage: 40 kA
  - 4) Voltage range factor (K): 1.0
  - 5) Short-time withstand current: 40 kA
  - 6) Momentary withstand and closing and latching current: 62 kA rms and 104 kA peak]
- k. [Interrupting class: 25 kA
  - 1) Maximum design voltage (V): 15 kV
  - 2) Impulse withstand voltage: 95 kV
  - 3) Interrupting current (I) at maximum design voltage: 25 kA
  - 4) Voltage range factor (K): 1.0
  - 5) Short-time withstand current: 25 kA
  - 6) Momentary withstand and closing and latching current: 39 kA rms and 65 kA peak]
- l. l. [Interrupting class: 40 kA
  - 1) 1.) Maximum design voltage (V): 15 kV
  - 2) 2.) Impulse withstand voltage: 95 kV
  - 3) 3.) Interrupting current (I) at maximum design voltage: 40 kA
  - 4) 4.) Voltage range factor (K): 1.0
  - 5) 5.) Short-time withstand current: 40 kA
  - 6) 6.) Momentary withstand and closing and latching current: 62 kA rms and 104 kA peak]
- m. [Interrupting class: 50 kA
  - 1) Maximum design voltage (V): 15 kV
  - 2) Impulse withstand voltage: 95 kV
  - 3) Interrupting current (I) at maximum design voltage: 50 kA
  - 4) Voltage range factor (K): 1.0
  - 5) Short-time withstand current: 50 kA
  - 6) Momentary withstand and closing and latching current: 78 kA rms and 130 kA peak]
- n. [Interrupting class: 63 kA
  - 1) Maximum design voltage (V): 15 kV
  - 2) Impulse withstand voltage: 95 kV
  - 3) Interrupting current (I) at maximum design voltage: 63 kA
  - 4) Voltage range factor (K): 1.0
  - 5) Short-time withstand current: 63 kA
  - 6) Momentary withstand and closing and latching current: 98 kA rms and 164 kA peak]
- 2. Circuit breaker rated interrupting time [five-cycles] [three-cycles].
- 3. Switchgear main bus continuous current [1200 A] [2000 A] [3000 A] [4000 A].

### 2.3 SWITCHGEAR GENERAL CONSTRUCTION

- A. The switchgear enclosure shall be of metal-clad construction as described in ANSI/IEEE standards.
- B. The switchgear shall be factory assembled into convenient shipping groups and tested. The switchgear shall be of a coordinated design so shipping groups shall be easily connected together at the site into a continuous lineup. Necessary shipping split connecting busbars, boots and hardware shall be furnished and shall be attached to the switchgear in the approximate locations where they shall be needed.
- C. The switchgear assembly shall consist of one or more vertical sections, each of which shall have a main bus compartment and two vertically stacked equipment cells. The cells shall be arranged for circuit breakers or auxiliary devices or shall be blank as indicated in the detailed specification. Each vertical

section shall be provided with a low voltage devices compartment located between the upper and lower cells at the front of the equipment.

- D. Each main bus compartment shall contain copper bus bars silver-plated at electrical connection points, three-phase, three-wire, fully insulated with fluidized bed epoxy coating or equivalent. Sleeve type insulation shall not be permitted. Bus connection joints shall be insulated with preformed PVC boots held together with nylon hardware for easy installation and removal during servicing. Copper bus bars shall be bead-blasted prior to applying epoxy coating to assure a proper bond between the epoxy and the bus bar, eliminating partial discharges. Each bus segment shall be individually high-potential tested prior to assembly. Taped joints are not permitted except in unusual joint configurations. The ground bus shall be bare silver-plated copper; at least ¼ by two inches and shall extend the full length of switchgear.
- E. Each circuit breaker compartment shall contain a racking mechanism, circuit breaker operated (not racking mechanism operated) automatic shutters and safety interlocks. Provide additional remote racking device for enhanced safety.
- F. Each circuit breaker cell shall also include:
  - 1. Hinged front panel.
  - 2. Primary and secondary disconnecting devices.
  - 3. Control circuit cutout device.
  - 4. Terminal blocks, control wiring and control power buses.
  - 5. Manual latch to retain circuit breaker in withdrawn position.
  - 6. Side wall mounted sliding type secondary disconnects to facilitate inspection of mating of contact from the front and easy accessibility for troubleshooting. Secondary disconnects using plug and socket arrangement with umbilical cord, as well as disconnects not visible for inspection, are not permitted.
  - 7. Provision shall be made for closed door racking with a manual racking handle. Mechanical position indication shall be visible with door closed.
  - 8. Racking mechanism shall be simple to install and operate. Racking mechanism using a chain to transmit motion from one side to the other side is not permitted. Provision for installing up to three padlocks shall be integral with the racking mechanism to insure positive position locking of the circuit breaker.
- G. Each auxiliary cell shall include the following:
  - 1. Hinged front panel, suitable for relays and instruments
  - 2. Necessary terminal blocks, control wiring and control power buses
  - 3. Device markers
- H. Switchgear construction shall facilitate floor roll-out of circuit breakers in the lower cells. Guide channels shall be provided for smooth circuit breaker roll-in.
- I. Each vertical indoor section shall be approximately 36" width x 98.5" depth x 95.25" height.
- J. The steel used in the structure and panels shall be chemically cleaned, hot phosphate treated, rinsed and oven-dried and shall be given an electrostatically applied coat of ANSI 61 polyester paint.
- K. Low voltage device panel located inside the circuit breaker or auxiliary cells shall be painted high-gloss white for better visibility and ease of maintenance.
  - 1. Enclosure: The indoor enclosure shall be constructed of bolted sheet steel material.

## 2.4 COMPONENTS

- A. Instrument transformers: Comply with ANSI/IEEE C57.13 and ANSI/IEEE C37.20.2.

1. Voltage transformers (VTs): Secondary voltage rating of 120 V and accuracy class of 0.3 with burdens of W, X and Y. The VTs shall be mounted on a rollout tray. Each tray must accommodate up to three VTs, with integrally mounted primary fuses. The auxiliary cell shall be equipped with automatic shutters and grounding fingers that remove any static charge from the windings before allowing operator access to the VTs.
  2. Current transformers (CTs): Ratios as indicated; burden and accuracy class as per ANSI, suitable for connected relays, meters and instruments. The CTs shall be bushing mounted. Each circuit breaker bushing shall be able to accommodate two standard accuracy CTs or one high accuracy CT. The CT secondary wiring shall be connected to shorting terminal blocks with ring tongue terminations.
  3. AC control power shall be furnished from:
    - a. An internally mounted dry-type transformer, including primary and secondary fuses. Control Power Transformer (CPT) shall be [15 kVA single-phase] [25 kVA single-phase] [50 kVA single-phase] [15 kVA three-phase] [30 kVA three-phase] [45 kVA three-phase]. Up to 15 kVA single-phase the CPT with its primary fuses shall be mounted on the drawout tray. Above 15 kVA single-phase the primary fuses shall be drawout tray mounted and the CPT shall be fixed mounted in the rear of the section.
  4. Suitable automatic transfer scheme is required when control power transformers are provided on the incoming side of the main circuit breakers in double-ended installations, to transfer the secondary load should one incoming supply fail.
- B. Multifunction digital-meters shall be UL-Listed or UL-Recognized, microprocessor-based units suitable for three- or four-wire systems. Units shall be mounted on the instrument compartment door and as follows:
1. For incoming monitoring for main circuit breakers, multifunction power meter with Modbus communication protocol shall be provided.
  2. For feeder circuit breakers, multifunction power meter with Modbus communication protocol shall be provided.
- C. Multifunction protective relaying. Microprocessor-based three-phase relays shall be UL-Listed or UL-Recognized and shall be provided as follows:
1. Main circuit breakers
    - a. The relays shall be Siemens 7SJ63 or 7SJ64 bay controller or equivalent. The relays shall include the following protection functions: 50/51, 50N/51N, 67/67N, 27, 59, 81O/U and 25 (7SJ64 only).
    - b. The relays shall provide monitoring of the CT and VT circuits and alarm on circuit failure.
    - c. The relays shall provide a graphic mimic display visually indicating the position (open/closed) of the circuit breaker, protection function trip and metering data. Unlimited user-configurable Human Machine Interface (HMI) screens shall allow the user to create unique single line displays with a simple tool or from an existing library.
    - d. The relays shall provide key locking to prevent unauthorized switching either local or remote.
    - e. The relays shall be capable of internally performing main-tie-main auto-transfer and auto-restore functions.
    - f. The relays shall have programmable logic capabilities to permit use in protection and control systems. Programming software must be compliant with IEC 61131 standard for PLC programming.
    - g. The relays shall have a modular communications processor to permit field change between Modbus RTU, Profibus-DP, Profibus-FMS, DNP3.0, IEC 60870-5-103 and IEC 61850 protocols. The relays shall be able to support either RS-485 or fiber optic communications.
    - h. The relays shall provide complete sequence-of-events recording, time stamped in milliseconds. The relays shall provide oscillography (waveform) capture, with configurable pre- and post-fault data capture times.
    - i. The relays binary inputs shall be provided with chatter blocking and filter time. The chatter blocking shall effectively block a binary input indication and prevent the generation

of indications when the signal cannot be interpreted. The filter time indicates how long a signal must be present before it shall be interpreted as an indication. This shall serve to suppress short, intermittent changes. These two features shall be available and settable separately for each binary input indication.

- j. j. The relays shall provide four protection settings groups. Setting group changes shall be available locally through front function key and binary input; remotely through operator or service communication interface using a personal computer and via system interface (Profibus, Modbus, etc.).
2. Bus protection – full differential
    - a. The relays shall be Siemens 7UT613 or equivalent. The relay shall be low-impedance percentage differential relays.
    - b. The relays shall have three restraint winding inputs.
    - c. The relays shall have a through-fault restraint setting to prevent tripping due to high current external faults.
    - d. The relays shall have a CT monitoring element to block differential trip if a CT secondary circuit has failed and shall provide alarm function.
    - e. The relays shall provide complete sequence-of-events recording, time stamped in milliseconds. The relays shall provide oscillography (waveform) capture, with configurable pre- and post-fault data capture times.
    - f. The relay shall have the capability to be applied as single-phase bus relays.
    - g. The relays shall have modular communication for simple integration into SCADA systems. The communication protocol shall be Modbus RTU.
  3. Feeder protection with communications
    - a. The relays shall provide the following functions: 50/51, 50N/51N, 67, 64, 87N, 37, 49, 46, 27, 59, 81O/U, 50BF, 46, 47, 25, 79 and 21FL.
    - b. The relays shall monitor the CT circuits and alarm on circuit failure.
    - c. The relays shall be capable of being used in a reverse interlocking bus protection scheme.
    - d. The relays shall have nine programmable function keys to replace control switches.
    - e. The relays shall have programmable logic capabilities to permit use in protection and control systems. Programming software shall be compliant with IEC 61131 standard for PLC programming.
    - f. f. The relays shall have a modular communications processor to permit field change between IEC 61850, Modbus RTU, Profibus-DP, DNP3.0 and IEC 60870-5-103 protocols. The relays shall be able to support either RS-485 or fiber optic communications.
    - g. All relay terminal blocks including CT blocks shall be pluggable to ensure ease of relay replacement and maintenance testing.
    - h. The housing shall be a sealed dust proof environment for the relay internal electronics. Head build up must be dissipated through the surface area of the steel enclosure. The relays thus shall maintain their tested insulation characteristic standards per IEC, IEEE, even if deployed in harsh dusty environments.
    - i. The relays must provide 20 flexible functions that shall be used to create additional protection functions to maximize application flexibility.
  4. Feeder protection – motor protection with communications
    - a. The relays shall be Siemens 7SK80 protective relay or equivalent. The relays shall provide the following protection functions: 50/51, 50N/51N, 67N, 67Ns, 50Ns, 59N/64, 37, 48, 66, 14, 51M, 49, 46, 27, 59, 81O/U, 50BF, 46 and 47.
    - b. The relays shall have five RTD inputs.
    - c. The relays shall have the option to connect 12 additional RTD inputs through an Ethernet connection.
    - d. The relays shall provide trip circuit supervision of the feeder circuit breaker and alarm on trip circuit failure.
    - e. The relays shall be capable of being used in a reverse (zone) interlocking bus protection scheme.
    - f. The relays shall provide logic programmability to create starting schemes. For example, reduced voltage starting.

- g. The relays shall provide logic programmability to create failsafe tripping logic.
  - h. The relays shall have nine programmable function keys to replace control switches.
  - i. The relays shall have programmable logic capabilities to permit use in protection and control systems. Programming software must be compliant with IEC 61131 standard for PLC programming.
  - j. The relays shall have a modular communications processor to permit field change between IEC 61850, Modbus RTU, Profibus-DP, DNP3.0 and IEC 60870-5-103 protocols. The relays shall be able to support either RS-485 or fiber optic communications.
  - k. All relay connectors including CT connectors shall be pluggable to ensure ease of relay replacement and maintenance testing.
  - l. The housing shall be a sealed dust proof environment for the relays internal electronics. Heat build up must be dissipated through the surface area of the steel enclosure. The relays thus shall maintain their tested insulation characteristic standards per IEC, IEEE, even if deployed in harsh dusty environments.
  - m. The relays shall provide 20 flexible functions that can be used to create additional protection functions to maximize application flexibility.
5. Feeder protection – transformer protection
- a. The transformer differential protection relays shall be Siemens 7UT61 or equivalent. The relays shall provide the following protection functions: 87, 87N, 50/51, 50/51G, 49, 46 and 50BF.
  - b. The transformer differential relays shall have a through-fault restraint setting to prevent tripping due to high current external faults.
6. [Generator circuit breaker protection – Simple overcurrent with communications
- a. The relays shall be Siemens 7UM623 series. The relays shall provide the following protection functions: 59, 51V, 81, 27, 32/32R, 40, 87G, 46 and 51G.
  - b. The relays shall provide current differential protection for the generators.
  - c. The relays shall monitor the CT and VT circuits and alarm on circuit failure.
  - d. The relays shall have programmable logic capabilities to permit use in protection and control systems. Programming software shall be compliant with IEC 61131 standard for PLC programming.
  - e. The relays shall recognize and alarm CT open circuit or short circuit conditions.
  - f. The relays shall support either RS-485 or fiber optic communications.
  - g. The relays shall have modular communication for simple integration into SCADA systems. The communication protocol shall be Modbus RTU.]
7. Software / data information – relay software
- a. The relay shall be configured through Windows based software current up to Windows XP Pro.
  - b. The relays shall provide complete sequence-of-events recording, time stamped in milliseconds under all conditions. The relays shall provide oscillography (waveform) capture, with configurable pre- and post-fault data capture times. All internally and externally generated binary values shall be configurable to appear in the custom generated fault. Information containing time, date, interrupted current amps per phase, time in pickup, trip open, close or user programmed status points, etc., shall be displayed.
  - c. Logging of system and protective events, last 200 events (accessible via front RS-232 communications port and rear service communications port used to connect to a personal computer having an RS-232 port or USB via conversion).
  - d. Log of last eight faults (maximum five second record time) containing date and time stamps, pickup and tripping signals, interrupted current amps, voltage, etc. The analog quantities displayed in the oscillography shall have the option for viewing in either primary or secondary quantities.
  - e. Fault records shall be in the industry standard Comtrade format that shall be imported or exported.
  - f. The relay shall provide four protection settings groups. Setting group changes shall be available locally through front function key and binary input; remotely through operator or



service communication interface using a personal computer and via system interface (Profibus DP, Modbus RTU, DNP3.0, IEC, etc.).

- g. All logging settings, annunciations, fault records, Binary I/O and LED assignments must have easy to print options and easy file transfer capabilities.
  - h. Relay software shall have feature for archiving or retrieving an entire project that includes all subfolders and relay files in one simple to use feature.
  - i. A measurement supervision feature shall be providing for monitoring external current and voltage transformers connected to the relay.
  - j. The software shall have the capability of entering the settings in both primary and secondary quantities.
  - k. The current transformer polarities shall be reversible using a setting in the software when it becomes necessary.
  - l. The software shall include a commissioning tool for all hardware (BI/BO/LEDs) and SCADA mapped points.
  - m. The software shall be compatible with earlier version relay firmware releases.
  - n. The software shall have a capability to assign an IP address to the relay allowing for a web browser commissioning tool feature to view relay information online.
- D. Provision for future circuit breakers: Equip compartments designated as “future” with rails, mounting brackets, supports, primary bushings, shutters and bus connections.
- E. Control wiring: Factory installed, complete with bundling and protection where necessary and complying with the following:
- 1. Extra-flexible conductors for wires across hinges and for interconnections between shipping units. Control and secondary wiring shall be at least No. 14 AWG.
  - 2. Conductors sized according to NFPA 70.
  - 3. Internal wiring shall be carried in inter-unit wiring area, which protects the wires. The wires shall be bundled, tie-wrapped and secured to metal anchors. Wire ties with self sticking tape shall not be permitted.

## 2.5 VACUUM CIRCUIT BREAKERS

- A. Vacuum circuit breakers: Drawout mounted units using three individual vacuum interrupters and including the following features:
- 1. Circuit breaker design shall operate at rated voltage to interrupt fault current within its rating within ~~five-~~ ~~three-~~ cycles of trip initiation.
  - 2. Contact-wear indicator shall be readily visible from the rear of the circuit breaker.
  - 3. Four minimum spare auxiliary contacts shall be provided. Additional contacts shall be provided on the cell wall as specified.
  - 4. Operating mechanism shall be electrically charged, mechanically and electrically trip-free and stored-energy operated.
  - 5. Closing velocity of moving contacts shall be independent of both control voltage level and operator.
  - 6. Design of mechanism shall permit manual charging of mechanism.
  - 7. Control power shall be 120 Vac for closing, 120 Vac with capacitor tripping.
  - 8. The operating mechanism shall be front accessible so that it is not necessary to work under the circuit breaker or tip it over in order to perform maintenance.
  - 9. A single visual check, such as a contact erosion indicator, shall be sufficient to verify both spring pressure and contact wear. The contact erosion indicator shall be identical across all circuit breaker ratings. Confusing maintenance procedures, such as separate contact erosion and wipe measurements, shall not be permitted.
  - 10. Circuit breaker tripping provisions shall include shunt trip coil for tripping with protective relays, lockout relays, control switch, or manual command signal from the relay. The circuit breaker shall include mechanical push button for manual tripping.

11. Circuit breaker closing provisions shall include close (spring release) coil for closing by electrical signal from control circuitry, control switch or manual command signal from the relay. The circuit breaker shall include mechanical push button for manual closing.
  12. Current transfer path from the interrupter moving stem to the circuit breaker pole-mounted finger cluster shall be flexible copper laminations with long mechanical life. Brush, roller, or wiping contacts shall not be permitted.
  13. Vacuum interrupters and circuit breaker shall be manufactured and warranted by the same manufacturer.
  14. Vacuum interrupter design shall limit the chopping currents to below 5 A to obviate the need for surge protection against switching transients during fault interruption for most loads. Surge limiters shall be provided for feeders to motors having locked rotor current of less than 600 A.
- B. The circuit breakers shall be floor rollout that permits convenient insertion and withdrawal of the vacuum circuit breakers in the lower cells (of switchgear not on a raised pad) without the use of lift truck, ramp or dolly.
  - C. Circuit breakers of equal ratings shall be interchangeable for the upper and lower cells.
  - D. [For 50 kA or lower ratings, the vacuum circuit breakers shall be designed to be used in switchgear cells of the same design and short-circuit rating but different voltage or continuous ratings, as long as the voltage and continuous current ratings of the circuit breaker shall be equal to or higher than required by the cell. 2000 A and 3000 A circuit breakers shall be designed to be used in 1200 A cells.]
  - E. [For 63 kA rating, the vacuum circuit breakers shall be designed to be used in switchgear cells of the same design and short-circuit rating but different voltage or continuous ratings, as long as the voltage and continuous current ratings of the circuit breaker shall be equal to or higher than required by the cell. 2000 A and 3000 A circuit breakers shall be designed to be used in 1200 A cells.]
  - F. It shall be possible to test the circuit breaker in the "Test" position inside the cell without the use of additional cables or couplers.
  - G. The switchgear manufacturer shall cycle each circuit breaker through at least 200 mechanical on-off operations as a part of routine production tests.

## 2.6 INFRARED VIEWING PANES (IR WINDOWS)

- A. The backside of the switchgear compartments contain cable or bus connections that can be thermographically inspected. One (1) Infrared window (3 inch round, transparent) shall be provided for each single high compartment section and two (2) windows (3 inches round, transparent) shall be provided for two high type sections. Refer to specification section 261414.
- B. Acceptable installers:
  1. IR viewing panes shall be factory installed by the switchgear manufacturer or field installed by a certified installer, as recommended by the IR viewing pane manufacturer.
  2. Installer shall be factory certified and trained by the IR viewing pane manufacturer.

## 2.7 ACCESSORIES

- A. Manual racking crank.
- B. Manual spring charging crank.
- C. [Circuit breaker test cabinet separately mounted and containing pushbuttons for circuit breaker closing and tripping, fuses and secondary coupler with cable approximately 9 feet long.]

- D. [Secondary test coupler to permit testing of circuit breaker outside the assembly.]
- E. [Circuit breaker lift truck for removing circuit breakers from the upper cells.]
- F. [Lift sling.]
- G. [Electric racking motor assembly and control station.]
- H. [Fifth wheel device for convenient handling of circuit breakers.]
- I. Six spare fuses of each type and rating of fuse used. Include spares for voltage transformer fuses and control power fuses.
- J. One spare indicating lamp of each type installed.
- K. ½ pint of touchup paint matching enclosure finish.
- L. Contact lubricant.
- M. [Ground and test device [for 50 kA or lower ratings], manually operated, suitable for phasing out, testing and grounding switchgear bus or feeder when the device is installed in place of circuit breaker shall include the following:
  1. Six primary disconnect studs.
  2. Padlock provisions on the doors of the test device in order to prevent access to a live circuit or a circuit that the user does not intend to ground or test.
  3. Six test terminals isolated phase-phase and phase-ground with insulating barriers and accessible by means of hinge insulating cover.
  4. Three single-pole three-position manually operable switches, suitable for connecting upper test terminals or lower test terminals to a common ground and including ground disconnect from connection to the switchgear ground bus system.]
- N. [Ground and test device [for 50 kA or lower ratings, or for 63 kA rating], electrically operated, suitable for phasing out, testing and grounding switchgear bus or feeder when the device shall be installed in place of circuit breaker and shall include the following:
  1. Interchangeable with drawout, medium voltage circuit breakers to provide interlocked electrical access to either bus or feeder; electrically operated.
  2. Remote-control station with [30] [40] [50] foot long coupler cable.
  3. Suitable interlocks to facilitate safe procedures.
  4. Test wells arranged to allow testing for presence of voltage on each of the 6 disconnects.
  5. Two devices shall be furnished, one for grounding the upper terminals and one for grounding the lower terminals through the power operated ground making switch.]
  6. [Optional - Ground and test device shall have interrupting capacity equal to that of the circuit breakers for which it is substituted.]

## PART 3 - EXECUTION

### 3.1 FIELD QUALITY CONTROL

- A. Conform to Section 014000 – Quality Requirements.

### 3.2 INSTALLATION

- A. Electrical contractor or switchgear installer shall install switchgear in accordance with manufacturer's written instructions and the following specifications.

### 3.3 ADJUSTMENTS AND CLEANING

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

### 3.4 FACTORY TESTING

- A. The following standard factory tests shall be performed on the circuit breaker element provided under this section. All tests shall be in accordance with the latest version of ANSI standards.
  - 1. Alignment test with master cell to verify all interfaces and interchangeability.
  - 2. Circuit breakers operated over the range of minimum to maximum control voltage.
  - 3. Factory setting of control gap.
  - 4. One-minute dielectric test per ANSI standards.
  - 5. Final inspections and quality checks.
- B. B. The following production test shall be performed on each breaker housing:
  - 1. Alignment test with master breaker to verify interfaces.
  - 2. One-minute dielectric test per ANSI standards on primary and secondary circuits.
  - 3. Operation of wiring, relays and other devices verified by an operational sequence test.
  - 4. Final inspection and quality check.
- C. The manufacturer shall provide certified copies of factory test reports for O & M Manuals.

### 3.5 MANUFACTURER'S CERTIFICATION

- A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.
- B. The contractor shall provide copies of the manufacturer's representative's certification in O&M Manuals.

### 3.6 TRAINING

- A. The contractor shall provide a training session for up to five (5) USPS's representatives for 3 normal workdays at a jobsite location determined by the USPS.
- B. The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the assembly, circuit breaker, protective devices and other major components.

### 3.7 FIELD ADJUSTMENTS

- A. The relays shall be set in the field by: A qualified representative of the manufacturer, retained by the Contractor, in accordance with settings designated in a coordinated study of the system as required elsewhere in the contract documents.

### 3.8 WARRANTY

- A. Equipment manufacturer shall warrant that all goods supplied are free of non-conformities in workmanship and materials for [12 months] [18 months] from date of initial operation.

### 3.9 START-UP SERVICE

- A. Switchgear manufacturer shall provide a factory-authorized service representative for a period of [2] [3] [4] [5] days to train USPS's maintenance personnel in the following:
  1. Procedures and schedules related to startup and shutdown, troubleshooting, servicing and preventive maintenance.
  2. Review data in the maintenance manuals. Refer to Division 1 Section.
  3. Schedule training with USPS with at least three week's advance notice.

### 3.10 COMMISSIONING

- A. Conform to Specification Sections:
  1. Section 260800 – Commissioning of Electrical Systems.
  2. Section 019113 – General Commissioning Requirements.

### 3.11 FIELD SERVICE

- A. Switchgear manufacturer's own field service office (same name as the manufacturer) shall be located not more than a three hour drive from the installation site.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~  
Last revised: 8/29/2013

SECTION 261317

MEDIUM-VOLTAGE INTERRUPTER SWITCHGEAR

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

*This specification shall be utilized only upon written approval from USPS Headquarters, submitted through the Contracting Officer.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes medium voltage metal-enclosed switchgear assemblies consisting of fusible or non-fusible load interrupter switches and associated auxiliary equipment.
- 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 Section include the following:
  - 1. Section 019113 - General Commissioning Requirements.
  - 2. Section 260500 - Common Work Results for Electrical.
  - 3. Section 260800 - Commissioning of Electrical Systems.
  - 4. Section 261116 - Secondary Unit Substations.
  - 5. Section 261216 - Dry-Type, Medium-Voltage Transformers.
  - 6. Section 261313 - Medium Voltage Circuit Breaker Switchgear.
  - 7. Section 261414 - Infrared Viewing Panes (IR Windows).
  - 8. Section 337173 - Electrical Utility Services.

1.2 SUBMITTALS

- A. Submit shop drawings and product data for approval and final documentation in the quantities listed according to the Conditions of the Contract. All transmittals shall be identified by customer name, customer location and customer order number.
- B. Documents for Approval: One-line diagrams, dimensioned plans, sections and elevations showing minimum clearances, installed devices, major features, nameplate legends and bills of material.
- C. Final Documents: Record documentation to include those in 1.3.B and wiring diagrams, single-line and three-line diagrams of switchgear bus and component connections, product data of accessories or parts

not previously described in the drawings, list of recommended spare parts and instruction and installation manuals.

- D. Product Data: Include features, characteristics and ratings of switches, fuses and other components. Also, time-current characteristic curves for power fuses and any overcurrent devices.
- E. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components and location and size of each field connection. Include the following:
  - 1. Enclosure type and details.
  - 2. Nameplate legends.
  - 3. Bus configuration with size and number of conductors in each bus run, including phase, neutral and ground conductors of main and branch buses.
  - 4. Current ratings of buses.
  - 5. Short-time and short-circuit ratings of switchgear assembly.
  - 6. Mimic bus diagram.
  - 7. Wiring Diagrams: Detail wiring for power, signal and control systems and differentiate between manufacturer-installed and field-installed wiring.

### 1.3 RELATED STANDARDS

- A. Comply with requirements of latest revisions of applicable industry standards, specifically including the following:
  - 1. ANSI/IEEE C37.20.3 – Standard for Metal-Enclosed Interrupter Switchgear.
  - 2. ANSI/IEEE C37.20.4 – Standard for Indoor AC Medium Voltage Switches Used in Metal-Enclosed Switchgear.
  - 3. NEMA
  - 4. UL

### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a firm with at least 5 years experience in manufacturing switchgear.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in factory labeled packages. Shipping groups shall not exceed 15 ft. in length.
- B. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from potential damage from weather and construction operations. Store so condensation will not form on or in switchgear and if necessary, apply temporary heat where required to obtain suitable service conditions.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
  - 1. Eaton Corporation, Cutler-Hammer Products, Pittsburg, PA (800) 525-2000.

2. General Electric Company (800) 626-2000.
3. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
4. Square D Company, Palatine, IL (800) 392-8781.
5. No substitutions permitted.

## 2.2 RATINGS

- A. System Configuration: Switchgear suitable for application in three-phase, 60-Hz, grounded-neutral system.
- B. Electrical Ratings:
  1. Nominal System Voltage, kV: [4.16] [7.2] [13.8] [34.5]
  2. Maximum Design Voltage, kV: [5] [8.25] [15] [38]
  3. BIL Impulse Level: [60] [95] [150] [200]
  4. Main-Bus Continuous: [600] [1200] [2000] A.
  5. Switch Duty Cycle, Fault Closing, symmetrical A: [40] [61]

## 2.3 GENERAL REQUIREMENTS

- A. The switchgear shall be factory assembled and tested and comply with applicable industry standards. If multiple sections, it shall be a coordinated design so that shipping groups are easily connected together at the site into a continuous line-up. Necessary connecting materials shall be furnished.
- B. The switchgear assembly shall consist of one or more metal-enclosed ventilated sections in indoor NEMA 1 enclosure(s). Units shall be of individual frames of bolted steel construction with full-side sheets separating adjacent units. Each frame shall be adequately braced to function properly under normal operating and short-circuit conditions. Assembly shall have the following:
  1. Window on door to permit viewing switch-blade positions when door is closed.
  2. Rear removable panels with handles
  3. Danger-warning sign
  4. Interlock air-interrupter switch with transformer secondary main circuit breaker, preventing switch from being opened or closed unless secondary main circuit breaker is open.
- C. The switchgear shall be UL listed with separate door to the switch. Door shall be mechanically interlocked with the switch to prevent closing the switch with the door open and to prevent opening the door with the switch closed. Door shall have provision for pad lock.
- D. Surge Arresters: Comply with IEEE C62.11, station class; metal-oxide-varistor type, with ratings as indicated, connected in each phase of incoming circuit and ahead of any disconnecting device.
- E. Main bus shall connect vertical sections and between compartments and shall be uniform capacity the entire length of assembly. The main horizontal bus shall be run in a vertical, edge-to-edge arrangement for high short circuit strength. Access to the rear cable termination area shall be possible without reaching over the main and vertical bus.
  1. Bus shall be 98% minimum conductivity copper with silver-plated joints.
  2. Ground Bus shall be copper of 98 percent minimum conductivity, with pressure connector for feeder and branch-circuit ground conductors, minimum size 1/4 by 2 inches.
  3. Bus bracing shall be equal to the short circuit interrupting rating of the lowest rated non-fused circuit breaker applied in the assembly.
  4. Neutral Bus shall be [50] [100] percent of phase-bus ampacity. Equip bus with pressure-connector terminations for outgoing circuit neutral conductors.
  5. [Neutral bus equipped with pressure-connector terminations for outgoing circuit neutral conductors. Neutral-bus extensions for busway feeders are braced.]



6. [\[Neutral Disconnect Link: Bolted, uninsulated, 1/4-by-2-inch copper bus, arranged to connect neutral bus to ground bus.\]](#)
  7. MV clearances shall be maintained in all horizontal and vertical buses such that insulation is not required.
- F. Fungus Proofing: Permanent fungicidal treatment for switchgear interior, including instruments and instrument transformers.

## 2.4 INFRARED VIEWING PANES (IR WINDOWS)

- A. The design of interrupter switches is such that all important electrical components and connections can be effectively viewed for thermographic inspection. A single, transparent, rectangular infrared window (9 inch W x 5 inch H) shall be provided in the front top section; centered on the Phase "B" inter-phase barrier. A single, transparent window (3 inch round) shall be provided in the bottom front section of the switch to view the fuses and another rectangular, window (9 inch W x 5 inch H, transparent) shall be provided in the top rear section, centered on phase "B", to view the cable connections at the top of the enclosure. Note that nonfusible, interrupter switches need not be equipped with a viewing pane in the bottom front section. Refer to specification section 261414 for specific details.
- B. Acceptable installers:
1. IR viewing panes shall be factory installed by the switchgear manufacturer or field installed by a certified installer, as recommended by the IR viewing pane manufacturer.
  2. Installer shall be factory certified and trained by the IR viewing pane manufacturer.

## 2.5 COMPONENTS

- A. Instrument Transformers: Comply with IEEE C57.13.
1. Potential Transformers: Secondary voltage rating of 120V and NEMA accuracy class of 0.3 with burdens of W, X and Y.
  2. Current Transformers: [\[Bar type for utilities\]](#) [\[Donut type for shielded cable\]](#), ratios as indicated; burden and accuracy class suitable for connected relays, meters and instruments.
- B. Multifunction Digital-Metering Monitors shall be UL-listed or -recognized, microprocessor-based unit suitable for three- or four-wire systems. Units shall be mounted in the instrument compartment door.
- C. The numerical protective relays shall have multi-phase inputs (current and voltage) and multifunction protection elements that are UL listed or recognized meeting ANSI Surge Withstand standards IEEE C37.90.1 and C37.90.2. Features include:
1. Protection, breaker control and automation CFC (Continuous Function Logic)
  2. Four Function keys that can be user-programmed
  3. Four (4) Line Backlit front display for metering, relay settings and fault information
  4. Seven (7) user-programmable target LED's and two (2) diagnostic alarm LED's
  5. Front access to circuit boards packaged in a flush mounted case with removable front cover
  6. Microprocessor Based Protection that includes:
    - a. Three-phase and Ground Instantaneous (2 element) Overcurrent with Timer (50, 50-1, 50-2, 50N-1, 50N-2)
    - b. Time Overcurrent (Selectable Curves)(51, 51G, 51N)
    - c. Negative sequence time and Instantaneous Overcurrent (46TOC, 46-1, 46-2)
    - d. [\[Three-phase and Ground Directional \(2 element\) \(67-1, 67-2, 67N-1, 67N-2\)\]](#)
    - e. [\[Frequency protection with 4 independent setpoints that can be used for either under-frequency or over-frequency \(81O/U\)\]](#)
    - f. [\[Over-voltage protection \(59\)\]](#)
    - g. [\[Under-voltage protection \(27-1, 27-2\)\]](#)
    - h. Breaker failure (50BF)

- i. Wide range of taps (0.5 - 20 amps, in 0.5 amp steps)
  - j. Trip coil monitoring, function 74TC, for dc control power applications
  - k. PLC programming capability to perform custom protection and control functions
  - l. Windows based software for easy configuration and programming of the relay
7. User Programmable Binary Inputs and Outputs
  8. Metering of phase and ground currents and amperes demand, min/max
  9. Metering of phase and ground voltages and min/max
  10. Metering of watts, vars, kilowatt-hours and kilovars-hours, including min/max and demand
  11. Logging of system and protective events, last 50 events (accessible via front RS-232 communications port and rear system communications port)
  12. Log of last 8 trips - containing time, date, interrupted amps, time in pickup, etc.
  13. Logging of per-phase interrupted amperes for the last fault
  14. 110-125VDC/110-250VAC power supply model selection options:
    - a. [7SJ6225-5EC02-3FG0 (no rear system port)]
    - b. [7SJ6225-5EC92-3FG0 +LOA (Profibus rear RS485 port)]
    - c. [7SJ6225-5EC92-3FG0 +LOB (Profibus rear Fiber port)]
    - d. [7SJ6225-5EC92-3FG0 +LOD (Modbus rear RS485 port)]
    - e. [7SJ6225-5EC92-3FG0 +LOE (Modbus rear Fiber port)]
    - f. [7SJ6225-5EC92-3FG0 +LOG (DNP3 rear RS485 port)]
    - g. [7SJ6225-5EC92-3FG0 +LOE (DNP3 rear Fiber port)]
- D. Control power transformer, single phase, with primary disconnect fuse 120/240 VAC secondary, internally mounted dry-type transformer with disconnect primary fuses, [5] [10] [15] kVA.
1. [Automatic transfer of load with main-tie-main controls.]
- E. Mimic Bus: Continuous mimic bus applied to front of switchgear, arranged in single-line diagram format, using symbols and lettered designations consistent with approved final mimic-bus diagram. Mimic-bus segments shall be coordinated with devices in switchgear sections to which applied, to produce a concise visual presentation of principal switchgear components and connections.

## 2.6 INTERRUPTER SWITCH AND FUSE ASSEMBLY

- A. Load interrupter switches shall be three-pole, single throw, gang-operated stored energy type with quick-make, quick-break operation.
1. Electrically operated
  2. Non removable switch handle
  3. Separate main and arcing contacts to provide maximum endurance for fault close and load interrupting duty
  4. Arcing contacts shall be spring loaded so that on opening they breaker after the main contacts, on closing they make after the main contacts. Arc interruption to take place in an interruption chute.

## 2.7 TESTING

- A. Perform production tests in compliance with ANSI C37 and NEMA SG 5 requirements. Provide certified test results.

## 2.8 UNITS REQUIRED

- A. Incoming Line: Qty [ ]
1. 3 - \_\_ kV MCOV [station] [intermediate] class surge arrestors
  2. [Set of \_ voltage transformers, rated \_\_\_\_\_ V]

3. [Set of \_ current transformers, rated \_\_\_\_\_A]
  4. [1 Microprocessor-based 3-phase and ground overcurrent relay, ANSI Device 50/51, 50/51N.]
  5. [1 – Microprocessor-based meter]
  6. Connections shall be made via:
    - a. [A set cable lugs [ ] per phase, [Clamp-type] [compression-type] [Cable terminators] [Potheads] for [\_\_\_\_\_] type cable [\_\_\_\_\_] size, [\_\_\_\_\_] kV for [top] [bottom] entry.]
    - b. [Metal-enclosed bus rated [\_\_\_\_\_] A]
- B. Switches: Qty [\_\_\_\_\_]
  1. Current rating: [600] [1200] A
  2. [Outgoing set of cable lugs] [Close-couple connection to transformer with insulated cable] [Close-couple connection to transformer with rigid bus]

## 2.9 ACCESSORIES

- A. The following accessories shall be provided:
1. Three spare control fuses for potential transformer and control power transformer.
  2. Spare Indicating Lights: One of each type installed.
  3. Touchup Paint: One-half pint of paint matching enclosure finish.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Electrical contractor to install metal-clad switchgear in accordance with manufacturer's written instructions and the following specifications.
- B. Install and anchor switchgear in accordance with manufacturer's instructions.
- C. Tighten bus joints, electrical connectors and terminals according to manufacturer's published torque-tightening values. Install equipment grounding conductors for switchgear with ground continuity to main electrical ground bus.

### 3.2 ADJUSTMENTS AND CLEANING

- A. Set field-adjustable, protective-relay trip characteristics.
- B. Clean exposed surfaces using manufacturer recommended materials and methods. Touch-up damaged coating and finishes using non-abrasive materials and methods recommended by manufacturer. Eliminate all visible evidence of repair.

### 3.3 TESTING

- A. After installing switchgear and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
1. Procedures: Perform inspections and tests specified below. Report values that do not meet manufacturer's written recommendations. Certify compliance with test parameters.
  2. Switchgear: Perform inspections and tests stated in NETA ATS, Section 7.1.
  3. Instrument Transformers: Perform inspections and tests stated in NETA ATS, Section 7.10.
  4. Metering and Instrumentation: Perform inspections and tests stated in NETA ATS, Section 7.11.
  5. Ground-Fault Systems: Perform inspections and tests stated in NETA ATS, Section 7.14.

6. Battery Systems: Perform inspections and tests stated in NETA ATS, Section 7.18.
7. Surge Arresters: Perform inspections and tests stated in NETA ATS, Section 7.19.

### 3.4 WARRANTY

- B. Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for [12 months] [18 months] from date of initial operation.

### 3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Engage a factory-authorized service representative to inspect field-assembled components, installation and connection of switchgear; and to pretest and adjust switchgear components. Report results in writing.
- B. Remove and replace malfunctioning units with new units and retest.

### 3.6 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.
- B. Train USPS's maintenance personnel on procedures and schedules for energizing and de-energizing, troubleshooting, servicing and maintaining equipment and schedules.
- C. Verify that switchgear is installed and connected according to the Contract Documents.
- D. Verify that electrical control wiring installation complies with manufacturer's submittal by means of point-to-point continuity testing.
- E. Complete installation and startup checks according to manufacturer's written instructions.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~87~~  
Last revised: 8/29/2013

SECTION 261414

INFRARED VIEWING PANES (IR WINDOWS)

\*\*\*\*\*

\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at this location.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification provides the technical requirements for the design, manufacture, testing and installation of Infrared viewing panes. The contractor shall provide and install all components as specified herein and shown on related electrical drawings
- 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 Section include the following:
  - 1. Section 260500 – Common Work Results for Electrical.
  - 2. Section 261116 – Secondary Unit Substations.
  - 3. Section 261216 – Dry-Type Medium-Voltage Transformers
  - 4. Section 261313 – Medium Voltage Circuit Breaker Switchgear.
  - 5. Section 261317 – Medium-Voltage Interrupter Switchgear.
  - 6. Section 262200 – Secondary Dry Type Transformers.
  - 7. Section 262413 – Switchboards.

1.2 REFERENCES

- A. Infrared viewing panes shall be U.L. recognized, shall allow visual and infrared scanning and shall comply with the following standards:
  - 1. IEEE C.37.20.2, section a.3.6 and UL Standard 1558 for impact and load requirements.
  - 2. U.L. Standard 508C and 746C for impact and flammability requirements.
  - 3. U.L. 94 5VA Flammability Resistance.
  - 4. IP65/NEMA 4 rated; both open and closed.
  - 5. UL Standard 891 – Switchboards.
  - 6. UL Standards 508A, 50V and 50E recognized.

1.3 SUBMITTALS

- A. Submit shop drawings and product data for approval and final documentation in the quantities listed according to the Conditions of the Contract. All transmittals shall be identified by customer name, customer location and customer order number.

- B. Documents for Approval: Pane identification tags, recording inspection parameters, dimensioned drawings and sections, major features and installation instructions. Section 013300 - Submittal Procedures: Procedures for submittals.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a firm with at least (10) years experience in manufacturing and installing infrared viewing panes (lens and/or optic type)

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in factory labeled packages.
- B. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from potential damage from weather and construction operations. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

\*\*\*\*\*

\*

**NOTE TO SPECIFIER**

Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.

\*\*\*\*\*

\*\*

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
  - 1. IRISS, Bradenton, FL (877) 704-7477.
  - 2. Schneider Electric, Westchester, OH (888) 778-2733.
  - 3. FLIR, Nashua, NH (866) 477-3687.
  - 4. Substitutions permitted with approval from contracting officer through the USPS Project Manager.
- B. Infrared viewing panes shall be manufactured utilizing a crystal or IR optic polymer, shall be sized as indicated and shall be transparent or opaque as specified.
  - 1. Opaque 2 inch round IR windows:
    - a. Basis of Design: IRISS #VPFR-50.
    - b. Acceptable manufacturers: As listed in para. 2.1A.
  - 2. Transparent 2 inch round IR windows:
    - a. Basis of Design: IRISS #VPT-50.
    - b. Acceptable manufacturers: As listed in para. 2.1A.
  - 3. Opaque 3 inch round IR windows:
    - a. Basis of Design: IRISS # VPFR-75.
    - b. Acceptable manufacturers: As listed in para. 2.1A.
  - 4. Transparent 3 inch round IR window:
    - a. Basis of Design: IRISS # VPT-75.
    - b. Acceptable manufacturers: As listed in para. 2.1A.
  - 5. Opaque 9 inch W x 5 inch H rectangular IR window:
    - a. Basis of Design: IRISS # CAP-C-12.
    - b. Acceptable manufacturers: As listed in para. 2.1A.

6. Transparent 9 inch W x 5 inch H rectangular IR window:
  - a. Basis of Design: IRISS # CAP-CT-12.
  - b. Acceptable manufacturers: As listed in para. 2.1A.
7. Opaque 21 inch W x 6 inch H rectangular IR windows:
  - a. Basis of Design: IRISS #CAP-C-24.
  - b. Acceptable manufacturers: As listed in para. 2.1A.
8. Transparent 21 inch W x 6 inch H rectangular IR windows:
  - a. Basis of Design: IRISS #CAP-CT-24.
  - b. Acceptable manufacturers: As listed in para. 2.1A.

## 2.2 TESTING REQUIREMENTS

- A. The IR viewing panes (opaque or transparent and sized as specified) shall meet or exceed the following minimum requirements:
  1. IR viewing panes shall be impact tested in accordance with U.L. 746c, section 56 with cover open and closed.
    - a. After conditioning at 0 degrees C for 3 hours, an impact of 5 foot-pounds shall be applied front and rear of the viewing panes. The test shall be deemed to have failed if the IR viewing pane cracks, shatters or dislodges.
  2. IR viewing panels shall undergo a front and rear load test as per IEEE standard C37.20.2, specifically section A.3.6.
    - a. A force of 445 N (100 ibf) shall be exerted perpendicular to the surface in which the viewing pane is mounted. This force should be distributed evenly over an area of 0.010 M2 (16 in2), as nearly square as possible, and as near the geometric center of the viewing pane as possible. If the viewing pane has an area less than 0.010 M2 (16 in2), the force should be evenly distributed over the entire viewing area. The 445 N (100 ibf) should be sustained for a period of 1 min on the front and rear of the viewing panels. The test shall be deemed to have failed if the IR viewing panel cracks, shatters or dislodges.
  3. IR viewing pane lens materials shall undergo a 5V flammability test in accordance with U.L. 746c, section 56.
    - a. After conditioning at 0 degrees C for 3 hours, the materials are subjected to a 5 inch flammability test. The test shall be deemed to have failed if the IR viewing panel cracks, shatters or dislodges.
  4. IR viewing panes shall have fixed metal covers (i.e. the cover cannot be removed by removing a screw, etc.).
    - a. This requirement ensures that locking screws and protective covers are never lost and that the viewing panel will be secured at all times when not in use.
  5. IR viewing panes shall be fail safe.
    - a. In the event of a premature failure of the lens, through accidental damage or misuse, the maximum opening within the panel should not exceed the requirement for IP2X.
  6. IR viewing panes shall withstand a minimum of 25 psi.
  7. IR viewing panes requiring PPE protection shall not be acceptable.

## 2.3 MECHANICAL PROPERTIES

- A. Infrared panes shall allow for safe visual and thermal imaging of fully energized electrical components through closed doors for voltages up to 72 KV. The IR windows as a minimum shall have the following mechanical properties:
  1. Environmental minimum standard: IP65 (Europe) or NEMA 4 (USA) both closed and when in use.
  2. Lens or optic shall be resistant to acids, alkalis and water (non-hydroscopic materials).
  3. Lens or optic must have vibration resistance.
  4. Gaskets and materials shall meet minimum flammability resistance per UL 94 5VA.
  5. IR window assembly shall be recognized by UL 508A and UL 50V.

6. IR window assembly shall be supplied with all fitting instructions, cutting templates and fixing screws.
7. Standard round viewing window lens or optic diameters shall be minimum 3 inch.
8. Rectangular window viewing lens or optics shall be available in standard 9 inch W x 5 inch H or customized solutions.
9. Visual inspection option shall be made available where specified and shall be in full compliance with UL 746C and IEEE C 37.20.2 section a.3.6.
10. Optional training and support shall be made available to the owner for additional cost.
11. IR window assemblies shall be reusable and recyclable.

2.4 INFRARED PERFORMANCE PROPERTIES

- A. The IR viewing panes shall be suitable for use with any thermal camera (i.e.: ultraviolet, shortwave, midwave and longwave IR ranges).
- B. Lens or optic material shall have stable transmission rates between 4 and 9 micron wavelengths. Transmission rates of the IR viewing panes shall therefore be quoted for the following wavelengths:

Shortwave IR wavelength = 4 microns (Basis of design @ 68 percent transmittance)  
 Longwave IR wavelength = 9 microns (Basis of design @ 72 percent transmittance)

PART 3 - EXECUTION

3.1 INSTALLATION

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*IR viewing panes are to be factory installed by the switchgear manufacturer for new construction projects and are to be field installed for R&A projects. Select paragraphs 3.1A accordingly.*  
 \*\*\*\*\*

- A. [IR viewing panes shall be factory installed by the switchgear manufacturer as recommend by the IR viewing pane manufacturer.]
- A. [IR viewing panes are to be field installed. Installer shall be factory certified and trained by the IR viewing pane manufacturer.]
- B. Refer to applicable requirements contained within specification sections 261116, 261216, 261313 and 261317.

3.2 ADJUSTMENTS AND CLEANING

- A. Repaint marred and scratched switchgear surfaces to match original finish.

3.3 REQUIREMENTS FOR IR VIEWING PANES MANUFACTURERS.

- A. IR viewing panes manufacturers have a duty of care to their customers to provide all the relevant details regarding the IR viewing panes materials that are utilized and as such shall, as a minimum, provide the following information:
  1. IR viewing panes shall be provided with instructions for use labels.
  2. IR viewing panes shall be provided with label system that identifies the material in viewing panes and the IR wavelength to LW & SW IR.
  3. IR viewing panes manufacturers shall provide MSDS on all substances in the assembly as per current regulations.



4. IR viewing panes shall not be manufactured utilizing barium fluoride due to its restricted and hazardous classification.

#### 3.4 TESTING

- A. IR viewing panes shall be operationally tested after installation to ensure satisfactory performance as specified by the manufacturer.
  1. This test ensures the IR viewing panes are fit for the purpose and provide the thermographers using the IR viewing panels with all the relevant information required to view the pane correctly and to ensure accuracy of data gathered.
- B. The actual IR transmission rates of the lens materials shall be factory tested and documented by the manufacturer.
  1. The manufacturer shall be responsible to complete regular functional testing to prove the IR transmission of the IR lens materials. These results shall then be made available to the inspecting bodies and clients utilizing the viewing panes.

#### 3.5 LABELING

- A. All IR viewing panes shall be provided with labels to record the following:
  1. Instructions for use: Clearly defined instructions that ensure the operator can correctly utilize the IR viewing pane.
  2. Identification labels: A labeling system shall be provided to identify the type of lens, IR characteristics, targets, etc. to ensure that the IR data gathered is correct and repeatable.

#### 3.6 GUARANTEE

- A. Manufacturer shall provide unconditional lifetime guarantee on the complete pane assembly (guarantee covering only manufacturing defects shall not be acceptable).

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~  
Last revised: 9/16/2015

SECTION 262200

SECONDARY DRY TYPE TRANSFORMERS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

***\*\*REQUIRED PARTS OR ARTICLES ARE INCLUDED IN THIS SECTION. DO NOT REVISE THIS SECTION WITHOUT AN APPROVED, WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT THROUGH THE USPS PROJECT MANAGER.***

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: The work specified in this Section includes, but shall not be limited to, the following:
  - 1. Transformers shall be manufactured in compliance with D.O.E. 10 CFR 431.192, April 2013.
  - 2. Transformer shall be UL 1561 listed to feed a mix of equipment load profiles such as computers without derating or significant degradation of efficiency.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
  - 1. Section 260500 - Common Work Results for Electrical.
  - 2. Section 261414 - Infrared Viewing Panes (IR Windows).

1.2 REFERENCES

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
  - 1. IEEE 1100, "IEEE Recommended Practice for Powering and Grounding Electronic Equipment."
  - 2. ANSI/IEEE C57.1110, " Recommended Practice for Establishing Transformer Capability When Feeding Nonsinusoidal Load Currents."
- C. International Code Council (ICC):
  - 1. ICC ES AC156, "Acceptance Criteria for Seismic Qualification by Shake Table Testing of Nonstructural Components and Systems."
  - 2. ICC IBC, "International Building Code."
- D. International Organization for Standardization (ISO):
  - 1. ISO 9001, "Quality Management Systems Requirements."
  - 2. ISO 14001, "Environmental Management Systems Requirements with Guidance for Use."
- E. National Electrical Manufacturers Association (NEMA):
  - 1. NEMA 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

2. NEMA ST 20, "Dry Type Transformers for General Applications."
  3. NEMA TP 1, "Standard for the Labeling of Distribution Transformer Efficiency."
  4. NEMA TP 2, "Standard Test Method for Measuring the Energy Consumption of Distribution Transformers."
- F. National Fire Protection Association (NFPA):
1. NFPA 70, "National Electrical Code," hereinafter referred to as NEC.
  2. NFPA 5000, "Building Construction and Safety Code."
- G. Underwriters Laboratories, Inc. (UL):
1. UL 1561, "Standard for Dry Type General Purpose and Power Transformers."
  2. UL 250, "Enclosure for Electrical Equipment".
- H. 2005 Energy Act PUBLIC LAW 109-58-AUG. 8, 2005. Comply with all Rules from Department of Energy:
1. 10 CFR 429
  2. 10 CFR 431

### 1.3 SUBMITTALS

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Section 013300 - Submittal Procedures: Procedures for submittals.
1. Product Data: Outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.
  2. Manufacturer's Test Reports:
    - a. Copy of ISO 9001 Certification of manufacturing operation.
    - b. Copy of ISO 14001 Certification of manufacturing operation.
    - c. Confirmation that transformers are UL 1561 listed with a K1 rating. Those requiring a k factor rating will be K13 rated.
    - d. Construction details, including, but not limited to, enclosure dimensions, kVA rating, primary and secondary nominal voltages, voltage taps, approximate center of gravity, and unit weight.
    - e. Basic performance characteristics, including, but not limited to, insulation class, temperature rise, core and coil materials, impedances and audible noise level, unit weight, and inrush value expressed in a multiplier of rated primary current RMS.
    - f. Efficiency data shall be reported as described in the following sections. Reference temperatures shall be included when reporting efficiency.
      - 1) No load and full load losses shall be calculated per NEMA ST 20 test methods.
      - 2) Efficiency curves as follows:
        - i. Linear loads.
        - ii. Data per the non linear load test program.
    - g. Sound level ratings.
  3. 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.
- C. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
1. Project Record Documents: Record actual locations of transformers.
  2. Maintenance Data: Include recommended maintenance procedures and intervals.

1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.
  - 1. Seismic Requirements:
    - a. ICC IBC, NFPA 5000.
    - b. Tri axial shake table test results conducted in accordance with the ICC ES AC156 test protocol 3 (Acceptance Criteria for Seismic Qualification Testing of Nonstructural Components).
  - 2. Comply with D.O.E. Guidelines established for manufacture, January 1, 2016 (10 CFR 431.192, April 2013).
- C. Compliance: Comply with applicable requirements of the following standards.
  - 1. CSA 802.2.
  - 2. CSA C22.2.
  - 3. ASHRAE 90.1—~~2010~~.
- D. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Transformers shall be packaged for shipment using materials that shall have the least environmental impact.
  - 1. Transformer Wrapping: Transformers shall be protected by cardboard protective material; all plastic wraps shall not be accepted.
  - 2. Transformer Shipping Base: Transformers shall be shipped on a base that uses at least 50 percent less wood than traditional pallets. Comply with ISPM No. 15.
- C. Store in a warm, dry location with uniform temperature. Cover ventilation openings to keep out dust, water and other foreign material.
- D. Handle transformers using lifting eyes and/or brackets provided for that purpose. Protect against unfavorable external environment such as rain and snow, during handling.

PART 2 - PRODUCTS

\*\*\*\*\*

\*

**NOTE TO SPECIFIER**

Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.

\*\*\*\*\*

\*\*

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Eaton Corporation, Cutler-Hammer Products, Pittsburgh, PA (800) 525-2000.
  - 2. General Electric Company (800) 626-2000.
  - 3. Siemens Energy & Automation, Inc., Alpharetta, GA (800) 964-4114.
  - 4. Square D Company, Palatine, IL (800) 392-8781.
- B. Basis of Design: Product specified shall be D.O.E. 10 CFR 431.192, April 2013 compliant transformers ("EX" Series) as manufactured by Square D Schneider Electric. Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect/Engineer will be the sole judge of the basis of what is equivalent.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

## 2.2 TWO WINDING TRANSFORMERS

- A. The transformer shall be UL 1561 listed and labeled with a K1 rating (per UL 1561 35.2.1 and 34.2). Provide K13 rated transformers to serve mail processing equipment and other non-linear loads.
- B. Windings shall be continuous wound copper with brazed or welded terminations.
- C. Insulation and varnish systems shall be Nomex-based UL recognized 220 degrees C class utilizing an epoxy polyester impregnation.
- D. Maximum winding temperature rise for K1 rated units shall be 80 degrees C and K13 rated units shall be 130 degrees C rise.
- E. Terminals, including, but not limited to, those for changing taps, shall be readily accessible by removing a front cover plate.
- F. The transformers shall have a basic impulse level of 10 kV BIL.
- G. Voltage taps shall be as follows:
  - 1. Primary 480 volts.
    - a. For transformers 15 kVA to 300 kVA, provide two 2-1/2 percent full capacity taps above and four 2-1/2 percent below nominal primary voltage.
    - b. For transformers 500 kVA to 750 kVA, provide two 2-1/2 percent full capacity taps above and two 2-1/2 percent below nominal primary voltage.
- H. Impedance shall be the manufacturer's standard.
- I. Three phase transformer efficiency shall be as stated below (tested at 35 percent of the nameplate rating, per D.O.E. 10 CFR 431.192:
  - 1. 15 kVA: 98.26 percent.
  - 2. 30 kVA: 98.58 percent.
  - 3. 45 kVA: 98.69 percent.
  - 4. 75 kVA: 98.97 percent.
  - 5. 112.5 kVA: 99.03 percent.
  - 6. 150 kVA: 99.04 percent.
  - 7. 225 kVA: 99.12 percent.
  - 8. 300 kVA: 99.20 percent.
- J. Sound Levels shall be as follows:
  - 1. 15 and 30 kVA: 39 dB.

- 2. 45 and 75 kVA: 44 dB.
- 3. 112.5 kVA: 47 dB.
- 4. 150 to 225 kVA: 49 dB.
- 5. 300 kVA: 54 dB.

- K. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, 365 days a year operation, with normal life expectancy as defined in ANSI C57.96.
- L. Where required for K13 rating, the neutral bus shall be configured to accommodate 200 percent of the rated current.
- M. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap in accordance with Article 250 of NFPA 70.
- N. Mounting: Suitable for wall, floor, or trapeze mounting, except transformers larger than 75 kVA, suitable for floor mounting.

2.3 ENCLOSURE

- A. The enclosure construction shall be ventilated, NEMA 2 drip-proof, with lifting holes. All ventilation openings shall be protected against falling dirt. On outdoor units, provide weather shields over ventilated openings.
- B. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

2.4 SOURCE QUALITY CONTROL

- A. Production test each transformer according to NEMA ST20.

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Secondary, dry type transformers "rated above 125 KVA" shall be equipped with IR viewing panes. Include paragraph 2.6 below for transformers rated above 125 KVA.*

\*\*\*\*\*

2.5 INFRARED VIEWING PANES (IR WINDOWS)

- A. Typically, the high voltage and low voltage tap connections are located on the top side of a dry type transformer. A single, transparent, rectangular window (21 inch W x 6 inch H) shall be provided to view the high and low voltage connections on this side of the transformer. The neutral connections are typically made by bolted connections at the bottom of the transformer. A single, opaque, 2 inch dia. round window shall be provided at the bottom side of the transformer to view these bolted connections. Refer to specification section 261414.
- B. Acceptable installers:
  - 1. IR viewing panes shall be factory installed by the transformer manufacturer or field installed by a certified installer, as recommended by the IR viewing pane manufacturer.
  - 2. Installer shall be factory certified and trained by the IR viewing pane manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Provide minimum 3 inch high concrete pad for floor mounted transformers.

### 3.3 INSTALLATION

- A. Install transformers in accordance with NECA SI and manufacturer's published instructions, at locations and as indicated on Drawings.
  - 1. Use manufacturer approved mounting brackets for transformers supported from building structure.
  - 2. Securely anchor transformers to concrete pad for floor mounted transformers.
  - 3. Provide working clearances in conformance with NFPA 70 and manufacturer's recommendations.
  - 4. Provide both primary and secondary protection using fuses or circuit breakers as indicated on Drawings.
- B. Set transformers plumb and level.
- C. Use minimum 2 foot length flexible conduit for connections to transformer case. Make conduit connections to side panel of enclosure.
- D. Mount transformers on vibration isolating pads suitable for isolating transformer noise from building structure.
- E. Provide grounding and bonding as specified in Section 260500.
- F. Furnish and install engraved plastic nameplates as specified in Section 260500.
- G. Furnish and install seismic restraints designed for type of mounting used.

### 3.4 FIELD QUALITY CONTROL

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Section 014000 - Quality Control: Field testing and inspection.
- C. Check for damage and tight connections prior to energizing transformer.
- D. Measure primary and secondary voltages and make appropriate tap adjustments.

END OF SECTION

USPS Mail Processing Specification issued: 10/1/201~~87~~  
Last revised: 8/29/201~~86~~

SECTION 262413

SWITCHBOARDS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. The contractor shall provide and install [service entrance] [distribution] switchboards as herein specified and shown on related electrical drawings.
- 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 include the following:
  - 1. Section 019113 - General Commissioning Requirements.
  - 2. Section 260500 - Common Work Results for Electrical.
  - 3. Section 260800 - Commissioning of Electrical Systems.
  - 4. Section 261116 - Secondary Unit Substations.
  - 5. Section 261216 - Dry-Type, Medium-Voltage Transformers.
  - 6. Section 261414 - Infrared Viewing Panes (IR Windows).
  - 7. Section 337173 - Electrical Utility Service.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data.
- B. Drawings: Submit shop drawings for approval. Include components, materials, finishes, detailed plan and elevation views, required conduit rough-in openings, anchors and accessories.

1.3 RELATED STANDARDS

- A. The switchboard shall be designed, manufactured and tested according to the latest applicable version of the following standards:
  - 1. ANSI/NFPA 70 – National Electrical Code (NEC)
  - 2. NEMA PB2 – Deadfront Distribution Switchboards
  - 3. UL 891 – Deadfront Switchboards



## 1.4 QUALITY ASSURANCE

- A. Manufacturer: For equipment required for the work of this section, provide product which is the responsibility of one manufacturer.
- B. Performance Requirements: Provide switchboards manufactured in accordance with Article 408 of the latest National Electrical Code and applicable portions of the NEMA PB2, UL 891 and NFPA 70, the National Electrical Code.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.

## 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. Eaton Corporation, Cutler-Hammer Products, Pittsburg, PA (800) 525-2000.
  - 2. General Electric Company (800) 626-2000.
  - 3. Siemens Energy and Automation, Alpharetta, GA (800) 964-4114.
  - 4. Square D Company, Palatine, IL (800) 392-8781.
  - 5. No substitutions permitted.
- B. For the equipment specified herein, the manufacturer shall be ISO 9000, 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum of ten (10) years.

### 2.2 GENERAL REQUIREMENTS

- A. Construction
  - 1. Switchboard shall be of the modular type construction, constructed in accordance with the latest NEMA PB-2 and UL 891 standards, with the required number of vertical sections bolted together to form one metal enclosed rigid switchboard. The sides, top and rear shall be covered with removable screw-on code gauge steel plates. Switchboard shall include all protective devices and equipment as listed on drawings with necessary interconnections, instrumentation and control wiring. All groups of control wires leaving the switchboard shall be provided with terminal blocks with suitable numbering strips. Service entrance switchboards shall be suitable only for use as service equipment and be labeled in accordance with UL requirements. System voltage, amperage and interrupting capacity shall be as indicated on the drawings. Enclosure construction shall be NEMA 1 indoor.
- B. Bus Requirements
  - 1. The bus shall be of sufficient size to limit the temperature rise to 65 degree C, based on UL tests. The bus shall be braced and supported to withstand mechanical forces exerted during a short circuit from a power source having the available short circuit current as indicated on the drawings. Provide a full capacity neutral where a neutral is indicated on the drawings. The through bus on the end section shall be extended and pre-drilled to allow the addition of future sections. Ground

bus and grounding conductor lug shall be furnished. Ground bus shall extend the entire length of the switchboard and shall be firmly secured to each vertical section. Bus Material shall be silver-plated copper.

C. Incoming Service

1. [Underground Service: To isolate incoming underground service conductors, an underground cable pull or auxiliary section shall be used. This section shall be of the [non-bussed] [bussed] type and shall be sealable per local utility requirements, when required.]
2. [Overhead Service:
  - a. Cable entry: Where necessary, provide top cable pull box and provide construction that shall be sealable per local utility requirements, when required.
  - b. Busway Entry: Switchboard to be fed by copper busway, as detailed on drawings [and other sections of this specification]. The switchboard manufacturer shall be responsible for coordination, proper phasing and internal bussing to the incoming busway.]
3. Service Section: The service section shall be designed for the system parameters indicated and shall have user metering and main protective device as indicated.
4. Screw-type mechanical lugs to terminate copper cable shall be provided as detailed on the drawings.

D. [Fire Pump Tap

1. The fire pump tap section shall be on the line side of the main disconnect(s) and contain only through bus and tap lugs to feed the fire pump.]

E. Main Protective Device

1. Service entrance style switchboards shall be double-ended type equipped with draw-out, low voltage, power circuit breakers for the “mains and tie” breakers and molded case feeder circuit breakers. Low voltage power circuit breakers shall be provided with a drawout frame and current rating as shown on the drawings. It shall be electrically operated power circuit breaker with a solid-state trip device providing adjustments for long time pick up and delay, short time pickup and delay, instantaneous, ground fault pickup and delay, and zone selective interlocking for short time and ground fault.
  - a. Insulated case, draw-out circuit breakers shall comply with the requirements of UL489 and UL1066. Breakers shall be three-pole, 100% rated type:
    - 1) Circuit breaker element shall have connected, test and disconnected position indicators, spring charged/discharged indicators and circuit breaker open or closed and ready to close indicators all of which shall be visible to the operator with the compartment door closed. It shall be possible to rack the circuit breaker element from the connected to the disconnected position with the compartment door closed, otherwise known as “through the door drawout”.
    - 2) Provide interlocks to prevent racking the circuit breaker unless the breaker is open.
    - 3) Ratings: Interrupting up to 100 kA at 480V without fuses. Short time current ratings for each circuit breaker shall be as indicated on the drawings or data tables. Circuit breakers shall be 600-volt class.
    - 4) Operating Mechanism: Mechanically and electrically trip-free, stored-energy operating mechanism with the following features:
      - i. Normal Closing Speed: independent of both control and operator
      - ii. Electrical operator, field installable with manual charging
      - iii. Operations counter
    - 5) Each low voltage circuit breaker shall be equipped with self-powered, microprocessor-based trip-device to sense overload and short circuit conditions. The device shall measure true RMS current. The tripping system shall consist of high accuracy (<1%) Rogowski coil sensors on each phase, a release mechanism and the following features:
      - i. Field Installable and interchangeable front mounted trip units. Trip units can be upgraded for future expansion in functionality, such as communication.
      - ii. Functions: Long time, short time and extended instantaneous protection function shall be provided (EIP) to allow the breaker to be applied at the

withstand rating of the breaker with minus 0% tolerance so that there is no instantaneous override whatsoever. This feature shall furthermore allow the circuit breaker to be applied up to the full instantaneous rating of the breaker on systems where the available fault current exceeds the breakers withstand rating. Each shall have an adjustable pick-up setting. In addition, long time and short time bands shall each have adjustable time delay. Short time function shall include a switchable I2t ramp and optionally I4t to improve co-ordination with fuses or inverse relays.

- iii. A software program shall be made available free of charge to support system co-ordination studies. The software will allow time current curves to be generated for the chosen settings.
  - iv. Individual LED's shall indicate an overcurrent, short circuit or ground fault trip condition.
  - v. Time-current characteristics shall be field adjustable locally or optionally remotely via a bus system ModBus.
  - vi. Current Adjustability shall be accomplished by use of dial setting and rating plugs on trip units. The rating plug shall be front mounted and upgradeable. Upgrades to the rating plugs shall not require changes to the CT.
  - vii. Pickup Points: 10 Long Time Settings.
  - viii. Field Installable Ground-fault protection with at least three time-delay bands and an adjustable current pickup and an I2t ramp. Arrange to provide protection for three-wire service.
  - ix. Field installable zone selective interlocking: Connections will be made between main, tie and feeder circuit breakers to ensure that the circuit breaker closest to the fault trips for short time and ground fault conditions.
  - x. A LCD display shall be available to simplify settings & viewing data locally.
  - xi. Field installable configurable analog and digital output relays shall be available to connect directly to the trip unit.
  - xii. Waveform capture and display shall be accomplished on the trip units LCD display.
  - xiii. A visible pin shall indicate wear. In addition to the visible pin indicator, estimated contact wear shall be calculated in the trip unit.
  - xiv. Terminal Block Connections shall be front mounted and utilize screw type terminals.
  - xv. Padlocking Provisions shall be included to install at least three padlocks on each circuit breaker to prevent movement of the drawout mechanism.
  - xvi. Operating Handle shall be an integral part of the breaker. No external tools shall be required to rack the breaker.
  - xvii. Control Switch: One for each electrically operated circuit breaker.
  - xviii. Key Interlocks: Main and tie-breakers.
  - xix. Undervoltage Trip: Adjustable time-delay.
  - xx. Shunt-Trip – field installable.
  - xxi. Modular communication and relaying accessories are to be available for retrofitting by the clients chosen engineer. It shall not be necessary for the manufacturer's personnel to retrofit accessories.
  - xxii. Accessories shall be front mounted. Modular communications and relaying accessories are to be available for retrofitting by the clients chosen engineer. It shall not be necessary for the manufacturer's personnel to retrofit accessories.
  - xxiii. Portable lifting yoke for drawout circuit breakers.
  - xxiv. Field interchangeable accessories shall include CT's, trip units, racking mechanism and all internal & external accessories.
- b. Feeder circuit breakers shall be molded case, quick-make, quick-break, trip-free, thermal magnetic, solid state type. The continuous current rating shall be adjustable from 20 to 100% without the need for a rating plug. Solid state breaker trip functions shall include adjustments for continuous amperage, long time pickup and delay, instantaneous short

- time pickup and delay and ground fault pickup and delay, if required. Breaker ratings shall be as shown on the drawings.
2. Main circuit breakers within switchboards down stream of the incoming service shall be molded case quick-make, quick-break, trip-free, thermal magnetic, solid state type. The continuous current rating shall be adjustable from 20 to 100% without the need for a rating plug. Solid state breaker trip functions shall include adjustments for continuous amperage, long time pickup and delay, instantaneous short time pickup and delay, ground fault pickup and delay and zone selective interlocking for short time and ground fault. Breaker ratings shall be as shown on the drawings.
    - a. Distribution section branch protective devices shall be molded case circuit breakers.
      - 1) Molded Case Circuit Breakers (MCCB's) shall be of quick-make, quick-break, trip-free, thermal magnetic, solid-state – 150 amp frame, 30 amp trip and above type with frame, trip and voltage ratings, as indicated on the drawings. The switchboard shall have space or fully equipped provisions for future units as shown on the drawings.
- F. Distribution Sections
1. Individual sections shall be front accessible, not less than 20" deep and the rear of all sections shall align. Incoming line termination, main device connection and all bolts used to join current-carrying parts shall be installed so as to permit servicing from the front only so that no rear access is required. The branch devices shall be front removable and panel mounted with line and load side connections front accessible. The interior shall be capable of accepting panel mounted molded case circuit breakers.
- G. Ground Fault Protection
1. Furnish and install, in the service equipment switchboard, ground fault protection and indication equipment as shown on drawings in accordance with NEC 230-95. All parts of the systems specified shall be UL Listed. All ground fault protection and indication equipment shall be factory installed, wired and tested by the switchboard manufacturer.
- H. Metering Equipment
1. Advanced electric meters shall be provided as an integral part of building switchgear for new construction. Advanced electric meters shall be programmable and capable of measuring kWh and other power characteristics (kw, amperage, power factor, etc.) on 5 – 60 minute intervals with built-in data storage. A fifteen (15) minute interval measurement shall be programmed at installation. The data shall be accessible on a real-time basis and downloadable to the Building Automation System for management of data. Refer to section 337173 – Electrical Utility Services.
- I. Finish
1. The complete switchboard shall be phosphatized and finished with ANSI 61 light gray polyester powder paint.
- J. Markings
1. Each switchboard section shall have a label permanently affixed to it, listing the following information: Name of manufacturer, system voltage, ampacity, type, manufacturer's shop order number and date.
  2. Each section of switchboard shall bear a UL listing mark, where qualified and a short circuit rating label.
  3. Front, side, rear and top of each switchboard section will have a DANGER label in accordance with NEMA Standard PB-2.
- K. Transient-Voltage Suppression
1. Provide Transient-Voltage Suppression per specification Section 262200.
- L. ARC FLASH
1. Apply in the field, the factory supplied arc flash warning labels to all switchboards to warn qualified persons of potential electrical arc flash hazards.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*All switchboards calculated to be classified as an ARC Flash Hazard Risk Category of "Dangerous" shall be equipped with IR Viewing Panes. Include paragraph 2.3 below for switchboards classified as HRC=Dangerous.*  
\*\*\*\*\*

2.3 INFRARED VIEWING PANES (IR WINDOWS)

- A. Each breaker position of the switchboard shall be equipped with an opaque, 3" round infrared window. The IR window shall be located on the [front] [rear] of the switchboard, centered on the cable to lug connections of the breaker. Refer to specification section 261414 for specific details.
- B. Acceptable installers:
  - 1. IR viewing panes shall be factory installed by the switchboard manufacturer or field installed by a certified installer, as recommended by the IR viewing pane manufacturer.
  - 2. Installer shall be factory certified and trained by the IR viewing pane manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates and conditions in which units will be installed. Check for clearance that will be required before, during and after equipment installation. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Strictly comply with manufacturer's instructions and recommendations and NEMA PB 2.1. Coordinate installation with adjacent work to ensure proper sequence of construction, clearances and support.
- C. Install units plumb, level and rigid without distortion to the switchboard cubicle(s).

3.2 ADJUSTMENTS AND CLEANING

- A. Clean exposed surfaces using manufacturer recommended materials and methods.
- B. Touch-up damaged coatings and finishes using non-abrasive materials and methods recommended by manufacturer. Eliminate all visible evidence of repair.

3.3 TESTING

- A. Perform factory and installation tests in accordance with applicable NEC, NEMA and UL requirements.

3.4 WARRANTY

- A. Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for [12 months] [18 months] from date of initial operation.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018~~7~~  
Last revised: 8/5/2016

SECTION 262416

PANELBOARDS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

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 SUBMITTALS

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

1.3 QUALITY ASSURANCE

- A. Panelboards shall be UL Listed and labeled and shall be designed in accordance with the applicable standards of ANSI and NEMA.

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. Cutler Hammer
  - 3. Square-D
  - 4. Eaton/Cutler Hammer

- a. Branch Circuit Panels:
  - 1) 120/208V: G.E. Type AQ
- b. Distribution Panels:
  - 1) Circuit breaker: G.E. Type CS or A

## 2.2 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.
  - 1. Panelboards shall be equipped with "door within door" type trim.
- C. Panels located adjacent to each other shall have identically sized enclosures and trims.
- D. Finish: Finish exposed parts with one coat of primer and one coat of light gray enamel suitable for overpainting in field if desired.
- E. Phase, neutral and ground bus bars shall be tin plated copper.
- F. Provide all hardware for future breakers, identified on drawings as SPACES, or for the full length of usable bus, whichever is longer.
- G. Provide ground bus with full complement of terminals in addition to insulated neutral bus.
- H. Circuit Breakers:
  - 1. Provide multi-pole units with common trip elements. Handle ties are not acceptable.
  - 2. Provide key-operated circuit breakers in the panelboards used for the Fire Alarm, Security and CCTV Systems. Circuit breakers shall be similar to square D type QO\_K.
  - 3. 120/208V branch circuit panelboards: Molded cast bolt-on type designed for 120/208V, three phase, four wire service with minimum 10,000 amperes rms short circuit rating.
  - 4. 277/480V branch circuit panelboards: Molded cast bolt-on type designed for 277/480V, three phase, four wire service with minimum 14,000 amperes rms short circuit rating.
- I. Provide all panelboards with lockout/tagout devices; Circuit-Safe type as manufactured by Stranco, Inc. or approved equal.
- J. 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.
- K. Circuit directories: Provide a metal-framed circuit directory on inside of inner door, with plastic protector.
- L. Provide 2-3/4 inch and 1-1 inch spare empty conduits routed above into accessible ceiling space from all flush mounted panelboards.
- M. Panels serving electronic equipment and/or other harmonic producing loads shall be equipped with double neutral bus bars.

## PART 3 - EXECUTION

### 3.1 CLEARANCES

- A. Minimum code required clearances around panelboards must be maintained.

### 3.2 MOUNTING HEIGHT

- A. Typically mount panel boards top at 6 ft. - 0 in. above finished floor but no more than 6 ft. - 6 in. above finished floor to top of circuit breaker handle.

### 3.3 MOUNTING HARDWARE

- A. Provide all necessary blocking, channels and other hardware for securing panelboards to wall, column, or other parts of building structure.

### 3.4 FIELD 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

USPS Mail Processing Facility Specification issued: 10/1/2018~~17~~  
Last revised: 5/20/2011



SECTION 262726

WIRING DEVICES

\*\*\*\*\*

\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Wall switches.
  - 2. Receptacles.
  - 3. Device plates and box covers.
  - 4. Receptacle raceway.
  
- 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: Supporting devices, electrical identification, grounding and bonding.
  - 2. Section 260533 – Raceway and Boxes for Electrical Systems: Pull, junction, outlet and switch boxes.

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.

PART 2 - PRODUCTS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.*

\*\*\*\*\*

2.1 WALL SWITCHES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
  1. Hubbell, Inc, Milford, CT (203) 882-4800.
  2. Leviton Manufacturing, Company, Inc., Little Neck, NY (800) 824-3005.
  3. Pass & Seymour, Syracuse, NY (800) 776-4035.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Provide 20Amp, 120/277Volt, specification grade, flush single pole toggle switches with side and back wired screw terminals.
- D. Single Pole Switch:
  1. Leviton Cat. No.1221-2.
  2. P&S Cat. No. PS20AC1l.
  3. Hubbell Cat. No. HBL1221.
- E. Double Pole Switch:
  1. Leviton Cat. No. 1222-2.
  2. P&S Cat. No. PS20AC2.
  3. Hubbell, Cat. No. HBL1222.
- F. Three-way Switch:
  1. Leviton, Cat. No. 1223-2.
  2. P&S Cat. No. PS20AC-3.
  3. Hubbell Cat. No. HBL1223.
- G. Indicator Switch:
  1. Leviton Cat. No. 1221-PLR (Red).
  2. P&S Cat. No. PS20AC1-RPL (Red).
  3. Hubbell Cat. No. HBL1221PL (Red).
- H. Locator Switch:
  1. Leviton Cat. No. 1221-LHC (Clear).
  2. P&S Cat. No. PS20AC1-CSL (Clear).
  3. Hubbell Cat. No. HBL1221IL (Clear).

- I. Locking Switch:
  - 1. Leviton Cat. No. 1221-2L.
  - 2. P&S Cat. No. PS20AC1-L.
  - 3. Hubbell Cat. No. HBL1221L.
- J. Color: Color as directed by USPS.

## 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 receptacles, 20Amp, 125Volt, 2 pole, 3 wire, grounding with green hexagonal equipment ground screw.
- C. Duplex Convenience Receptacle:
  - 1. Leviton Cat. No. 5362.
  - 2. P&S Cat. No. 5362.
  - 3. Hubbell Cat. No. HBL5352.
- D. Tamper and weather resistant GFCI Receptacle (Side Wired Feed-Thru):
  - 1. Hubbell Cat. No. GFR5362SG.
- E. Color: As directed by USPS.

## 2.3 WALL PLATES

- A. Provide stainless steel wall plates.
- B. Provide waterproof covers on all exterior receptacles.

## 2.4 RECEPTACLE RACEWAY

- A. Manufacturer: Wiremold.
- B. Raceway Material: Metal with manufacturer's standard materials. Size as indicated on drawings.
- C. Wire: No. 12 AWG minimum
- D. Wiring Devices: Quantity, type as indicated on drawings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Provide 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 NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- F. Connect wiring devices by wrapping conductor 2/3 of screw diameter in clockwise direction around screw terminal. Tighten screw to 12 pound-inches. Do not use spring pressure devices for wire connections.
- G. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- H. Provide plates on switch, receptacle, and blank outlets.

### 3.4 CONSTRUCTION

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

### 3.5 FIELD QUALITY CONTROL

- A. 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. Operate each wall switch with circuit energized and verify proper operation.

### 3.6 ADJUSTING

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

### 3.7 CLEANING

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

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~<sup>7</sup>  
Last revised: ~~9/6/2018~~<sup>9/30/2016</sup>

SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

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.

- 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 Contracting Officer.
  - 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: 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.

- 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. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to USPS Project Manager~~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. Switches:

1. Install in accordance with manufacturers published instructions and NECA SI.
2. Install where indicated on Drawings, where required by equipment, and where required by NFPA 70.
3. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

#### B. Fuses:

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

### 3.3 FIELD QUALITY CONTROL

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

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~  
Last revised: ~~9/5/2018~~3/31/2010

SECTION 2629~~2~~34

VARIABLE SPEED DRIVES

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

~~\*\*REQUIRED PARTS OR ARTICLES ARE INCLUDED IN THIS SECTION. DO NOT REVISE WITHOUT AN APPROVED DEVIATION FROM USPS HEADQUARTERS, FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.~~

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

~~EDIT THIS SECTION BY ADDING AND/OR DELETING TEXT FOR THE SPECIFIC CONDITIONS AND REQUIREMENTS OF THE PROJECT SITE.~~

~~Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location. Drawing Coordination Items listed at end of Section.~~

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Variable Speed Drive System
- 2. High efficiency electric motors

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 250504 – Building Automation System (BAS) General: BAS integration methods.
- 2. Section 260500 – Common Work Results for Electrical: Basic electrical methods.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers (IEEE):

- 1. IEEE 519-1992 - Harmonic Distortion Standard.

B. National Electrical Contractors Association (NECA):

- 1. NECA SI - Standard of Installation.

C. National Electrical Manufacturers Association (NEMA):

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. Product Specifications.
    - b. Descriptive Bulletins
  2. Assurance/Control Submittals:
    - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
    - b. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- B. Section 017704 – Closeout Procedures and Training: Procedures for closeout submittals.
  1. Project Record Documents: Record actual locations, ratings and sizes of variable speed drives.

### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with Manufacturer's recommendations and as specified herein.
- 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 Contracting Officer.
  1. Three of each size and type fuse installed.

## PART 2 - PRODUCTS

\*\*\*\*\*

### NOTE TO SPECIFIER

Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.

\*\*\*\*\*

### 2.1 MANUFACTURERS

- A. Variable Speed Drives and Motors: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  1. ABB, New Berlin WI, (414) 785-8605.
  2. Allen-Bradley, Milwaukee WI, (414) 382-2000.
  3. Cutler-Hammer Eaton Corp., Milwaukee WI, (800) 833-3927.

4. Square D Company, Schneider Electric; (888) 778-2733.
5. MagneTek, La Vergne TN, (800) 624-6383.
6. Reliance Electric, Rockwell Automation, Cleveland OH, (800) 241-2886.

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

## 2.2 VARIABLE SPEED DRIVE EQUIPMENT (VSD):

- A. Drive System shall be compatible with electrical characteristics of motors furnished and rated for operation with equipment furnished.
- B. System shall feature the following minimum operating characteristics:
1. Input ac voltage tolerance of 480V, plus or minus 10 percent.
  2. Input frequency tolerance of 50/60 Hz, plus or minus 6 percent.
  3. Minimum Efficiency: 96 percent at 60 Hz, full load.
  4. Minimum Displacement Primary-Side Power Factor: 96 percent.
  5. Overload Capability: 1.1 times the base load current for 60 seconds; 2.0 times the base load current for 3 seconds.
  6. Starting Torque: 100 percent of rated torque or as indicated.
  7. Speed Regulation: Plus or minus 1 percent.
- C. Isolated control interface to allow controller to follow control signal over an 11:1 speed range.
1. Electrical Signal: 4 to 20 mA at 24 V.
- D. Internal Adjustability Capabilities:
1. Minimum Speed: 5 to 25 percent of maximum rpm.
  2. Maximum Speed: 80 to 100 percent of maximum rpm.
  3. Acceleration: 2 to a minimum of 22 seconds.
  4. Deceleration: 2 to a minimum of 22 seconds.
  5. Current Limit: 50 to a minimum of 110 percent of maximum rating.
- E. Self-Protection and Reliability Features:
1. Input transient protection by means of surge suppressors.
  2. Under- and overvoltage trips; inverter overtemperature, overload, and overcurrent trips.
  3. Motor Overload Relay: Adjustable and capable of NEMA 250, Class 10 performance.
  4. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.
  5. Instantaneous line-to-line and line-to-ground overcurrent trips.
  6. Loss-of-phase protection.
  7. Reverse-phase protection.
  8. Short-circuit protection.
  9. Motor overtemperature fault.
- F. Automatic Reset/Restart: Attempts three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Bidirectional autospeed search shall be capable of starting into rotating loads spinning in either direction and returning motor to set speed in proper direction, without damage to controller, motor, or load.
- G. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped.
- H. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.

- I. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
- J. Minimum 5% line reactor.
- K. The VSD must meet the requirements for Radio Frequency Interference (RFI) above 7 MHz as specified by FCC regulations, part 15, subpart J, Class A devices.
- L. Status Lights: Door-mounted LED indicators shall indicate the following conditions:
  - 1. Power on.
  - 2. Run.
  - 3. Overvoltage.
  - 4. Line fault.
  - 5. Overcurrent.
  - 6. External fault.
- M. Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual speed control potentiometer and elapsed time meter.
- N. Indicating Devices: Digital display and selector switch, mounted flush in controller door and connected to indicate the following controller parameters:
  - 1. Output frequency (Hz).
  - 2. Motor speed (rpm).
  - 3. Motor status (running, stop, fault).
  - 4. Motor current (amperes).
  - 5. Motor torque (percent).
  - 6. Fault or alarming status (code).
  - 7. PID feedback signal (percent).
  - 8. DC-link voltage (VDC).
  - 9. Set-point frequency (Hz).
  - 10. Motor output voltage (V).
- O. Control Signal Interface:
  - 1. Electric Input Signal Interface: A minimum of 2 analog inputs (0 to 10 V or 0/4-20 mA) and 6 programmable digital inputs.
  - 2. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BMS or other control systems:
    - a. 0 to 10-V dc.
    - b. 0-20 or 4-20 mA.
    - c. Potentiometer using up/down digital inputs.
    - d. Fixed frequencies using digital inputs.
    - e. RS485.
    - f. Keypad display for local hand operation.
  - 3. Output Signal Interface:
    - a. A minimum of 2 analog output signal (0/4-20 mA), which can be programmed to any of the following:
      - 1) Output frequency (Hz).
      - 2) Output current (load).
      - 3) DC-link voltage (VDC).
      - 4) Motor torque (percent).
      - 5) Motor speed (rpm).
      - 6) Set-point frequency (Hz).
  - 4. Remote Indication Interface: A minimum of 2 dry circuit relay outputs (120-V ac, 1 A) for remote indication of the following:

- a. Motor running.
- b. Set-point speed reached.
- c. Fault and warning indication (overtemperature or overcurrent).
- d. PID high- or low-speed limits reached.

P. Communications Interface: Provide BACnet compliant MS/TCP interface to be used with an external system within a multidrop LAN configuration. Communication capabilities shall include, but not be limited to; run-stop control, speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, acceleration/deceleration time adjustments, and lock and unlock the keypad. The interface shall allow monitoring of process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature, VSD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the communications interface

\*\*\*\*\*

**NOTE TO SPECIFIER**

~~\*\*The following section must be edited to meet the Job requirements for Bypass.—Consult with USPS~~

\*\*\*\*\*

Q. Manual bypass shall be provided for each VSD. VSD and bypass components shall be mounted inside a common NEMA 1 enclosure, fully pre-wired and ready for installation as a single UL listed device. Bypass shall include the following:

- 1. Input, output, and bypass contactors, to disconnect power to the VSD, when the motor is running in the bypass mode.
- 2. 115 V.A.C. control transformer, with fused primary.
- 3. Thermal overload relay, to protect the motor while operating in the bypass mode.
- 4. Circuit breaker/disconnect switch, with a “through-the-door” handle mechanism.
- 5. Control and safety circuit terminal strip.
- 6. “Drive-Off-Bypass” selector switch.
- 7. Pilot lights for “Power On” and “Fault”.
- 8. “Normal/Test” selector switch, to allow testing and adjustment of the VSD while the motor is running in the bypass mode.

2.3 ENCLOSURES

A. NEMA 1 enclosure

\*\*\*\*\*

**NOTE TO SPECIFIER**

~~\*\*The following section must be edited to meet the project requirements.—Consult with USPS~~

\*\*\*\*\*

2.4 ACCESSORIES

- A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.
- B. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.
- C. Control Relays: Auxiliary and adjustable time-delay relays.
- D. Historical Logging Information and Displays:
  - 1. Real-time clock with current time and date.
  - 2. Running log of total power versus time.

3. Total run time.
  4. Fault log, maintaining last four faults with time and date stamp for each.
- E. Current-Sensing, Phase-Failure Relays for Bypass Controller: Solid-state sensing circuit with isolated output contacts for hard-wired connection; arranged to operate on phase failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage; with adjustable response delay.

## 2.5 HIGH EFFICIENCY DRIVE EQUIPMENT:

- A. Motors shall conform to the latest applicable requirements of NEMA, IEEE, ANSI, NEC and be U.L. listed. Motors shall be designed for continuous duty. Motors shall feature an engraved, stainless steel nameplate listing horsepower, volts, phase, rated and full load amps, model and serial numbers.
- B. All new motors furnished on this project shall be premium efficiency type rated for [ ] volt, [ ] phase.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to ~~USPS Project Manager 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. Variable Speed Drives:
1. Provide a digital, electronic variable speed drive system that is compatible with the equipment to be controlled and suitable for the application.
  2. Provide the services of a factory trained technician to assist in installation, startup and training of Postal Service personnel. Provide filters or other accessories as required to minimize harmonic noise in controlled motors.
  3. Connect new VSD's to operate equipment and be controlled by BAS or other method as specified. BAS Controller shall operate all VSD's according to the sequence of operations. VSD control systems requiring operator to make changes at drive unit are not acceptable.
  4. Connect VSD to BAS using either twisted pair or shielded cable as required for system furnished. Check that RPM/HERTZ and other readings at BAS are equal to readings at VSD panel. Insure that system is properly grounded and all connections are properly torqued to manufacturer's recommendations.
  5. Set minimum speed to allow proper motor cooling and lubrication (normally 20 percent).
  6. Mount VSD (normally on wall) to allow for less than 25 feet of lead length between the drive and motor to prevent voltage reflection. Allow for proper air flow around VSD for cooling and service access. Check for over-voltage by measuring the phase-phase voltage at the motor terminals.

7. Provide line reactors with 3 to 5 percent impedance or use filter device between drive and motor where required to compensate for power fluctuations (surges and drops).
8. Mount drive in location to provide adequate ventilation for heat dissipation. Mount drive in interior locations only and provide adequate ventilation.
9. Coordinate startup and testing with controls contractor. All controls shall be installed and ready to function in accordance with the sequence of operations prior to final testing and training. Adjust controller to update minimum of twice per second.
10. Where multiple pump or fan systems are designed to operate in parallel, adjust VSD to maintain speeds within 20 revolutions per minute of each other when multiple motors are operating.

B. High Efficiency Motors:

1. Provide premium efficiency drive motors that are compatible with digital electronic variable speed drive systems and suitable for the application.
2. Securely mount and connect new motors to new VSD in accordance with manufacturer's recommendations, the National Electrical Code and as noted above. Size wiring as specified and per the NEC. All wiring shall be run in conduit suitable for the application.
3. For three phase motors, verify direction of rotation. Verify proper grounding. Check phase to phase voltage and phase to ground voltage. Report results to the USPS Project Manager Contracting Officer.
4. Torque all connections per manufacturer's recommendations.
5. Provide thermal overloads in starter sized for the application.
6. Check operation of system complies with the sequence of operations.

### 3.3 FIELD QUALITY CONTROL

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

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~<sup>7</sup>  
Last revised: ~~9/6/2018~~<sup>7/1/2010</sup>



SECTION 264100

FACILITY LIGHTNING PROTECTION

\*\*\*\*\*

\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

\*

\*\*\*\*\*

\*

**NOTE TO SPECIFIER**

*A Lightning Protection System is not required on all Mail Processing Facilities. Utilize this Outline Specification for facilities where the lightning risk assessment calculation predicts expected lightning stroke frequency to exceed the tolerable lightning frequency.*

\*\*\*\*\*

\*

**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.

**1.2 REFERENCES**

- A. UL 96 – Lightning Protection Components.

- B. UL96A – Installation Requirements for Lightning Protection Systems.
- C. ANSI/NFPA 780 – Lightning Protection Code.
- D. LPI-175 – Lightning Protection Institute.

### 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.

### 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 and II 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 ground reading megger using two reference rods. If 5-OHMS cannot be attained, drive additional sections until 5-OHMS has been obtained.
- 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.
- C. Installation shall be made in an inconspicuous manner with conductors coursed to conceal equipment as much as possible. Down conductors shall be concealed with structure, and shall be run in 1" PVC conduit. Refer to NFPA 780 (78) 3-12.13.
- D. Where fasteners are to be mounted in masonry or structural work, they shall be furnished to the Masonry or Structural Contractor so they may be installed during construction of the project.
- E. Conductors concealed in steel reinforced concrete shall be installed, bonded, etc. per NFPA 780 (78) 3-18.3 and 3-12.13. Specific attention is brought to the requirements of 3-12.13 requiring down conductors to be connected to reinforced steel at its upper and lower extremities.
- F. Provide proper connections of lightning protection system to all grounded media in and around the protected structure per NFPA 780 (78) 3-23 "Potential Equalization".

- G. Provide proper grounding of all grounding media in, on and around structure to provide common ground potential per NFPA 780 (78) 3-17 including electric service, telephone and antenna system grounds as well as underground metallic piping systems, underground metal conduits, etc.
- H. Underground counterpoise: Bond to underground counterpoise system. Items required to be bonded/connected in "F" and "G" above shall be bonded/connected via ground ring system where available and applicable.
- I. All exposed conductors located 6 ft. or less above finished floor or finished grade is to be suitably protected/shielded as well as other exposed locations where conductor is subject to mechanical damage.
- J. Coordinate and receive approval of all penetrations of roofing system and mounting to roofing system with Designer and Roofing Contractor prior to submittal of shop drawings.
- K. Coordinate and receive approval of all connections to structural steel, rebar, etc. with Structural Engineer prior to submittal of shop drawings.
- L. Submittal of shop drawing by Contractor is evidence that the Contractor has received approval of penetrations, connections, etc., by all parties and that Contractor assumes responsibility for such penetrations, connections, etc.
- M. Locate air terminals as required. Take care to insure that all points are within 2'-0" of outside building edge, outside corners and ridge ends, and that maximum spacing does not exceed 20'-0", and that minimum projection above object protected is 10".
- N. Maintain horizontal or downward coursing of main conductor and insure that all bends have at least an 8" radius and do not exceed 90'.
- O. Support all roof coursing conductors, down leads and bonding cables at 3'-0" on center maximum.
- P. Ground electrodes shall be installed within concrete handholes, in unpaved, accessible areas, but in no instance shall they be less than 1'-0" below grade and 2'-0" from foundation wall. Driven rods shall penetrate earth at least 10'-0". All down conductors shall be bonded to the electrodes utilizing exothermic welds.
- Q. 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.
- R. Bond to metal bodies of conductance located within 6'-0" 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.

### 3.2 FIELD QUALITY CONTROL

- A. 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.
- B. Obtain UL Master Label per UL 96A. Submit copy of paperwork to the [USPS Project Manager Contracting Officer](#) 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

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~  
Last revised: ~~9/6/2018~~/~~31/2016~~

SECTION 264128

SURGE PROTECTIVE DEVICES (SPDS)

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes the materials and installation requirements for surge protective devices (SPD) for the protection of all power and communications circuits. Provide and install materials, labor and auxiliaries required to furnish and install complete surge suppression for the protection of building electrical and electronics systems from the effects of induced transient voltage surge and lightning discharge as indicated on drawings.
  - 1. Provide surge suppression devices for the following equipment:
    - a. Each main electrical service switchboard as indicated for on drawings.
    - b. Distribution and branch panels as indicated for on drawings.
    - c. All electronic communications equipment installed including but not limited to: fire alarm, intrusion, ePACS, CCTV, and paging systems.
  - 2. Provide surge suppression protection on all exterior lighting and communications systems wiring if the "expected lightning stroke frequency" exceeds the "tolerable lightning frequency" of the structure.
- 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 262413 – Switchboards.
  - 3. Section 264100 – Facility Lightning Protection.
  - 4. Section 265600 – Exterior Lighting.
  - 5. Section 275117 – Video Intercom and Exterior Gate Control System.
  - 6. Section 281304 – Enterprise Physical Access Control System
  - 7. Section 282305 – Integrated Security and Investigative Platform (ISIP) CCTV System.
  - 8. Section 283100 – Fire Emergency Voice/Detection and Alarm Communication System (EVACS).
  - 9. Section 337173 – Electrical Utility Services.

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, Third Edition, effective September 29, 2009 – Surge Protective Devices

### 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](http://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 3rd 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 (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- E. The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

## 1.5 DELIVERY, STORAGE AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following.
  - 1. 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
- 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 3rd Edition Listed. Provide unit with the following features and accessories:
  - 1. LED indicator lights for power and protection status.
  - 2. Audible alarm, with silencing switch, to indicate when protection has failed.
  - 3. One set of dry contacts rated at 5.0 amperes, 240 volts ac, for remote monitoring of protection status.
- C. Short Circuit Current Rating: SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
- D. SPD Type: SPD shall be UL labeled as Type 1 (verifiable at UL.com), intended for use without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- E. In Rating: SPD shall be UL labeled with 20kA Inominal (I-n) (verifiable at UL.com) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.
- F. SPD shall provide surge current diversion paths for all modes of protection; L-N, L-G, N-G, and L-L in WYE systems, and L-L, L-G in DELTA Systems.
- G. Minimum Single Impulse Surge Current Capability (single pulse rated) per phase shall be.
  - 1. Single Impulse Surge Current Capacity is to be 300 kA.
- H. Connection Means: Permanently wired via internal 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 3rd Edition Voltage Protection Rating for grounded WYE circuits with voltages of 480Y/277, 3-phase, 4-wire shall be as follows:

VOLTAGE	L-N	L-G	N-G
208Y/120V	700V	700V	700V
480Y/277V	1500V	1500V	1500V

- J. Install devices 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 3rd Edition Listed. Provide unit with the following features and accessories:
  - 1. LED indicator lights for power and protection status.
- C. Short Circuit Current Rating: SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
- D. SPD Type: SPD shall be UL labeled as Type 1 (verifiable at UL.com), intended for use without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- E. In Rating: SPD shall be UL labeled with 20kA Inominal (I-n) (verifiable at UL.com).
- F. SPD shall provide surge current diversion paths for all modes of protection; L-N, L-G, N-G, and L-L in WYE systems, and L-L, L-G in DELTA Systems.
- G. Minimum Single Impulse Surge Current Capability (single pulse rated) per phase shall be.
  - 1. Single Impulse Surge Current Capacity is to be 150 kA.
- H. Connection Means: Permanently wired via internal 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 3rd Edition Voltage Protection Rating for grounded WYE circuits with voltages of 480Y/277, 3-phase, 4-wire shall be as follows:

VOLTAGE	L-N	L-G	N-G
208Y/120V	700V	700V	700V
480Y/277V	1500V	1500V	1500V

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

2.4 FIRE ALARM AND SECURITY SYSTEM SURGE PROTECTIVE DEVICES (SPDS)

- A. Power Surge Protection
1. SPD shall be listed or recognized in accordance with UL 1449 Third Edition verifiable by visiting UL.com.
  2. SPD shall provide surge current L-N or L-G mode of protection.
  3. SPD shall be chase.
  4. Every mode of protection, shall be protected by internal overcurrent and thermal overtemperature controls.
  5. SPD shall meet or exceed the following criteria:
    - a. Minimum surge current capability (single pulse rated) per phase shall be:
      - 1) 120/240 Panel Application 50kA per phase
    - b. UL 1449 3rd Edition listed Voltage Protection Ratings for shall not exceed the following:
 

VOLTAGE	L-N/L-G	MCOV
120V or 240/120V	600V	150V
  6. SPD shall have a warranty for a period of two years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

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

- C. Video 75 ohm coaxial cable
1. Solid state, silicon avalanche diode circuitry for non-interrupting overvoltage protection of RG-59/U coaxial cable. Unit shall be provided with one female input connector for "F" series male connector, one output RG-59/U coax cable terminated with an "F" series male cable end connector and A #16 stranded, 18 inch long grounding wire on output end of unit or similar arrangement. Securely mount adjacent to protection equipment and ground to equipment or local building ground if an equipment ground is not available.
    - a. Normal Operating Characteristics
      - 1) Voltage .....5.8V max
      - 2) Current.....500ma max
      - 3) Frequency.....DC to 10 Mhz
      - 4) Insertion Loss.....3.5db @ 4Mhz
    - b. Protection Requirements
      - 1) Transient suppression level.....7.5v Voltage Protection Level
      - 2) Transient response.....<5 nanoseconds
      - 3) Operating temp.....-20o C to +50o C
      - 4) Energy dissipation.....15,000 watts (10X1000 Test Wave)

PART 3 - EXECUTION

3.1 EXAMINATION

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

- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to ~~USPS Project Manager~~~~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. The installation shall meet the following criteria:
  1. Install per manufacturer's recommendations and contract documents.
  2. Install units plumb, level and rigid without distortion.
  3. One primary suppressor shall be installed external to the service entrance in accordance with manufacturer instructions.
  4. Service Entrance SPD shall be installed on the load side of the main service disconnect.
  5. Service Entrance SPD ground shall be bonded to the service entrance ground.
  6. At Service Entrance, a UL approved disconnect switch shall be provided as a means of servicing if a 60A breaker is not available.
  7. One SPD shall be installed external to each designated distribution panelboard.
  8. At Distribution and Branch, SPD shall have an independent means of disconnect such that the protected panel remains energized. A 30A breaker (or larger) may serve this function.
  9. SPD shall be installed per manufacturer's installation instructions with lead lengths as short (less than 24") and straight as possible. Gently twist conductors together.
  10. Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers per NEC.

### 3.3 ADJUSTMENTS AND CLEANING

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

### 3.4 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

USPS Mail Processing Facility Specification issued: 10/1/2018~~7~~  
Last revised: ~~3/23/2017~~9/5/2018

SECTION 265100

INTERIOR LIGHTING  
(LED-SOLID STATE)

Formatted: Space After: 0 pt

**NOTE TO SPECIFIER**

*The USPS has implemented the use of solid-state, LED interior luminaires to minimize the operating cost for each facility. Utilize Use this Specification Section for all newly constructed or totally renovated Mail Processing Facilities only. This Specification is intended as a guide to the Architect/Engineer preparing the Construction Documents.*

*Text in [brackets] indicates a choice must be made. Brackets with [ ] indicates information may be inserted at that location.*

**NOTE TO SPECIFIER**

**\*\*REQUIRED PARTS OR ARTICLES ARE INCLUDED IN THIS SECTION. DO NOT REVISE THIS SECTION WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  1. Interior luminaires and accessories.
  2. Emergency lighting units.
  3. Exit signs.
  4. Ballast/Light emitting diode (LED) drivers.
  5. Lamps.
  6. Luminaire accessories.
- B. Substitutions:
  1. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not allowed.
- C. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- D. Related Sections:
  1. Section 260500 - Common Work Results for Electrical: Basic electrical methods.
  2. Section 260623 - Lighting Control Devices.

1.2 REFERENCES

- A. As specified in Section 260500 - Common Work Results for ElectricalAmerican National Standards Institute (ANSI):
  1. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.
  2. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.
- B. Illuminating Engineering Society (IES):

Formatted: Space After: 0 pt, Tab stops: 7", Right

265100 - 1

1. IES LM-79 - (2008) Electrical and Photometric Measurements of Solid-State Lighting Products.
2. IES LM-80 - (2015) Measuring Lumen Maintenance of LED Light Sources.
3. IES TM-21 - (2011; Addendum B 2015) Projecting Long Term Lumen Maintenance of LED Light Sources.

C. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code.
2. NFPA 101 - Life Safety Code.

~~B-D.~~ National Electrical Manufacturers Association (NEMA):

1. NEMA ANSILG C78.377 – (2017) Electric Lamps— Specifications for the Chromaticity of Solid State Lighting Products~~WD 6— Wiring Devices- Dimensional Requirements.~~
2. NEMA SSL 1 – (2010) Electronic Drivers for Led Devices, Arrays, or Systems.
3. NEMA SSL 3 - (2011) High-Power White LED Binning for General Illumination.

**Formatted:** 4, Outline numbered + Level: 4 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 0.6" + Tab after: 1" + Indent at: 1"

**Formatted:** 4, Outline numbered + Level: 4 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 0.6" + Tab after: 1" + Indent at: 1"

~~C.~~ National Fire Protection Association (NFPA):

1. NFPA 70 – National Electrical Code.
2. NFPA 101 – Life Safety Code.

~~D.~~ Building Codes:

1. International Building Codes
2. National Electrical Code
3. State and Local Codes (where applicable)

E. Federal Communications Commission Parts 18.305, 18.307 (EMI RFI).

F. American Society of Heating, Refrigerating and Air Conditioning, Inc.

1. ANSI/ ASHRAE/ IES Standard 90.1—2010.

G. Underwriters Laboratories (UL)

1. UL 1472 – (2015) UL Standard for Safety Solid-State Dimming Controls.
2. UL 1598 – (2008; Reprint Oct 2012) Luminaires.
3. UL 844 – (2012; Reprint Mar 2016) UL Standard for Safety Luminaires for Use in Hazardous (Classified) Locations.
4. UL 8750 – (2015; Reprint Feb 2018) UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products.
5. UL 924 – (2016; Reprint Nov 2017) UL Standard for Safety Emergency Lighting and Power Equipment.

1.3 SUBMITTALS

A. As specified in Section 260433500 - Submittals Procedures: Procedures for submittals~~Common Work Results for Electrical.~~

1. Product Data: ; Submit catalog cuts, drawings, descriptive matter and lighting performance characteristics as required to completely define the materials and construction details employed, finishes applied, dimensions, hinging, latching and relamping provisions, and electrical characteristics~~Provide dimensions, ratings, and performance data for each luminaire specified.~~
2. Assurance/Control Submittals:
  - a. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

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

1. Operation and Maintenance Data: Submit manufacturer's operation and maintenance instructions for each type of luminaire.

**Formatted:** Space After: 0 pt, Tab stops: 7", Right

1.4 DEFINITIONS

- A. For LED luminaire light sources, "Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions. This is also known as 70 percent "Rated Lumen Maintenance Life" as defined in IES LM-80.
- B. For LED luminaires, "Luminaire Efficacy" (LE) is the appropriate measure of energy efficiency, measured in lumens/watt. This is gathered from LM-79 data for the luminaire, in which absolute photometry is used to measure the lumen output of the luminaire as one entity, not the source separately and then the source and housing together.
- C. Total harmonic distortion (THD) is the root mean square (RMS) of all the harmonic components divided by the total fundamental current.

1.4.1.5 QUALITY ASSURANCE

- A. As specified in section 260500 – Common Work Results for Electrical, Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- B. Products shall be tested, approved and labeled/listed by Underwriters Laboratories, Inc., or by a nationally recognized testing laboratory (NRTL). Regulatory Requirements:
  - 1. Conform to requirements of NFPA 70.
  - 2. Conform to requirements of NFPA 101.
  - 3. Products: Listed and classified by Underwriters Laboratories Incorporated as suitable for the purpose specified and indicated.
- C. Electrical equipment and materials shall be new and within one year of manufacture, complying with the latest codes and standards. Re-built, refurbished and/or re-manufactured electrical equipment and materials shall not be furnished on this project.

1.5.1.6 MAINTENANCE

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to ~~Contracting Officer through~~ the USPS Project Manager.
  - 1. Two of each luminaire lens type.
  - 2. Each component type: Provide quantity for each unique ballast/driver, and lamp equal to 2 percent of luminaire total, but not less than two of each type.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
**\*\*REQUIRED PART (PRODUCTS) FOLLOWS. DO NOT REVISE THIS PART, EXCEPT AS NOTED BELOW, WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.**  
 \*\*\*\*\*

Formatted: Space After: 0 pt, Tab stops: 7", Right

PART 2 - PRODUCTS

2.1 LUMINAIRE MANUFACTURERS

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

1. ~~Alphabet Lighting, Tustin, CA (714) 259-9959.~~
- ~~2. Beghelli, Miramar, FL (954) 442-6600.~~
- ~~2. Canlet/Canplas Industries Ltd., Denver, CO (303) 373-1918.~~
3. Chloride Systems, Burgaw, NC (910) 259-1000.
- ~~4. Columbia Lighting, Greenville, SC (864) 678-1000.~~
- 4.5. Cooper Lighting (Halo, Invue, Lumark, McGraw-Edison, Metalux, Portfolio, Sure-Lites), Peachtree City, GA (770)486-4800.
- ~~6. Compass Lighting Products, Greenville, SC (866) 313-3909.~~
- ~~5.7. Day-Brite, Tupelo, MS (662) 842-7212.~~
- ~~6.8. Dual-Lite, Cheshire, CT (203) 699-2000.~~
- ~~7.9. Edison-Price Lighting, Long Island City, NY (718) 685-0700.~~
- ~~8.10. Elcast Lighting, Addison, IL (630) 543-5390.~~
- ~~9. Fostoria Process Equipment, Chicago, IL (800) 495-4525.~~
- ~~10.11. Gardco Lighting, San Leandro, CA (800) 227-0758.~~
- ~~12. GE Lighting Systems, Charlotte, NC (803) 462-2016.~~
- ~~14.13. Gotham Lighting, Conyers, GA (800) 315-4982.~~
- ~~12.14. Guth Lighting, St. Louis, MO (314) 533-3200.~~
- ~~13.15. H.E. Williams, Carthage, MO (417) 358-4065.~~
- ~~14.16. Holophane, Newark, OH (740) 345-9631.~~
- ~~15.17. Hubbell Lighting, Inc., (Columbia, Spaulding, Sterner) Spartanburg, SC (864) 599-6000.~~
- ~~16.18. Indy Lighting, Fishers, IN (317) 849-1233.~~
- ~~17.19. Intense Lighting LLC, Anaheim, CA (800) 691-5321.~~
- ~~18.20. Kenall Manufacturing, Gurnee, IL (847) 360-8200.~~
- ~~19.21. Kirlin Lighting, Detroit, MI (313) 259-6400.~~
- ~~20.22. Kramer Lighting, Sturtevant, WI (800) 236-6800.~~
- ~~24.23. Kurt Versen Company, Westwood, NJ (201) 664-8200.~~
- ~~24. Kurtzon Lighting, Chicago, IL (773) 277-2121.~~
- ~~22.25. LaMar Lighting, Farming Dale, NY (631) 777-7700.~~
- ~~23. LightAlarms (Thomas & Betts) Montreal, ON (888) 552-6467.~~
- ~~24.26. Lighting Alternatives, Cherry Hill, NJ (877)847-1102.~~
- ~~25.27. Lithonia Lighting, Conyers, GA (770) 922-9000.~~
- ~~26.28. LSI Industries, Cincinnati, OH (513) 793-3200.~~
- ~~27.29. Lumaux Industries Lighting Inc., AltoonaSacramento, PCA (81477) 89445-2537552.~~
- ~~28. Nulite, Denver, CO (303) 287-9646.~~
- ~~29.30. Omega Lighting, Tupelo, MS (800) 234-1890.~~
- ~~30. Optimum Lighting, Henderson, NC (800) 541-9082.~~
31. Pheonix Products, Milwaukee, WI (414) 438-1200.
32. Prescolite Lighting, Spartanburg, SC (864) 599-6000.
33. Prudential Lighting, Los Angeles, CA (213) 746-0360.
34. Vista Lighting, Tupelo, MS (662) 690-4105.
35. Zumtobel Staff, Highland, NY (800) 448-4131.

\*\*\*\*\*  
**NOTE TO SPECIFIER**

*Edit for location and Luminaire Schedule.*  
\*\*\*\*\*

265100 - 4

USPS MPFS

Date: 10/1/2018

INTERIOR LIGHTING  
(LED-SOLID STATE) INTERIOR LIGHTING

Formatted: Space After: 0 pt, Tab stops: 7", Right

2.2 LUMINAIRE TYPES

NOTE TO SPECIFIER

In areas where the mounting heights do not exceed 10 ft. A.F.F., integral battery units are to be added within select fluorescent luminaires to provide the required emergency/lighting levels; self-contained battery luminaires are not to be used for this application. The following luminaire types do not contain the necessary part numbers for integral battery packs. Contact the manufacturer to identify part numbers for the battery backup version of the same luminaire.

NOTE TO SPECIFIER

The Department of Energy recently issued new energy standards effective January 26, 2018 which will prohibit the use of "full output", 4 ft., 32Watt/T8 lamps. Therefore, interior, linear, fluorescent luminaires shall utilize reduced wattage, 28W lamps. Utilize 32Watt, 3000 lumen lamps in areas where the temperature will fall below 65 degrees F.

- A. Type A1 Lithonia #2BLT4-XXX-ADP-EZ1-LP840SP8G Series.
1. Description: Recessed, 2 ft. W x 4 ft. L x 34 in. D LED fluorescent grid type troffer with side reflectors and dropped acrylic center lens non-air handling.
2. Lens: Prismatic High performance extruded acrylic diffuser with curved linear prisms, A-12 pattern, 0.125 inches thick, 100 percent UV stabilized.
3. Housing: a. 22 gauge steel body, flush steel door with mitered corners. b. Frame and housing finished with baked white enamel or powder coated finish.
4. Ballast/Driver: LED high efficiency - 30W and 3000 Lumen, 34W at 4000 Lumen, 45W at 4800 Lumen or 53W at 6000 Lumen. Wattage based on lumen package selected. For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
5. Mounting: a. Recessed in Inverted T suspended ceiling. b. Recessed in gypsum board ceiling; provide flanged frame-in kit.
6. Lamps: 3000 Lumen, 4000 Lumen, 4800 Lumen or 6000 Lumen LED array; 4000K rated 60,000 hours at LLD = 0.8 Two, three or four T8 as specified in the Lamps section below.
7. Marking: Luminaires are to be labeled on the interior reflector side with lumen amp and ballast type package used.
8. Alternate Manufacturers: a. Columbia #LCAT24-40-XXXX-G-ED-UH-E-Williams 50GS24 Series. b. Metalux #24RTC-XX-UNV-L840-CD-UGC8 Series. c. As listed in paragraph 2.1A.

Formatted: Font: Bold

Formatted: USPS5

Formatted: USPS5

- B. Type A2 Lithonia #2BLT2-XXX-ADP-EZ1-LP840SP8F Series.
1. Description: Recessed, 2 ft. W x 24 ft. L x 34 in. D or 2 ft. W x 4 ft. L x 4 in. D fluorescent flanged LED type troffer with side reflectors and dropped acrylic center lens, non-air handling.
2. Lens: Prismatic High performance extruded acrylic diffuser with curved linear prism, A-12 pattern, 0.125 inches thick, 100 percent UV stabilized.
3. Housing: a. 22 gauge steel body, flush steel door with mitered corners. b. Frame and housing finished with baked white enamel or powder coated finish.
4. Ballast/Driver: LED high efficiency - 20W at 2000 Lumen, 30W at 3300 Lumen or 39W at 4000 Lumen. Wattage based on lumen package selected. For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
5. Mounting: a. Recessed in inverted T suspended ceiling. b. Recessed in a gypsum board ceiling. Provide frame-in kit or plaster frame.
6. Lamps: 2000 Lumen, 3300 Lumen or 4000 Lumen LED array; 4000K rated 60,000 hours at LLD = 0.8 Two, three or four T8 as specified in the Lamps section below.

Formatted: Font: Bold

Formatted: 5

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: Space After: 0 pt, Tab stops: 7", Right



7. Marking: Luminaires are to be labeled on the interireflector side with lamp and ballast type lumen package used.
8. Alternate Manufacturers:
  - a. Columbia #LCAT22-40-XXXX-G-ED-UH.E-Williams 50FS24 Series.
  - b. Metalux #22RTC-XX-UNV-L840-CD-UFC8 Series.
  - c. As listed in paragraph 2.1A.

C. **Type A3** Lithonia SP8G-Series#BLT4-XXX-ADP-EZ-LP840.

1. Description: Recessed, 1 ft. W x 4 ft. L x 34 in. D fluorescent grid LED type troffer with side reflectors and dropped acrylic center lens, non-air handling.
2. Lens: Prismatic High performance extruded acrylic diffuser with curved linear prism, A-12 pattern, 0.125 inches thick, 100 percent UV stabilized.
3. Housing:
  - a. 22 gauge steel body, flush steel door with mitered corners.
  - b. Frame and housing finished with baked white enamel or powder coated finish.
4. Ballast/Driver: LED high efficiency – 20W at 2000 Lumen, 30W at 3300 Lumen or 39W at 4000 Lumen. Wattage based on lumen package selected For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
5. Mounting:
  - a. Recessed in inverted T suspended ceiling.
  - b. Recessed in a gypsum board. Provide frame-in kit or plaster frame.
6. Lamps: 2000 Lumen, 3000 Lumen, 4000 Lumen, 4800 Lumen or 6000 Lumen LED array: 4000K rated 60,000 hours at LLD = 0.8 One or two T8 as specified in the Lamps section below.
7. Marking: Luminaires are to be labeled on the interireflector side with lamp and ballast type lumen package used.
8. Alternate Manufacturers:
  - a. Columbia #LCAT14-40-XXXX-G-ED-UH.E-Williams 50G14 Series.
  - b. Metalux #14RTC-XX-UNV-L840-CD-UGC8 Series.
  - c. As listed in paragraph 2.1A.

**Formatted:** Font: Bold

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** 5, Indent: Left: 0", First line: 0"

**Formatted:** Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** 5

D. **Type A4** Lithonia SP8F Series.

1. Description: Recessed 1 ft. W x 4 ft. L x 4 in. D fluorescent flanged troffer with acrylic lens, non-air handling.
2. Lens: Prismatic acrylic, A-12 pattern, 0.125 inches thick, 100 percent UV stabilized.
3. Housing: 22 gauge steel, flush steel door with mitered corners, white baked enamel or powder coated finish.
4. Ballast: For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
5. Mounting: Recessed in gypsum board ceiling. Provide frame-in kit or plaster frame.
6. Lamps: One or Two T8 as specified in the Lamps section below.
7. Marking: Luminaires are to be labeled on the reflector side with lamp and ballast type used.
8. Alternate Manufacturers:
  - a. Metalux FC8 Series.
  - b. H.E. Williams 50F14 Series.
  - c. As listed in paragraph 2.1A.

E.D. **Type A5** Lithonia #STL4-XXX-EZ1-LP840AW232 Series.

1. Description: 102 in. W x 4 ft. L x 43.25 in. D fluorescent wraparoundsurface volumetric LED luminaire, non-air handling.
2. Refractor/Lens: Impact modified, linear – faceted refractor with diffusing film injection-molded prismatic acrylic, A-12 pattern, 0.187 inches thick, 100 percent UV stabilized.
3. Housing:
  - a. 20 gauge steel body with die-cast end caps mitered corners.
  - b. Housing: White baked enamel or powder coated finish.

**Formatted:** Font: Bold

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** 5, Indent: Left: 0"

**Formatted:** Space After: 0 pt, Tab stops: 7", Right

4. Ballast/Driver: LED high efficiency – 20W at 2000 Lumen, 27W at 3000 Lumen, 35W at 4000 Lumen or 45W at 6000 Lumen. Wattage based on lumen package selected For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
5. Mounting: Surface ceiling mounted.
6. Lamps: 2000 Lumen, 3000 Lumen, 4000 Lumen or 6000 Lumen LED array; 4000K rated 60,000 hours at LLD = 0.9 Two T8 as specified in the Lamps section below.
7. Marking: Luminaires are to be labeled on the interreflector side with lamp and ballast type lumen package used.
8. Alternate Manufacturers:
  - a. Columbia #LAW4-40-XX-ED-UH.E. Williams 224 Series.
  - b. Metalux #2WSN-LD4-XXXX-F-UNV-L840-CD1-UWB1 Series.
  - c. As listed in paragraph 2.1A.

**F.E. Type A6** Lithonia #STL4-XXX-EZ1-LP840 Metalux #CRX32 Series.

1. Description: 56 in. W x 4 ft. L x 4 3/8 in. D fluorescent wrap around surface volumetric LED luminaire, non-air handling.
2. Refractor/Lens: Prismatic impact modified, linear – faceted refractor with diffusing film, acrylic, A-12 pattern, 0.125 inches thick, 100 percent UV stabilized.
3. Housing:
  - a. 20 gauge steel with die-cast end caps mitered corners.
  - b. Housing: White polyester baked enamel or powder coated finish.
4. Ballast/Driver: LED high efficiency – 19W at 2000 Lumen, 28W at 3000 Lumen or 40W at 4000 Lumen. Wattage based on lumen package selected For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
5. Mounting: Surface ceiling mounted.
6. Lamps: 2000 Lumen, 3000 Lumen or 4000 Lumen LED array; 4000K rated 60,000 hours at LLD = 0.9 One or Two T8 as specified in the Lamps section below.
7. Marking: Luminaires are to be labeled on the interreflector side with lamp and ballast type lumen package used.
8. Alternate Manufacturers:
  - a. Metalux #4SWLED-LD4-XXXX-UNV-CD1-U.H.E. Williams 204 Series.
  - b. Columbia #CWM4-40-XX-SM-FR-FA-ED-U.LSI Industries #TSW5X32 Series.
  - c. Prudential #5100T804WA Series.
  - d. Lithonia #CB Series.
  - e-c. As listed in paragraph 2.1A.

Formatted: Font: Bold

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: 5, Indent: Left: 0"

**G.F. Type B1** Kenall #ES848-XXX40K-2H-PPLithonia DMS-ARDP Series.

1. Description: 8 in. x 4 ft. long enclosed and gasketed industrial fluorescent LED luminaire. UL listed for damp location.
2. Lens: UV-stabilized, pearlescent, polycarbonate, smooth exterior and linear prism interior, 0.125 inches thick Deep high impact acrylic diffuser.
3. Housing:
  - a. 20 gauge -sSteel housing.
  - b. White polyester powder coated.
4. Ballast/Driver: LED high efficiency – 49W at 5000 Lumen, 73W at 7000 Lumen or 97W at 9000 Lumen. Wattage based on lumen package selected For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
5. Mounting: Surface ceiling or pendant mounted.
6. Lamps: 5000 Lumen, 7000 Lumen or 9000 Lumen LED array; 4000K rated 80,000 hours at LLD = 0.7 (5000L & 7000L), 60,000 hours at LLD = 0.7 (9000L) One, two or three T8 as specified in the Lamps section below.
7. Marking: Luminaires are to be labeled on the interreflector side with lamp and ballast type lumen package used.
8. Alternate Manufacturers:
  - a. Kennall #ES848/232 Series Fail-Safe #HVSL8-4-LD4-X-XXX-40-UNV-0-EDD-X.

Formatted: Font: Bold

Formatted: Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: 5

Formatted: Space After: 0 pt, Tab stops: 7", Right

- b. Kurtzon #FP-FPD-1-40-X/LEDR-840-UNV,Nulite-DM Series.
- c. As listed in paragraph 2.1A.

**H.G. Type B2** Kenall #ES896-XXX40K-2H-PPLithonia DMST-ARDP Series.

1. Description: 8 in. x 48 ft. long enclosed and gasketed industrial fluorescentLED luminaire. UL listed for damp location.
2. Lens: UV-stabilized, pearlescent, polycarbonate, smooth exterior and linear prismatic interior, 0.125 inches thickDeep high-impact-acrylic diffuser.
3. Housing:
  - a. 20 Gauge sSteel housing.
  - b. White polyester powder coated.
4. Ballast/Driver: LED high efficiency – (2) 49W at 5000 Lumen each, (2) 73W at 7000 Lumen each or (2) 97W at 9000 Lumen each. Wattage based on lumen package selectedFor requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
5. Mounting: Surface ceiling or pendant mounted.
6. Lamps: (2) 5000 Lumen, (2) 7000 Lumen or (2) 9000 Lumen LED arrays; 4000K rated 80,000 hours at LLD = 0.7 (5000L & 7000L), 60,000 hours at LLD = 0.7 (9000L)Two or four T8 as specified in the Lamps section below.
7. Marking: Luminaires are to be labeled on the interireflector side with lamp and ballast typelumen package used.
8. Alternate Manufacturers:
  - a. Fail-Safe #HVSL8-8-LD4-X-XXX-40-UNV-0-EDD-XKennall #ES896/232 Series.
  - b. Nulite-DM-8 Series
  - e.b. As listed in paragraph 2.1A.

**Formatted:** Font: Bold

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**NOTE TO SPECIFIER**

*Utilize luminaire "B3" within unattended stairways to comply with ASHRAE 90.1 – 2010, 9.4.1.6.g.*

**H.H. Type B3** Lithonia #WL2-18L-EZ1-LP840-NES7/N80.

1. Description: 2 ft. long enclosed and gasketed industrial fluorescent luminaire. UL listed for damp location.
2. Refractor/Lens: High-impact modified, clear-ribbed, polycarbonate linear-faceted refractor with diffusing film.
3. Housing:
  - a. 20 ga. steel housing with die-cast aluminum end caps.
  - b. White polyester powder coated finish.
4. Ballast/Driver: 18 Watt, 1800 Lumen-LED array.
5. Mounting: Surface wall or ceiling.
6. Lamp: 1800 Lumen, 4000K, LED array; 60,000 Hrs. at LLD = 0.9.
7. Luminaire shall be equipped with integral occupancy sensor to control 50% high light output.
8. Alternate Manufacturers:
  - a. Metalux #2SWLED-LD4-XXXX-LW-UNV-L840-CD1-U.
  - b. Columbia #CWM2-40-MW-SM-FR-FA-ED-U-OW.
  - c. Columbia #ESL2-40-MW-FA-W-ED-U-NXOS.
  - a.d. As listed in paragraph 2.1A.

**Formatted:** Font: Bold

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** 5, Indent: Left: 0"

**J.I. Type CL1** Lithonia #ZLIN-L48-XXXX-FST-40KC Series.

1. Description; 4 ft. - 0 in. long, fluorescent-lampLED strip luminaire with protective lens/diffuser tube guards around lamps.
2. Lens: Snap on frosted, diffused lensNone.
3. Housing:
  - a. 20 gauge cold rolled steel housing with punched knockouts for mounting.
  - b. End plates shall be die-formed heavy gauge rolled steel with punched knockouts for through wiring.
  - c. White baked enamel finish with a minimum 90 percent reflectance.

**Formatted:** Font: Bold

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** 5, Indent: Left: 0"

**Formatted:** Space After: 0 pt, Tab stops: 7", Right

4. Ballast/Driver: LED high efficiency – 25W at 3000 Lumen, 34W at 5000 Lumen or 52W at 7000 Lumen. Wattage based on lumen package selectedFor requirements refer to Ballast section below and for quantities, and circuitry refer to drawings.
5. Mounting:
  - a. Surface mounted to the underside of the ceiling. Attach luminaire to ceiling grid by means of a gripper hanger which attaches to any standard ceiling grid system.
  - b. For spaces without ceiling, suspend from structure with all-thread rods to required height.
  - c. Electrical Contractor to determine quantity of hangers required for either method.
6. Lamps: 3000 Lumen, 5000 Lumen or 7000 Lumen LED arrays; 4000K rated 60,000 hours at LLD = 0.7One or two T8 as specified in the Lamps section below.
7. Marking: Luminaires are to be labeled on the interiorreflector side with lamp and ballast typelumen package used.
8. Alternate Manufacturers:
  - a. Lumax Industries #CNLED-XXL-4K-48-9-FAFH.E-Williams 76 Series.
  - b. Metalux #4SNLED-LD5-XXX-LW-UNV-L840-CD1-USS Series.
  - c. As listed in paragraph 2.1A.

**K-J. Type CL2** Lithonia #ZLIN-L24-XXXX-FST-40K-C Series.

1. Description: 23 ft. long, fluorescent-LED strip luminaire with protective lens/diffuser tube guards around lamps.
2. Lens: Snap on frosted, diffused lensNone.
3. Housing:
  - a. 20 gauge cold rolled steel housing with punched knockouts for mounting.
  - b. End plates shall be die-formed heavy gauge rolled steel with punched knockouts for through wiring.
  - c. White baked enamel finisher powder-coated with a minimum 90 percent reflectance.
4. Ballast/Driver: LED high efficiency – 15W at 1500 Lumen, 19W at 2500 Lumen or 31W at 3500 Lumen. Wattage based on lumen package selectedFor requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
5. Mounting:
  - a. Surface mounted to the underside of the ceiling. Attach luminaire to ceiling grid by means of a gripper hanger which attaches to any standard ceiling grid system.
  - b. For spaces without ceiling, suspend from structure with all-thread rods to required height.
  - c. Electrical Contractor to determine quantity of hangers required for either method.
6. Lamps: 1500 Lumen, 2500 Lumen or 3500 Lumen LED arrays; 4000K rated 60,000 hours at LLD = 0.7Two or four T8 as specified in the Lamps section below.
7. Marking: Luminaires are to be labeled on the interiorreflector side with lamp and ballast typelumen package used.
8. Alternate Manufacturers:
  - a. Lumax Industries #CNLED-XXL-4K-24-9-FAFH.E-Williams 76 Series.
  - b. Metalux #2SNLED-LD5-XXX-LW-UNV-L840-CD1-USS Series.
  - c. As listed in paragraph 2.1A.

Formatted: Font: Bold

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: 5, Indent: Left: 0"

**K. Type CL3** Lithonia #TZLIN-L96-XXXX-FST-40K Series.

1. Description: 8 ft. long, LED strip luminaire with protective lens/diffuser.
2. Lens: Snap on frosted, diffused lens.
3. Housing:
  - a. 20 gauge cold rolled steel housing with punched knockouts for mounting.
  - b. End plates shall be die-formed heavy gauge rolled steel with punched knockouts for through wiring.
  - c. White baked enamel finish with a minimum 90 percent reflectance.
4. Ballast/Driver: LED high efficiency – 48W at 6000 Lumen, 68W at 10,000 Lumen or 104W at 14,000 Lumen. Wattage based on lumen packages selected.
5. Mounting:
  - a. Surface mounted to the underside of the ceiling. Attach luminaire to ceiling grid by means of a gripper hanger which attaches to any standard ceiling grid system.

Formatted: Font: Bold

Formatted: Space After: 0 pt, Tab stops: 7", Right

- b. For spaces without ceiling, suspend from structure with all-thread rods to required height.
- c. Electrical Contractor to determine quantity of hangers required for either method.
- 6. Lamps: 6000 Lumen, 10,000 Lumen or 14,000 Lumen LED arrays, 4000K rated 60,000 hours at LLD=0.7.
- 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
- 8. Alternate Manufacturers:
  - a. Metalux #8TSNLED-LD5-XXX-LW-UNV-L840-CD1-U.
  - b. Lumax #CNLED-XXXL-4K-96-9-FAF.
  - c. As listed in paragraph 2.1A.

**NOTE TO SPECIFIER**

*The lumen output and quantity of the unit mounted lamps or unit mounted lighting heads supplied with battery luminaires EM1, EM2, EM3 and EM4 shall be chosen to comply with the footcandle lighting intensities required by NFPA 101.*

- L. **Type EM1** Lithonia #ELSQM-2L/LEX/N Series.
  - 1. Description: Ceiling mounted semi-recessed 10.5 inch square decorative halogen emergency light unit with nickel-cadmium battery. Provide with line latching, solid-state voltage limiting charger, solid-state switching, low voltage disconnect, brownout circuit, overload, short-circuit protection test switch and power indicator light.
  - 2. Lens: Lexan lens.
  - 3. Housing: Black thermoplastic body, UL924 listed, all components meet the UL 94-0.5VA flame retardant standard.
  - 4. Mounting: Provide with manufacturer rough-in kit for semi-recessed installation.
  - 5. Voltage: [277] [120]
  - 6. Lamps: 20W Tungsten Halogen (included)
  - 7. Alternate Manufacturers:
    - a. Sure-Lites USF1 Series.
    - b. As listed in paragraph 2.1A.
  
- M. **Type EM2** Lithonia #ELM2-LED-SD Series.
  - 1. Description: Compact contemporary design LED emergency lighting unit with adjustable heads and nickel-cadmium battery. Provide with line latching, solid-state voltage limiting charger, solid-state switching, low voltage disconnect, brownout circuit, overload, short-circuit protection test switch and power indicator light.
  - 2. Battery: Sealed, maintenance free Nickel-Cadmium, 3.6 volt.
  - 3. Housing: White thermoplastic body, UL924 listed, all components meet the UL 94-0.5VA flame retardant standard.
  - 4. Mounting: Wall mounted.
  - 5. Voltage: [277] [120]
  - 6. Lamps: 2 @ 1.5 Watt/3.6 Volt. (included).
  - 7. Alternate Manufacturers:
    - a. ~~Beghelli #XLPLED-HO Series.~~
    - b. ~~Isolite #RL2LED-2-WH-SD Dual-Lite #LZ20 Series.~~
    - c. ~~Lightalarms #LCA-2LEDR Series.~~
    - d. ~~Compass #CU2SD.~~
    - e. ~~As listed in paragraph 2.1A.~~
  
- N. **Type EM3** Lithonia #ELT36 Series.
  - 1. Description: Industrial design halogen emergency lighting unit with adjustable heads and nickel-cadmium battery. Provide with line latching, solid-state voltage limiting charger, solid-state switching, low voltage disconnect, brownout circuit, overload, short-circuit protection test switch and power indicator light.
  - 2. Battery: Sealed, maintenance free Nickel-Cadmium, 12 volt, with 36 Watt capacity.

Formatted: Font: Bold

Formatted: Font: Bold

Formatted: Font: Bold

Formatted: Space After: 0 pt, Tab stops: 7", Right

3. Housing: 18-gauge steel housing finished in instrument tan color, with hinged faceplate for ease of maintenance. UL924 listed, all components meet the UL 94-0.5VA flame retardant standard.
4. Mounting: Wall mounted.
5. Voltage: [277] [120].
6. Lamps: 12W Halogen (included).
7. Alternate Manufacturers:
  - a. Beghelli #EST12V-42 Series.
  - b. Dual-Lite #LM36N-12V Series.
  - c. Lightalarms #P12N2 Series.
  - d. Chloride #2N25-J212 Series.
  - e. Isolite #ELL12-NC42-2-H12W.
  - e-f. As listed in paragraph 2.1A.

O. **Type EM4** (exterior egress doors) Lithonia #AFN-~~XXW~~-EXT-FWD/LED Series.

1. Description: Wall Mounted UL wet location ~~Xenon-LED~~ emergency lighting unit
2. ~~Ballast/DriverLamping: LED high efficiency – 11W at 900 Lumen LED (forward throw)Sealed Beam 6 Watt Xenon.~~
3. Housing: UL listed wet location (NEMA 4X) heavy-duty polycarbonate sealed, gasketed, and corrosion resistant. Finish by ~~contracting officer through~~ the USPS Project Manager.
4. Battery: Nickel-Cadmium, with self-diagnostics. Listed for cold weather (-0 degrees to 122 degrees F), wet locations.
5. Mounting: Surface wall.
6. Voltage: [277] [120].
7. Lamps: ~~11W at 900 Lumen LED arrayTwo 6 Watt Xenon.~~
8. Alternate Manufacturers:
  - a. Isolite #ELED-EM-XX-CD-1,Sure-Lites: AELI-Series
  - a-b. Compass #CUWZ-HTR-PC.
  - b-c. As listed in paragraph 2.1A.

Formatted: Font: Bold

**NOTE TO SPECIFIER**

*Wall or column mounted platform task lights (dock lights) should be selected for all platforms. This cord connected luminaire is to be provided with a dedicated receptacle. At enclosed platforms the "dock light" receptacle shall be controlled by dock door limit switch: door open - receptacle energized; door closed - receptacle de-energized. Twist-timers wired upstream of the "dock light receptacle" shall be provided at open docks*

P. **Type P1** D.L. Manufacturing Versa-Light Model #450.

1. Description: Flexible/Rotatable, shock and vibration resistant "LED" dock light with protective lamp shield.
2. Power Supply: Solid state, fan cooled, integral transformer with integral switch and cord connection.
3. Housing and Arm: Welded steel housing with stainless steel flexible tube.
4. Mounting: Wall mounted.
5. Voltage: 120 Volt with 15 Amp, 120 Volt plug and cord.
6. Lamp: 57 Watt, 3000K, 85,000 hrs LED array.
7. Alternate Manufacturers:
  - a. Phoenix #DLP-FLEX-LED.
  - b. APS Resource - FT Ultra LED.
  - c. Substitutions permitted.

Formatted: Font: Bold

Q. **Type R1** Gotham #EVO40/100-4WR-MD-MVOLT-~~SF~~ Series.

1. Description: Recessed 4.5 inch dia. aperture LED downlight.
2. Reflector: Low brightness, white painted, ~~self-flanged~~less reflector.
3. Ballast/Driver: 13 Watt/1000 Lumen LED light engine with remote phosphor technology; 5-year factory warranty.

Formatted: Font: Bold

Formatted: Space After: 0 pt, Tab stops: 7", Right

4. **Housing/Mounting Frame:**
  - a. Frame to be 18 gauge galvanized steel ring.
  - b. Mounting ring shall be secured to grid ceiling bar hangers (supplied with luminaire).
  - c. **NOTE:**—Luminaire frame to be supported from the structure by at least two opposing corners.
5. Junction Box:
  - a. Junction box to be code approved for through wiring.
  - b. Junction box to be secured to the mounting ring and accessible from two sides.
  - c. Junction box to be pre-wired and accessible per code through the ceiling trim opening.
6. Mounting:
  - a. 24 inch grid ceiling bar hangers shall be supplied by manufacturer and securely fastened to grid.
  - b. Provide 28 inch 'C' channel mounting bars and flange kit for drywall ceilings.
7. Voltage: [277] [120].
8. Lamp: 1000 Lumen at 13W, 4000K, remote phosphor enclosed LED array; 60,000 hours at LLD = 0.7.
9. Alternate Manufacturers:
  - a. Intense Lighting #RP4/IC430 Series.
  - b. Portfolio #LD4B109D010-EURM4B-120-80-40-4LBM-XX-1-MW-Series.
  - c. Alphabet #NU4-RD-SW-13LM-40K-80-WH80-NL-XXX-DM10-WH-WH.
  - e-d. As listed in paragraph 2.1A.

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: 5, Indent: Left: 0"

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: 5, Indent: Left: 0"

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

R. **Type R2** Gotham #EVOWW-40/10-4WR-LD-MVOLT-SF Series.

1. Description: Recessed 4.5 inch dia. aperture LED wall washer type downlight.
2. Reflector: Low brightness, white painted, self-flanged less reflector.
3. Ballast/Driver: 13 Watt/1000 Lumen LED light engine with remote phosphor technology; 5-year factory warranty.
4. **Housing/Mounting Frame:**
  - a. Frame to be 18 gauge galvanized steel ring.
  - b. Mounting ring shall be secured to ceiling bar hangers (supplied with luminaire).
  - c. **NOTE:**—Luminaire frame to be supported from the structure by at least two opposing corners.
5. Junction Box:
  - a. Junction box to be code approved for through wiring.
  - b. Junction box to be secured to the mounting ring and accessible from two sides.
  - c. Junction box to be pre-wired and accessible per code through the ceiling trim opening.
6. Mounting:
  - a. 24 inch grid ceiling bar hangers shall be supplied by manufacturer and securely fastened to grid.
  - b. Provide 28 inch "C" channel mounting bars and flange kit for drywall ceiling.
7. Voltage: [277] [120].
8. Lamp: 1000 Lumen at 13W, 4000K, remote phosphor enclosed LED array; 60,000 hours at LLD = 0.7.
9. Alternate Manufacturers:
  - a. Intense Lighting #RP4/IC435 Series.
  - b. Portfolio #LD4B109D010-EURM4B-1020-80-40-4LBSW-XX-1-XX-Series.
  - c. Alphabet #NU4-RW-SW-13LM-40K-80-WW-XXX-DM10-WH-WH.
  - e-d. As listed in paragraph 2.1A.

Formatted: Font: Bold

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: 5, Indent: Left: 0"

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: 5, Indent: Left: 0"

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

S. **Type R3** Lithonia Lighting 2AVG/MDC Series.

1. Description: Recessed, 2 feet x 4 feet x 5.5 inches, fluorescent grid troffer with indirect louver.
2. Louver: Indirect, white metal diffuser, round holes with large center slots constructed of aluminum. Louver shall be held by internal spring catches and center itself in the housing when it is snapped in.
3. Housing: 22 gauge steel, with white baked enamel or powder coated finish.

Formatted: Space After: 0 pt, Tab stops: 7", Right

- 4. ~~Ballast: For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.~~
- 5. ~~Mounting: Recessed in inverted T suspended ceiling.~~
- 6. ~~Lamps: Two or three T8 as specified in the Lamps section below.~~
- 7. ~~Marking: Luminaires are to be labeled on the reflector side with lamp and ballast type used.~~
- 8. ~~Alternate Manufacturers:~~
  - a. ~~H.E. Williams DIGS24 Series.~~
  - b. ~~Metalux 2RDI-SL5 Series.~~
  - c. ~~As listed in paragraph 2.1A.~~

- ~~T. Type R4 Lithonia AVG/MDC series.~~
- 1. ~~Description: Recessed 1 foot x 4 feet x 5.5 inches, fluorescent grid troffer with indirect louver.~~
  - 2. ~~Louver: Indirect, white metal diffuser, round holes with large center slots constructed of aluminum. Louver shall be held by internal spring catches and center itself in the housing when it is snapped in.~~
  - 3. ~~Housing: 22 gauge steel with white baked enamel finish or powder coated finish. Housing shall be prepared in a three step process of cleaning, degreasing and washing prior to painting.~~
  - 4. ~~Ballast: For requirements refer to Ballast section below and for quantities, ballast factor, and circuitry refer to drawings.~~
  - 5. ~~Mounting: Recessed in inverted T suspended ceiling.~~
  - 6. ~~Lamps: One or two T8 as specified in the Lamps section below.~~
  - 7. ~~Marking: Luminaires are to be labeled on the reflector side with lamp and ballast type used.~~
  - 8. ~~Alternate Manufacturers:~~
    - a. ~~H.E. Williams DIGS14 Series.~~
    - b. ~~Metalux 2RDI-SLS Series.~~
    - c. ~~As listed in paragraph 2.1A.~~

- U.S. Type R5 Gotham #EVO40/15-6WR-MD-MVOLT-SF Series.
- 1. Description: Recessed 6 inch dia. aperture LED downlight.
  - 2. Reflector: Low brightness white painted, self-flanged~~less~~ reflector.
  - 3. Ballast/Driver: 19 Watt/1500 Lumen LED light engine with remote phosphor technology; 5-year factory warranty.
  - 4. Housing~~Mounting Frame~~:
    - a. Frame to be 18 gauge galvanized steel ring.
    - b. Mounting ring shall be secured to grid ceiling bar hangers (supplied with luminaire).
    - c. NOTE: Luminaire frame to be supported from the structure by at least two opposing corners.
  - 5. Junction Box:
    - a. Junction box to be code approved for through wiring.
    - b. Junction box to be secured to the mounting ring and accessible from two sides.
    - c. Junction box to be pre-wired and accessible per code through the ceiling trim opening.
  - 6. Mounting:
    - a. 24 inch grid ceiling bar hangers shall be supplied by manufacturer and securely fastened to grid ~~of~~.
    - b. Provide 28 inch 'C' channel mounting bars and flange kit for drywall ceilings.
  - 7. Voltage: [277] [120].
  - 8. Lamp: 1500 Lumen at 19W, 4000K, remote phosphor enclosed LED array; 60,000 hours at LLD = 0.7.
  - 9. Alternate Manufacturers:
    - a. Intense Lighting #RP6/IC630 Series.
    - b. Portfolio #LD6B15D010-EURM6B-1020-80-40-6LB-M-1-MW-Series.
    - c. Alphabet #NU6-RD-SW-20LM-40K-80-WH75-NL-XXX-DM10-WH-WH.
    - e-d. As listed in paragraph 2.1A.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
 \*\*\*\*\*

265100 - 13

**Formatted:** Font: Bold

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** 5, Indent: Left: 0"

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** 5, Indent: Left: 0"

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** Space After: 0 pt, Tab stops: 7", Right



*Under cabinet lighting is required for several casework units provided within "Retail". The luminaires are furnished by the casework supplier to be mounted and powered by the Contractor. Therefore, include under cabinet luminaires UC1 and UC2 only for existing damaged under cabinet lighting requiring replacement.*

**V.T. Type UC 1** Lithonia ~~N2S#UCLD-24IN-40K-WH~~ Series.

1. Description: ~~2 ft. long, u~~nder cabinet mounted ~~2'-long, single fluorescent lamp~~**LED** luminaire, with ~~solid front. Tandem-wired~~**swivel head.**
2. Housing:
  - a. ~~Low profile extruded aluminum housing~~**20 gauge cold-rolled steel.**
  - b. ~~White polyester powder coat finish with 92% overall reflectance.~~
3. Lens: Clear acrylic prismatic ~~serrated~~ diffuser shall snap into place without tools.
4. Ballast/Driver: ~~For requirements refer to Ballast section below and for quantities, ballast factor, and circuitry refer to drawings.~~
  - a. ~~LED high efficiency – 13W at 740 Lumen.~~
  - b. ~~Electrical contractor shall inter-link wire the lamp sockets to an adjacent UC 2 luminaire using factory connector (when applicable).~~
5. Lamp: ~~740 Lumen LED array; 4000K, 50,000 hours at LLD=0.7~~**One T8 as specified in the Lamps section below.**
6. Marking: Luminaires are to be labeled on the reflector side with lamp and ballast type used.
7. Alternate Manufacturers:
  - a. ~~HALO-Trac #HU1024D940P-HU105H.E. Williams 2SF Series.~~
  - b. ~~Metalux-OFCL Series.~~
  - e.b. ~~As listed in paragraph 2.1A.~~

**Formatted:** Font: Bold

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** 5, Indent: Left: 0"

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**W.U. Type UC 2** Lithonia ~~N2S#UCLD-18IN-40K-WH~~ Series.

1. Description: ~~18 inc. long, u~~nder cabinet mounted ~~3'-long, single fluorescent lamp~~**LED** luminaire, with ~~solid front. Tandem-wired~~**swivel head.**
2. Housing:
  - c. ~~Low profile extruded aluminum housing~~**20 gauge cold-rolled steel.**
  - a. ~~White polyester powder coat finish with 92% overall reflectance.~~
3. Lens: Clear acrylic prismatic ~~serrated~~ diffuser shall snap into place without tools.
4. Ballast/Driver: ~~For requirements refer to Ballast section below and for quantities, ballast factor, and circuitry refer to drawings.~~
4. ~~Ballast to operate this luminaire and an adjacent UC 1 luminaire where applicable. Individual lead-lengths shall not exceed 18 feet.~~
  - a. ~~LED high efficiency – 13W at 740 Lumen.~~
  - b. ~~Electrical contractor shall inter-link to an adjacent UC 2 luminaire using factory connector (when applicable).~~
5. Lamp: ~~600 Lumen LED array; 4000K, 50,000 hours at LLD=0.7~~**One T8 as specified in the Lamps section below.**
6. Marking: Luminaires are to be labeled on the reflector side with lamp and ballast type used.
7. Alternate Manufacturers:
  - a. ~~HALO-Trac #HU1018D940P-HU105H.E. Williams 2SF Series.~~
  - b. ~~Metalux-OFCL Series.~~
  - e.b. ~~As listed in paragraph 2.1A.~~

**Formatted:** Font: Bold

**Formatted:** 5, Indent: Left: 0"

**Formatted:** 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

**Formatted:** Outline numbered + Level: 4 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 0.6" + Tab after: 1" + Indent at: 1"

**Formatted:** USPS5

**NOTE TO SPECIFIER**

*Standard preferred lamps are 28W, 2600 lumens but lower lumen, reduced wattage lamps may be used in combination with ballast factor to achieve optimum efficiency at the lowest installed/operating cost and still meet required light levels.*

**X.V. Type W1** Lithonia ~~TAF10TZLID-L96-SMR-XXXX-FST-40K~~ Series.

1. Description: Cable/chain ~~or pendant~~ hung, 8 ft. long ~~tandem, industrial LED, strip light~~**fluorescent** luminaire, providing 10 percent uplighting with locking lamp holders and protective wireguards.

**Formatted:** Font: Bold

**Formatted:** Space After: 0 pt, Tab stops: 7", Right

2. ~~Lens/ers: 8 ft. long, symmetrical reflector with uplight and drop lens #ZLR-L96-SYM-UPL-WHNone.~~
3. ~~Housing:~~
  - a. ~~Channel and end plates of formed steel, 20 gauge material thickness.~~
  - b. ~~Reflector and housing finished with 90% minimum reflectance, shall be white baked enamel with 90% minimum reflectance or powder coated.~~
4. ~~Ballast/Driver: 60W at 6000 Lumen, 81W at 10,000 Lumen or 121W at 14,000 Lumen. Wattage based on lumen package selected. For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.~~
5. ~~Mounting: Wire rope/chain from ceiling structure.~~
6. ~~Lamps: 6000 Lumen, 10,000 Lumen or 14,000 Lumen LED array; 4000K, 50,000 hours at LLD=0.7 Four T8 as specified in the Lamps section below.~~
7. ~~Marking: Luminaires are to be labeled on the interior reflector side with lamp and ballast type lumen package used.~~
8. ~~Switching: See electrical drawings.~~
- 9.8. ~~Alternate Manufacturers:~~
  - a. ~~Mercury #LW4-8-XXXX-40K-HTA-SRAMetalux-8TDIM Series.~~
  - b. ~~Lumax #CHLEDR-XXXL-4K-96-9.H.E.Williams "828" Series.~~
  - c. ~~As listed in paragraph 2.1A.Lighting Alternatives "TURT8" Series.~~
  - d. ~~Holophane "ICS08" Series.~~

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: 5, Indent: Left: 0"

**Y.W. Type W2** Lithonia ~~AF10#ZLID-L48SMR-XXXX-FST-40K~~ Series.

1. ~~Description: Cable/chain or pendant hung, 4 ft. long single, industrial LED strip light fluorescent luminaire, providing 10 percent uplighting with locking lamp holders and protective wireguards.~~
2. ~~Lens/er: 4 ft. long, symmetrical reflector with uplight and drop lens #ZLR-L48-SYM-UPL-WHNone.~~
3. ~~Housing:~~
  - a. ~~Channel and end plates of formed 20 gauge steel.~~
  - b. ~~Reflector and housing shall be finished with 90% minimum reflectance white baked enamel or powder coated finish with 90% minimum reflectance.~~
4. ~~Ballast/Driver: 30W at 3000 Lumen, 41W at 5000 Lumen or 59W at 7000 Lumen. Wattage based on lumen package selected. For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.~~
5. ~~Mounting: Wire rope/chain from ceiling structure.~~
6. ~~Lamps: 3000 Lumen, 5000 Lumen or 7000 Lumen LED array; 4000K, 50,000 hours at LLD=0.7 One or two T8 as specified in the Lamps section below.~~
7. ~~Marking: Luminaires are to be labeled on the interior reflector side with lamp and ballast type lumen package used.~~
8. ~~Switching: See electrical drawings.~~
- 9.8. ~~Alternate Manufacturers:~~
  - a. ~~Mercury #LW4-4-XXXX-40K-HTA-SRAMetalux-DIM Series.~~
  - b. ~~Lumax #CHLEDR-XXXL-4K-48-9.H.E.Williams "824" Series.~~
  - c. ~~As listed in paragraph 2.1A.Lighting Alternatives "TURT8" Series.~~
  - d. ~~Holophane "ICS04" Series.~~

Formatted: Font: Bold

Formatted: 5, Outline numbered + Level: 5 + Numbering Style: a, b, c, ... + Start at: 1 + Alignment: Left + Aligned at: 1" + Tab after: 1.4" + Indent at: 1.4"

Formatted: 5, Indent: Left: 0"

**X. Type W3** Lithonia #TMSL-XXXX-L/LV-40K-80CRI-WH Series.

1. ~~Description: Cable/chain or pendant hung, 8 ft. long, enclosed and gasketed, LED low bay luminaire, U.L. listed for damp locations.~~
2. ~~Lens: 8 ft. long, enclosed and gasketed diffused acrylic.~~
3. ~~Housing:~~
  - a. ~~Full body housing and optical assembly of formed steel, 20 gauge material thickness.~~
  - b. ~~Housing shall be high gloss, white baked enamel with 90% minimum reflectance.~~
  - c. ~~Reflector: Internal, anodized, MIRO 5 high reflectance aluminum.~~
4. ~~Ballast/Driver: 58W at 8000 Lumen, 149W at 16,000 Lumen or 181W at 20,000 Lumen. Wattage based on lumen packages selected.~~
5. ~~Mounting: Wire rope/chain or pendant from ceiling structure.~~

Formatted: Font: Bold

Formatted: Space After: 0 pt, Tab stops: 7", Right

- 6. Lamps: 8000 Lumen, 16,000 Lumen or 20,000 Lumen LED array; 4000K, 60,000 hours at LLD=0.94.
- 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
- 8. Alternate Manufacturers:
  - a. Metalux #8ILED-LD5-XX-W-FL/UPL.
  - b. As listed in paragraph 2.1A.

Y. **Type W4** Lithonia #MSL-XXXX-L/LV-40K-80CRI-WH Series.

Formatted: Font: Bold

- 1. Description: Cable/chain or pendant hung, 4 ft. long, enclosed and gasketed, LED low bay luminaire. U.L. listed for damp locations.
- 2. Lens: 4 ft. long, enclosed and gasketed diffused acrylic
- 3. Housing:
  - a. Full body housing and optical assembly of formed steel, 20 gauge material thickness.
  - b. Housing shall be high gloss, white baked enamel with 90% minimum reflectance.
  - c. Reflector: Internal, anodized, MIRO 5 high reflectance aluminum.
- 4. Ballast/Driver: 29W at 4000 Lumen, 75W at 8000 Lumen or 86W at 10,000 Lumen. Wattage based on lumen packages selected.
- 5. Mounting: Wire rope/chain or pendant from ceiling structure.
- 6. Lamps: 4000 Lumen, 8000 Lumen or 10,000 Lumen LED array; 4000K, 60,000 hours at LLD=0.94.
- 7. Marking: Luminaires are to be labeled on the interior side with lumen package used.
- 8. Alternate Manufacturers:
  - a. Metalux #4ILED-LD5-XX-W-FL/UPL.
  - b. As listed in paragraph 2.1A.

Z. **Type W6** Lithonia #BG-XXXX-SEF-PFL-WD-40K-80CRI-DWH"FGB" Series.

Formatted: Font: Bold

- 1. Description: Cable/chain or pendant hung 12 in. x 24 ft. (nominal) long, high bay, industrial fluorescent LED luminaire with wide beam distribution, and U.L. listed for damp locations protective wireguards.
- 2. Lens: 2 ft. long, diffused polycarbonate for glare control
- 3. Housing: Impact and corrosion resistant, die formed aluminum (0.40 inches), painted after fabrication with 90% reflectance white or specular aluminum reflector, baked enamel or powder coated finish:
  - a. Full body housing and optical assembly of formed steel, 20 gauge material thickness. Welded, riveted or screwed rigid housing; 20 gauge, cold-rolled steel is an acceptable housing.
  - b. Housing shall be high gloss, white baked enamel with 90% minimum reflectance.
  - c. Reflectors: Injection molded acrylic.
- 4. Ballast/Driver: 54W at 8000 Lumen thru 186W at 30,000 Lumen. Wattage based on lumen package selected. For requirements refer to Ballast section below and for quantities and circuitry refer to drawings.
- 5. Mounting: Ceiling, 20' and above, wire rope/chain or pendant from ceiling structure.
- 6. Lamps: 8000 Lumen thru 30,000 Lumen LED array; 4000K, 60,000 hours at LLD=0.88. Four, six or eight T8 as specified in the Lamps section below.
- 7. Marking: Luminaires are to be labeled on the interior reflector side with lamp and ballast type lumen package used.
- 8. Alternate Manufacturers:
  - a. As listed in paragraph 2.1A. Metalux HB1 Series.
  - b. LaMar Lighting MO Series.
  - c. H.E. Williams "GL" Series.
  - d. Holophane "HB" Series.
  - e. Lithonia "FGB" Series.

AA. **Type XF1** (hazardous location) Hubbell #HLEML-45-30-XX-G-AN Canlet "LED Vapor Proof".

Formatted: Font: Bold

- 1. Description: Vapor tight LED luminaire UL listed for Class I, Div. 2, Groups C, D, hazardous locations.

Formatted: Space After: 0 pt, Tab stops: 7", Right

2. Lens: Heat and impact resistant opal glass globe.
3. Housing: Body and guard of Lexan thermoplastic.
4. Ballast/Driver: LED high efficiency – 20W at 1800 Lumens.
- 4-5. Mounting: Surface, wall or ceiling mounted.
- 5-6. Voltage: [277] [120].
- 6-7. Lamps: 1800 Lumen 20 Watt LED array; 4000K.
- 7-8. Alternate Manufacturer:
  - a. Solar Ray Lighting #HQH1-026-50-PC-U-GRHubbell.
  - b. Solar Ray Lighting #HTJS-020-50Guth.
  - c. As listed in paragraph 2.1A.

**NOTE TO SPECIFIER**

*The exit sign luminaires specified below include a battery. If the Facility is equipped with emergency power delete the battery and connect the luminaire to an emergency circuit as necessary. Modify manufacturer number as necessary.*

- BB. **Type X1** Lithonia #LQM-S-W-3R-120/277-ELN-SD Series.
1. Description: Ceiling or wall mount, single face LED exit sign with canopy. Self powered and with self diagnostics.
  2. Features: Red Letters, White Stencil, White Housing (verify colors with local jurisdiction). Injection molded UL94-5V rated polycarbonate frame and canopy.
  3. Mounting: Ceiling, back or end-mounted.
  4. Battery: Maintenance free sealed Nickel Cadmium with long life, full recharge time of 24 hours max.
  5. Voltage: [277] [120].
  6. Lamps: LED lamp module.
  7. Alternate Manufacturers:
    - a. Sure-Lites #LPX7-X-SD-Series.
    - b. Compass #CERSD.
    - b-c. As listed in paragraph 2.1A.

Formatted: Font: Bold

- CC. **Type X2** Lithonia #LQM-S-W-3R-120/277-ELN-SD Series.
1. Description: Ceiling or end mount, double face LED exit sign with canopy. Self powered and with self diagnostics.
  2. Features: Red Letters, White Stencil, White Housing (verify colors with local jurisdiction). Injection molded UL94-5V rated polycarbonate frame and canopy. Two bottom apertures snap out to emit downlight as required.
  3. Mounting: Ceiling or end-mount.
  4. Battery: Maintenance free sealed nickel-cadmium with long life, full recharge time of 24 hours maximum.
  5. Voltage: [277] [120].
  6. Lamps: LED lamp module.
  7. Alternate Manufacturers:
    - a. Sure-Lites #LPX7-X-SD-Series.
    - b. Compass #CERSD.
    - b-c. As listed in paragraph 2.1A.

Formatted: Font: Bold

2.3 LUMINAIRESELECTRONIC FLUORESCENT LAMP BALLASTS

- A. Provide luminaires as indicated in luminaire schedule and details on project plans. Provide luminaires complete with light sources of quantity, type and wattage indicated. Provide all luminaires of the same type by the same manufacturer. Luminaires must be specifically designed for use with the driver or ballast and light source provided.Manufacturers:;

Formatted: Space After: 0 pt, Tab stops: 7", Right

1. ~~Advance Transformer Company, Rosemont, IL (847) 390-5000.~~
2. ~~General Electric Co., Nela Park, OH (800) 435-2677~~
3. ~~Osram/Sylvania, Danvers, MA (800) 544-4828.~~
4. ~~Universal Lighting Technologies, Nashville, TN (615) 316-5100.~~

**B. LED Luminaires Description:**

1. Install ballast/drivers, LED arrays and specified accessories at the factory. Fluorescent lamp ballasts shall be parallel lamp, high frequency, energy efficient, electronic program start ballasts operating lamps at a frequency above 42 kHz with a minimum power factor of 0.98 for primary lamp. Ballast shall be compatible for operating the lamps indicated. Ballast shall have a minimum ballast factor for primary lamp of 1.15. The lamp crest factor shall measure 1.7 or less. Ballasts shall meet or exceed all EMI and RFI standards of the Federal Communications Commission (FCC) regulations Part 18 (including 15J). Ballasts shall be UL labeled and comply with all local, State and Federal efficiency standards. Lamp and ballast combinations shall be chosen to provide a minimum efficacy of 94 LMS/Watt.
2. Luminaires must have a minimum 5 year manufacturer's warranty.
3. Luminaires must have a minimum L70 lumen maintenance value of 50,000 hours as calculated by IES TM-21, with data obtained per IES LM-80 requirements.
4. Luminaire drive current value must be identical to that provided by test data for luminaire in question.
5. Luminaires must be listed with the DesignLights Consortium 'Qualified Products List' when falling into category of "General Application" luminaires. i.e. Interior Directional, Display Case, Troffer, Linear Ambient, or Low/High Bay. Requirements are shown in the Designlights Consortium "Technical Requirements Table" at <https://data.energystar.gov/dataset/EPA-Recognized-Laboratories-For-Lighting-Products/jgwf-7qrr>.
6. Provide Department of Energy 'Lighting Facts' label for each luminaire.

**Formatted:** Outline numbered + Level: 4 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 0.6" + Tab after: 1" + Indent at: 1"

**NOTE TO SPECIFIER**

R&A Projects may require several ballast factor and lamp types due to the existing construction. Therefore, substitute the paragraph below in place of paragraph 2.3 B.1. for R&A projects. Delete paragraph for new construction.

1. Fluorescent lamp ballasts shall be parallel lamp, high frequency, energy efficient, electronic program start ballasts operating lamps at a frequency above 42 kHz with a minimum power factor of 0.98 for primary lamp. Ballast shall be compatible for operating the lamps indicated. Ballast shall have a minimum ballast factor for primary lamp of 0.71. The lamp crest factor shall measure 1.7 or less. Ballasts shall meet or exceed all EMI and RFI standards of the Federal Communications Commission (FCC) regulations Part 18 (including 15J). Ballasts shall be UL labeled and comply with all local, State and Federal efficiency standards. Lamp and ballast combinations shall be chosen to provide a minimum efficacy of 84 LMS/Watt.
2. Compact fluorescent ballasts shall be parallel lamp, high frequency, energy efficient, electronic ballasts operating at a frequency above 50 kHz with a minimum power factor of 0.96. Ballast shall have a minimum ballast factor of 0.97. Total harmonic distortion shall range from 5 to 13 percent, depending upon lamp/ballast combination. Compact fluorescent ballasts shall operate 10 to 42 Watt lamps. Ballasts shall be factory tested and meet ANSI 15-C62.41, ANSI C82.1 Class P. Ballasts integrated into flood light or other special application lamps should meet the specifications if available.

**C. Luminaires for hazardous locations: Provide five-year lamp and five-year ballast factory warranties**

1. In addition to requirements stated herein, provide LED luminaires for hazardous locations which conform to UL 844 or which have Factory Mutual certification for the class and division indicated.

**D.** ~~Universal Voltage shall be used when available and cost effective. Otherwise use Voltage 120 or 277 volts as required to match source voltage.~~

**Formatted:** Space After: 0 pt, Tab stops: 7", Right

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
\*\*\*\*\*

*Include paragraph 2.3E below if the lightning risk assessment calculation deems a building lightning protection system is required.*  
\*\*\*\*\*

2.4 LED DRIVERS/LAMPS

- A. NEMA SSL 1, UL 8750. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:
1. Output power (watts) and luminous flux (lumens) as shown in luminaire schedule for each luminaire type to meet minimum luminaire efficacy (LE) value provided:  
General Electric Company, Nela Park, OH (800) 435-2677.
  2. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided:  
Osram/Sylvania, Danvers, MA (800) 544-4828.
  3. Current draw Total Harmonic Distortion (THD) of less than 20 percent:  
Philips Lighting Company, Somerset, NJ (800) 555-0050.
  4. Class A sound rating.
  5. Operable at input voltage of 120-277 volts at 60 hertz.
  6. Minimum 5 year manufacturer's warranty.
  7. RoHS compliant.
  8. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.
  9. UL listed for dry or damp locations typical of interior installations.
  10. LED driver shall tolerate sustained open circuit and short circuit output conditions without damage.
  11. LED driver shall comply with the requirements of the FCC rules and regulations, Title 47 CFR Part 15 Non-Consumer (Class A).
- B. Lamp Types: As specified for luminaire. Refer to Section 016000 for substitutions and product options.
- C. Linear Fluorescent Lamps
1. Color Temperature: 4100K.
  2. Life: F028/841/XP/XL/SS/ECO, 2600 lumen lamp to be rated for a minimum of 84,000 hours based on the lamp operating with a program start ballast on 12-hour cycles.
- D. Reflector Lamp Beam Patterns: ANSI C78.379.
- E. Mercury content: Fluorescent lamps shall contain low mercury and pass the federal Toxic Characteristic Leaching Procedure (TCLP) test and be classified as non-hazardous waste. Lamp must be marked as such (i.e., green tips, green etchings, etc.)

2.5 LIGHT SOURCES

- A. NEMA ANSLG C78.377, NEMA SSL 3. Provide type and wattage as indicated in luminaire schedule on project plans.
- B. LED arrays shall have a correlated color temperature (CCT) of 4000K; minimum color rendering index (CRI) value of 80.
- C. High power, white light output utilizing phosphor conversion (PC) process or mixed system of colored LEDs, typically red, green and blue (RGB).

265100 - 19

USPS MPFS

Date: 10/1/2018

INTERIOR LIGHTING  
(LED-SOLID STATE) INTERIOR LIGHTING

Formatted: Space After: 0 pt, Tab stops: 7", Right

D. Provide light source color consistency by utilizing a binning tolerance within a 4 step McAdam ellipse.

E. Luminaire shall have door frame and lens compatible for use with LED arrays and integral airflow ventilation system.

## 2.6 LED EMERGENCY DRIVERS

A. Provide LED emergency driver with automatic power failure detection, test switch and LED indicator (or combination switch/indicator) located on luminaire exterior and provide self-diagnostic function integral to emergency driver. Integral lead-calcium battery is required to supply a minimum of 90 minutes of emergency power at 1400 Lumens. Driver must be RoHS compliant, rated for installation in plenum-rated spaces and damp locations, and be warranted for a minimum of five years.

## 2.7 LUMINAIRE SUPPORT HARDWARE

A. Wire:

1. ASTM A641/A641M; Galvanized, soft tempered steel, minimum 0.11 inches in diameter, or galvanized, braided steel, minimum 0.08 inches in diameter.

F. Threaded Rods:

1. Threaded steel rods, 3/16 inch diameter, zinc or cadmium coated.

G. Straps:

1. Galvanized steel, one inch by 3/16 inch, conforming to ASTM A653/A653M, with a light commercial zinc coating or ASTM A1008/A1008M with an electrodeposited zinc coating conforming to ASTM B633, Type RS.

## 2.8 EQUIPMENT IDENTIFICATION

A. Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

B. Provide labeled luminaires in accordance with UL 1598 requirements. All luminaires must be clearly marked for operation of specific light sources and ballasts or drivers. Note the following light source characteristics in the format "Use Only \_\_\_\_\_":

1. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.
2. All markings related to light source type must be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when light sources are in place. Ballasts or drivers must have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

## 2.9 FACTORY APPLIED FINISH

A. Provide all luminaires and lighting equipment with factory-applied painting system that as a minimum, meets requirements of NEMA 250 corrosion-resistance test.

## 2.10 RECESS- AND FLUSH-MOUNTED LUMINAIRES

A. Provide access to lamp and ballast from bottom of luminaire. Provide trim [and lenses] for the exposed surface of flush-mounted luminaires as indicated on project drawings and specifications.

265100 - 20

USPS MPFS

Date: 10/1/2018

INTERIOR LIGHTING  
(LED-SOLID STATE) INTERIOR LIGHTING

Formatted: Space After: 0 pt, Tab stops: 7", Right

## 2.11 SUSPENDED LUMINAIRES

- A. Provide hangers capable of supporting twice the combined weight of luminaires supported by hangers. Provide with swivel hangers to ensure a plumb installation. Provide cadmium-plated steel with a swivel ball tapped for the conduit size indicated. Hangers must allow fixtures to swing within an angle of 45 degrees. Brace pendants 4 feet or longer to limit swinging. Single-unit suspended luminaires must have twin-stem hangers. Multiple-unit or continuous row luminaires must have a tubing or stem for wiring at one point and a tubing or rod suspension provided for each unit length of chassis, including one at each end. Provide rods in minimum 0.25 inch diameter.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. As specified in Section 260500 – Common Work Results for Electrical~~Conform to 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 through 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

- A. Electrical installations must conform to IEEE C2, NFPA 70, and to the requirements specified herein. Install luminaires to meet the requirements of ASHRAE 90.1 and ASHRAE 189.1. To encourage consistency and uniformity, install luminaires of the same manufacture and model number when residing in the same facility or building.~~Install suspended luminaires and exit luminaire signs using pendants supported from swivel hangers, as applicable, or wire rope from ceiling structure, as applicable, or in accordance with details shown on drawings.– Provide pendant/wire rope length required to suspend luminaire at indicated height.~~
- B. Luminaires:~~Support grid mounted recessed fluorescent luminaires at each corner using a minimum of four wire hangers of same gauge as ceiling suspension system supported from building structure independent of ceiling framing.~~
1. Set luminaires plumb, square, and level with ceiling and walls, in alignment with adjacent luminaires and secure in accordance with manufacturers' directions and approved drawings. Installation must meet requirements of NFPA 70. Obtain approval of the exact mounting height on the job before commencing installation and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed.
  2. Recessed and semi-recessed luminaires must be independently supported from the building structure by a minimum of four wires, straps or rods per luminaire and located near each corner of the luminaire. Ceiling grid clips are not allowed as an alternative to independently supported luminaires.
  3. Round luminaires or luminaires smaller in size than the ceiling grid must be independently supported from the building structure by a minimum of two wires, straps or rods per luminaire, spaced approximately equidistant around. Do not support luminaires by acoustical tile ceiling panels.

Formatted: Space After: 0 pt, Tab stops: 7", Right

265100 - 21

USPS MPFS

Date: 10/1/2018

INTERIOR LIGHTING  
(LED-SOLID STATE) INTERIOR LIGHTING



a. Where luminaires of sizes less than the ceiling grid are indicated to be centered in the acoustical panel, support each independently and provide at least two 3/4 inch metal channels spanning, and secured to, the ceiling tees for centering and aligning the luminaire. Provide wires, straps, or rods for luminaire support in this section.

C. Suspended Luminaires:

1. Provide suspended luminaires with swivel hangers so that they hang plumb and level. The stem, canopy and luminaire must be capable of 45 degree swing. Pendants, rods, or chains, 4 feet or longer excluding luminaire, must be braced to prevent swaying using three cables at 120 degree separation.
2. Suspended luminaires in continuous rows must have internal wireway systems for end to end wiring and must be properly aligned to provide a straight and continuous row without bends, gaps, light leaks or filler pieces.
3. Match supporting pendants with supported luminaire. Aircraft cable must be stainless steel. Canopies must be finished to match the ceiling and must be low profile unless otherwise shown.
4. Maximum distance between suspension points must be 10 feet or as recommended by the manufacturer, whichever is less.

~~C-D.~~ Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

~~D-E.~~ Install surface mounted luminaires and exit luminaire signs plumb and adjust to align with building lines and with each other. Secure to prevent movement. Mount exit signs to outlet box mounted flush in wall or ceilings. Outlet box for ceiling mounted exit signs: Connect to rigid conduit system.

~~E.~~ Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure.

~~F.~~ Install recessed luminaires to permit removal from below.

~~G-F.~~ Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating. In fire rated ceilings, recessed luminaires must carry 1 hour UL fire rating classification.

~~H-G.~~ Install earthquake clips to secure recessed grid-supported luminaires in place.

~~I-H.~~ Install wall mounted luminaires, emergency lighting units and exit luminaire signs at height as scheduled.

~~J-I.~~ Install accessories furnished with each luminaire.

~~K-J.~~ Bond products and metal accessories to branch circuit equipment grounding conductor.

~~L-K.~~ Install specified light sources~~lamps~~ in each emergency lighting unit, exit luminaire sign, and luminaire.

~~L.~~ Wire exit signs and emergency lighting units ahead of the local switch, to the normal lighting circuit located in the same room or area.

~~M.~~ Luminaire whips shall be steel or aluminum. M/C cable shall be permissible for luminaire whips/connections. Luminaire whips/connections shall be made with a minimum of #12 AWG copper conductors. Equipment grounding conductors shall be provided in all luminaire whips and/or connections.

1. All luminaire whips shall be supported to luminaire support wire/cable with an approved fastener equal to an Erico "KX" flexible conduit hanger or other UL listed supports and fasteners.

~~N.~~ Luminaires are not to be used as a raceway unless stamped for use as raceway by manufacturer. Single luminaire in lay-in ceilings shall not be used for raceway and shall be connected to an outlet box located within six feet (6') of fixture with flexible conduit or luminaire whips.

Formatted: Space After: 0 pt, Tab stops: 7", Right

### 3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.
- C. Final acceptance will be based on measurement of initial lighting levels after required hours of burn in as specified in USPS Mail Processing Facility Design Criteria, not maintained lighting levels.

### 3.4 WARRANTY

- A. Provide a written 5 year on-site replacement warranty for material, luminaire finish, and workmanship. On-site replacement includes transportation, removal, and installation of new products.
  - 1. Include finish warranty to include failure and substantial deterioration such as blistering, cracking, peeling, chalking, or fading.
  - 2. Material warranty must include:
    - a. All drivers.
    - b. Replacement when more than 10 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.
- B. Warranty period must begin on date of beneficial occupancy. Provide the USPS Project Manager with signed warranty certificates prior to final payment.

### 3-43.5 ADJUSTING

- A. Aim and adjust luminaires as directed by ~~Contracting Officer through~~ the USPS Project Manager.
- B. Position exit luminaire sign directional arrows as indicated.

### 3-53.6 CLEANING

- A. Section 017300 - Execution: Cleaning installed work.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.
- F. ~~Relamp luminaires with defective or burned out lamps just prior to Final Acceptance.~~

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018~~7~~  
Last revised: 9/4/2017~~8~~/31/2018

265100 - 23

USPS MPFS

Date: 10/1/2018~~7~~

~~INTERIOR LIGHTING~~  
~~(LED-SOLID STATE) INTERIOR LIGHTING~~

Formatted: Space After: 0 pt, Tab stops: 7", Right

SECTION 265600  
EXTERIOR LIGHTING

\*\*\*\*\*

**NOTE TO SPECIFIER**

Use this Specification Section for Mail Processing Facilities only. This Specification is intended as a guide to the Architect/Engineer preparing the Construction Documents.  
Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

**\*\*REQUIRED PARTS OR ARTICLES ARE INCLUDED IN THIS SECTION. DO NOT REVISE THIS SECTION WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.**

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior luminaires and accessories.
  - 2. Poles.
  - 3. Ballasts/~~Drivers~~.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- C. Related Sections
  - 1. Section 033000 - Cast-in-Place Concrete: Concrete for pole foundation.
  - 2. Section 260500 - Common Work Results for Electrical: Basic electrical methods.
  - 3. Section 260623 - Lighting Control Devices.

1.2 REFERENCES

- A. ~~As referenced in Section 260500 – Common Work Results for Electrical~~American National Standards Institute (ANSI):
  - 1. ~~ANSI C78.379 – Electric Lamps – Incandescent and High-Intensity Discharge Reflector Lamps – Classification of Beam Patterns.~~
  - 2. ~~ANSI C82.4 – Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).~~
- B. Illuminating Engineering Society North America (IESNA):
  - 1. IESNA RP-8 - Recommended Practice for Roadway Lighting.
  - 2. IESNA RP-20 – Recommended Practice for Lighting for Parking Facilities.
  - 3. IESNA RP-33 - Recommended Practice for Lighting for Exterior Environments.
- C. ~~National Fire Protection Association (NFPA):~~
  - 1. ~~NFPA 70 – National Electrical Code.~~
  - 2. ~~NFPA 101 – Life Safety Code.~~
  - 3. ~~State and Local Building Codes (where applicable).~~

~~D.C.~~ Federal Communications Commission Parts 18.305, 18.307 (EMI RFI).

~~E.D.~~ American Society of Heating, Refrigerating and Air Conditioning, Inc.

- 1. ANSI/ ASHRAE/ IES Standard 90.1—~~2010~~.

1.3 SUBMITTALS

A. ~~As specified in Section 260500 – Common Work Results for Electrical. Conform to Section 013300– Submittal Procedures: Procedures for submittals.~~

- 1. Product Data:
  - a. Luminaire dimensions, ratings, and performance data.
  - b. Complete computer data printout of illumination levels based on a 5 ft. by 5 ft. grid pattern.
- 2. Shop Drawings:
  - a. Indicate dimensions and components for each luminaire which is not a standard Product of the manufacturer.
  - b. Indicate illumination levels in accordance with layout and scheduled luminaires indicated on Drawings.

1.4 QUALITY ASSURANCE

~~A. As specified in Section 260500 – Common Work Results for Electrical. Qualifications~~

- ~~1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.~~

Formatted: USPS3

~~B. Regulatory requirements~~

- ~~1. Conform to requirements of NFPA 70 and 101.~~

Formatted: USPS3

~~2.A. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.~~

1.5 DELIVERY, STORAGE, AND HANDLING

A. ~~As specified in Section 260500+6000 – Common Work Results for Electrical. Product Requirements: Transport, Handle, Store, and Protect Products.~~

1.6 MAINTENANCE

- A. Section 017704 – Closeout Procedures and Training: Procedures for closeout submittals.
- B. Extra Products: At completion of installation, deliver to ~~Contracting Officer through~~ the USPS Project Manager.
  - 1. Each component type: Provide quantity for each unique ballast, ~~driver~~, surge protector and ~~LED array lamp~~ equal to two (2) per cent of luminaire total, but not less than two of each type.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
**\*\*REQUIRED PART (PRODUCTS) FOLLOWS. DO NOT REVISE THIS PART, EXCEPT AS NOTED BELOW, WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.**  
\*\*\*\*\*

## PART 2 - PRODUCTS

### 2.1 LUMINAIRE MANUFACTURERS

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

1. ~~Alphabet Lighting, Tustin, CA (714) 259-9959.~~
2. Architectural Landscape Lighting, Santa Ana, CA 92704 (714) 668-1107.
3. Barron Lighting Group (Trace-Lite), Phoenix, AZ 85027 (888) 533-3948.
4. Bronzelite Commercial Landscape Lighting, (800) 273-1569.
5. ~~CGF Design Inc., Morton Grove, IL (847) 815-5079.~~
6. Cooper Lighting (Invue, Lumark, Lumiere, Portfolio, McGraw-Edison, Portfolio), Peachtree City, GA (770)486-4800.
7. ~~Deco Lighting, Commerce, CA (800) 613-3326.~~
8. Gardco/Philips Lighting, San Leandro, CA (800) 227-0758.
9. Gotham Lighting, Conyers, GA (800) 315-4982.
10. Hadco Lighting, Littlestown, PA (717) 359-7131.
11. H.E. Williams, Carthage, MO (417) 358-4065.
12. Holophane, Newark, OH (740) 345-9631.
13. Hydrel Architectural and Landscape Products, Sylmar, CA 91342 (818) 362-9465.
14. Hubbell Lighting, Inc., (KIM, Spaulding,) Spartanburg, SC (864) 599-6000.
15. Intense Lighting, Anaheim, CA (800) 961-5322.
16. Kenall Manufacturing, Gurnee, IL (847) 360-8200.
17. Kim Lighting, City of Industry, CA (626) 968-5666.
18. Kirlin Lighting, Detroit, MI (313) 259-6400.
19. ~~Ligman Lighting USA, Hillsboro, OR (503) 645-0500.~~
20. Lithonia Lighting, Conyers, GA (770) 922-9000.
21. LSI Industries, Cincinnati, OH 513) 793-3200.
22. McPhilben Lighting, San Leandro, CA (510) 357-6900.
23. Pathway Lighting, Old Saybrook, CT (800) 342-0592.
24. Neptun Light Inc., Lake Bluff, IL (888) 735-8330.
25. Quality Lighting, Franklin Park, IL (847) 451-0090.
26. Visionaire Lighting, Rancho Dominguez, CA (310) 512-6480.
27. Wide-Lite, San Marcos, TX (512) 392-5821.

- B. Substitutions:

1. Section 016000 – Product Requirements: Product options and substitutions, substitutions not permitted.

### 2.2 LUMINAIRE TYPES

- A. **Type MH3** (exterior) ~~Lithonia #MRWLED-XX-40K-SRX~~~~Barron Trace-Lite TLED114P~~ Series.
1. Description: 18 inch dia. half cylinder wall mounted full cut-off, solid state, LED luminaire. Lens door is fully gasketed with one-piece solid silicone and UL listed for wet locations.
  2. Lens: ~~Precision molded acrylic 1/8 inch thick tempered glass.~~
  3. Housing: Die-cast single piece aluminum housing. Finish by ~~contracting officer through~~ the USPS Project Manager.
  4. Ballast/Driver: ~~20W @ 2200 Lumen, 29W @ 3000 Lumen, 40W @ 4500 Lumen or 61W @ 6000 Lumen. Wattage based on lumen package selected~~~~Solid-state light engine and driver.~~
  5. Mounting: Surface wall.
  6. Voltage: ~~[277] [120].~~
  7. Lamp: ~~48Watt, 2200-5,000 Lumen, 3000 Lumen, 4500 Lumen or 6000 Lumen LED array, 85cRI, 40,000 hours @ LLC = 0.9.~~
  8. ~~Label~~~~Published-Life: UL listed for wet locations; IP65 rated~~~~50,000-hours-at 70-percent lumen depreciation.~~

Formatted: Font color: Auto

265600 - 3

USPS MPFS

Date: 10/1/2018

EXTERIOR LIGHTING

9. Warranty: Full five (5) year factory replacement warranty (internal components).
10. Alternate Manufacturers:
  - a. Gardco/Philips: #104LED/55LA Series.
  - b. Hubbell: #RDI-50L8 Series.
  - c. Lithonia: #WSRLED-2-700MA-XX-40K-SRX-MVOLT.
  - d. McGraw Edison: #ISC-C02-LED-E1-BL3.
  - e. Barron Trace-Lite #TLED111P Series.
  - d.f. Deco Lighting #D440-LED-XX-40-UNV-D-XX Series.
  - e.g. As listed in paragraph 2.1A.

**NOTE TO SPECIFIER**

*Utilize luminaire PL1 for illumination under dock, platform, carrier and fuel pump service island canopies. Luminaire shall be mounted a minimum of 12'-0" above floor level within Class 1 locations (NEC 511.7).*

- A. **Type PL1** (exterior) Lithonia #DSXCSLED-10C-1000-40K-T5M-MVOLT-SRM-DWH-XD Series.
  1. Description: Low profile, square, full cut-off canopy light U.L. listed for wet locations.
  2. Housing/Lens: Die-cast aluminum housing with tempered, flat glass lens and pressure stabilizing vent.
  3. Ballast/Driver: ~~37-Watt @ 3800 Lumen thru 107W @ 11,000 Lumen. Wattage based on lumen package selected, fully-encased, potted, solid-state driver with integral surge protection.~~
  4. Mounting: ~~[Surface or, wall mounted with recessed outlet box - 7/8 inch profile.]~~ [Surface mounted with surface box - 5 inch profile.]
  5. Lamp: ~~3,80046 Lumen thru 11,000 Lumen, 37-Watt, 80-CRI, 4000K, LED array, 4000K, 60,000 hours; LLD=0.85.~~
  6. Voltage: ~~[277] [120].~~
  7. Label: U.L. listed for wet locations; IP6~~6~~7 rated with 5-year factory warranty.
  8. Alternate manufacturers:
    - a. Philips/GardcoWidelite # M3L-48G2 Series.
    - b. LSI #XSL2 Series (recessed only).
    - c. ~~Deco Lighting #D533-LED-XX-40-UNV-LSI-Industries #CRUS(SM)SC-LED-SS-NW-UE-WHT Series.~~
    - d. ~~McGraw-Edison #CNC-XXX-LED-E1-XX-Series~~ Alternate LED lumen packages conforming to AS503, Module 2A, 5-3-2.6 are permitted.
    - e. ~~McGraw-Edison #LRC-B-XX-7-LED-E1-XXX Series.~~
    - e.f. As listed in paragraph 2.1A.
  
- B. **Type PL2** (exterior) Lumark #XTOR Series.
  1. Description: Slim, low profile, wall mounted, full cut-off LED luminaire. U.L. listed for wet locations.
  2. Housing/Lens: Die-cast aluminum housing with flat glass bottom lens.
  3. Ballast/Driver: ~~12W @ 1400 Lumen, 18-Watt @ 2100 Lumen, 26-W @ 2700 Lumen or 38W at 4200 Lumen. Wattage based on lumen package selected, fully-encased, solid-state driver.~~
  4. Mounting: Surface, wall mounted with recessed outlet box - 4 inch profile.
  5. Lamp: ~~[14600 Lumen, 18-Watt] [21800 Lumen, 2700 Lumen or 4200 Lumen LED array; 4000K, 6 Watt], 65,CRI, 5000K, LED array - 72,000 hours; LLD=0.90.~~
  6. Voltage: ~~[277] [120].~~
  7. Label: U.L. listed for wet locations; 5 year factory warranty.
  8. Alternate manufacturers:
    - a. ~~Hubbell #SGX-XX-4K7-UNV Series.~~
    - a.b. As listed in paragraph 2.1A.
  
- B. **Type PL3** (exterior) Gotham #EVO40-~~XXX-1~~226WRMD Series.
  1. Description: Recessed 6 inch diameter aperture LED downlight.
  2. Reflector: Low brightness white painted, flangeless reflector.

265600 - 4

3. Ballast/Driver: 132-Watt/ @ 112200 Lumen thru 176W @ 17.500 Lumen. Wattage based on lumen package selectedLED light engine with remote phosphor technology; 5-year factory warranty.
  4. Mounting Frame: Frame to be 18 gauge galvanized steel ring. Mounting ring shall be secured to ceiling hangers (supplied with luminaire). NOTE: Luminaire frame to be supported from the structure by at least two opposing corners.
  5. Junction Box: Junction box to be code approved for through wiring. Junction box to be secured to the mounting ring and accessible from two sides. Junction box to be pre-wired and accessible per code through the ceiling trim opening.
  6. Mounting: 28 inch 'C' channel mounting bars and flange kit for drywall ceilings.
  7. Voltage: [277] [120].
  8. Lamp: 112200 Lumen thru 17,500 Lumen LED array; 4000K, ~~remote phosphor enclosed LED array;~~ 60,000 hours at LLD = 0.7.
  9. Label: U.L. listed for damp locations; 5-year factory warranty.
  10. Alternate Manufacturers:
    - a. Portfolio #LD6AXX20D040ERM6-840H20 Series.
    - b. Omega #OM6LED39U-R6LED40KMDWH Series.
    - c. Intense Lighting #RP62000408-27 Series.
    - d. As listed in paragraph 2.1A.
- C. **Type PL4** (exterior) Kenall MR13XEL-PP-XXL-MW-20L40K-DV-FS Series
1. Description: 13 inch dia., low profile, round ~~with vertical eyelid~~, wall mounted, full cut-off LED luminaire. ~~UL listed for wet locations.~~
  2. Reflector: High efficiency, semi-specular aluminum.
  3. Lens: Pearlescent, U.V. stabilized, high impact resistant, virgin injection molded polycarbonate.
  4. Finish: Finish by ~~contracting officer through~~ the USPS Project Manager.
  5. Recessed Housing: 18 gauge, cold rolled steel.
  6. Ballast/Driver: 1320-Watt/ @ 10100 Lumen or 24W @ 2200 Lumen. Wattage based on lumen package selected. LED light engine; 5-year factory warranty.
  7. Mounting: Semi-recessed, wall mounted; A.D.A. compliant.
  8. Voltage: [277] [120].
  9. Lamp: 11900 Lumen or 2200 Lumen, ~~4000K, enclosed~~ LED array; 4000K, 60,000 hours at LLD = 0.7.
  10. Label: U.L. listed for damp locations; 5-year factory warranty.
  11. Alternate manufacturers:
    - a. Cooper/Fail-Safe TR15LED Series.
    - b. KIM WF31CSLED Series.
    - c. CGF Design #G8-6-LED-CT4-UNV-0-10D Series.
    - e-d. As listed in paragraph 2.1A.
- D. **TYPE PL5** Gotham #EVOCYL-40/XX25-6AR-MD-LD-MVOLT-EZ10 Series.
1. Description: Pendant 8 inch dia., aperture LED downlight.
  2. Reflector: Low brightness, matte-diffused, clear specular alzak finish.
  3. Housing: Heavy gauge aluminum cylinder, finished white. Pendant hung on a 24 inch stem with a swivel canopy.
  4. Ballast/Driver: 1230-Watt/ @ 112500 Lumen thru 47W @ 4500 Lumen. Wattage based on lumen package selected. LED light engine with remote phosphor technology; 5-year factory warranty.
  5. Mounting: Pendant or surface mounted, height as indicated by architectural elevations.
  6. Voltage: [277] [120].
  7. Lamp: 1100 Lumen or 25200 Lumen, ~~4000K, enclosed~~ LED array; 4000K, 60,000 hours at LLD = 0.7.
  8. Label: U.L. listed for wet locations; 5-year factory warranty.
  9. Alternate manufacturers:
    - a. Alphabet #608W6XTM19-XXLM-40K-83-DAXX-UNV-DIM10 SeriesH.E. Williams.
    - b. Gotham #EVOCYL-40/25-6AR-MVOLT.
    - e-b. Pathway #C68SLB79V Series.
    - e-c. Kirilin #LSR Series.

265600 - 5

e.d. Portfolio #LSR6B Series.  
f.e. As listed in paragraph 2.1A.

- E. **Type SB1** Kim #VRB1-LED-20L-ED54K-UV-XX Series.
1. Description: 6 in. x 42 in. high aluminum domed top round LED bollard with flared cone.
  2. Reflector: Anodized aluminum upper reflector with spun anodized aluminum flared cone
  3. Housing: extruded, one piece aluminum, 0.156 inch wall thickness. Top cover is a weldment of 0.125 inch wall extrusion and 0.25 inch top plate. ~~Top cover seals to housing with closed cell EPDM gasketing.~~ Finish by ~~contracting officer through~~ the USPS Project Manager.
  4. Ballast/Driver: ~~254 Watt @ 10300~~ Lumen, LED light engine; ~~5-year factory warranty.~~
  5. Mounting: Four ½ in. x 11 in. anchor bolts with double nuts and washers, included.
  6. Voltage: [277]
  7. Lamp: ~~10300~~ Lumen, ~~5000K, enclosed~~ LED array; ~~4000K~~ 60,000 hours at LLD = 0.7.
  8. Label: U.L. listed for wet locations; ~~5-year factory warranty.~~
  9. Alternate Manufacturers:
    - a. ~~Visionaire #OWK-2/42-COG-20-7-4K-UNV-AB~~
    - b. ~~Gardco/Philips #BRM832-42-CWL-NW-360-UNIV~~
    - c. ~~McGraw-Edison~~
    - d. ~~Spaulding~~
- e.b. As listed in paragraph 2.1A.

- F. **Type SF1** LSI #XIGBA-LED-19-350-NW-UE-SP10-SVG-XXX Series DSA.
1. Description: Round, direct burial spotlight to illuminate flagpole (3 required).
  2. Reflector: 10 degree beam pattern, specular aluminum spun reflector.
  3. Housing: Single piece, compression-molded, composite housing with integral junction box and brass trim ring.
  4. External Lens: ¼ inch thick, slip-resistant walk-over, clear high-impact tempered glass lens with cast aluminum directional shield.
  5. Internal Lens and Gasket: Clear, high-impact, tempered glass lens with silicone gasket.
  6. Ballast/Driver: ~~22 Watt @ 2159~~ Lumen, 350 mA, LED array; ~~5-year factory warranty.~~
  7. Mounting: Direct burial mounting. Provide [6 inch deep gravel bed] [cast in-place rough-in housing].
  8. Voltage: [480] [277].
  9. Lamp: 2159 Lumen, ~~4000K, enclosed~~ LED array; ~~4000K~~ 60,000 hours at LLD = -0.7.
  10. Label: UL listed for wet locations; 5-year factory warranty.
  11. Alternate Manufacturers:
    - a. Kim #LTV8IFF-NF-36L-4K-UV-SR Series.
    - b. Ligman Lighting #UKI60781-31WLED-N-W40-UNV-A61312.
    - c. ~~As listed in paragraph 2.1 A.~~

Formatted: Font color: Blue

Formatted: USPS5

- G. **Type SP1** ~~Lithonia #DSX1LED-40C-1000-40K-TXX-MVOL Series~~ ~~Gardco EH14L-XX-X-110LA.~~
1. Description: Rectilinear architectural arm-mounted sharp cut-off, solid state, LED luminaire.
  2. Reflector: Anodized segmented reflectors, beam distribution as required.
  3. Housing: Rugged aluminum rectilinear housing with all seams continuously welded for integrity. Corrosion-resistant polyester powder coat. Finish by ~~contracting officer through~~ the USPS Project Manager.
  4. Ballast/Driver: ~~138W @ 12,000+~~ Lumen, ~~1000 mA~~ ~~Solid state light engine and driver.~~
  5. Mounting: 20 – 25 ft. high straight square aluminum pole.
  6. Voltage: [480] [277].
  7. Lamp: ~~440Watt, 12,000,750+~~ Lumen, LED array; ~~85CRI, 4000K, 60,000 hours @ LLD = 0.7.~~
  8. Quantity of luminaires per pole as shown on the design drawings.
  9. Published Life: 60,000 hours at 70 percent lumen depreciation.
  10. Label: UL listed for wet locations.
  - 10.11. Warranty: Full five (5) year factory replacement warranty (internal components).
  12. Alternate Manufacturers:
    - a. Gardco/Philips #ECF-S-48L-1A-NW-G2-AR Series.
    - b. Deco #D824-LED-120-40-UNV-LP-XX-PM Series.



c. McGraw-Edison #GLEON-AF-02-LED-E1-XXX-XX Series,  
11-d. As listed in paragraph 2.1 A.

Formatted: USPS5

- H. **Type SP2** Lithonia #DSX1LED-60C-1000-40K-TXX-MVOL Series Gardco EH14L-XX-X-160LA
1. Description: Rectilinear architectural arm-mounted full cut-off, solid state, LED luminaire.
  2. Reflector: Anodized segmented reflectors. Beam distribution as required.
  3. Housing: Rugged aluminum rectilinear housing with all seams continuously welded for integrity. Corrosion-resistant polyester powder coat. Finish by contracting officer through the USPS Project Manager.
  4. Ballast/Driver: 209W @ 18,000+ Lumen, 1000 mA Solid state light engine and driver.
  5. Mounting: 20 – 25 ft. high aluminum pole.
  6. Voltage: [480] [277].
  7. Lamp: 160Watt, 185,000+ Lumen, LED array, 85cRI, 4000K, 60,000 hours @ LLD = 0.7.
  8. Quantity of luminaires per pole as shown on the design drawings.
  9. LabelPublished Life: UL listed for wet locations 60,000 hours at 70 percent lumen depreciation.
  10. Warranty: Full five (5) year factory replacement warranty (internal components).
  11. Alternate Manufacturers:
    - a. Gardco/Philips #ECF-S-64L-1A-NW-G2-AR Series.
    - b. Deco #D826-LED-200-40-UNV-LP-XX-PM Series.
    - c. McGraw-Edison #GLEON-AF-03-LED-E1-XXX-XX Series.
- 11-d. As listed in paragraph 2.1 A.

Formatted: USPS5

- I. **Type SP5** Lithonia #DSX1LED-30C-1000-40K-TXX-MVOL Series Gardco EH14L-XX-X-85LA
1. Description: Rectilinear architectural arm-mounted full cut-off, solid state, LED luminaire.
  2. Reflector: Anodized segmented reflectors. Beam distribution as required.
  3. Housing: Rugged aluminum rectilinear housing with all seams continuously welded for integrity. Corrosion-resistant polyester powder coat. Finish by contracting officer through the USPS Project Manager.
  4. Ballast/Driver: 105W @ 9,000+ Lumen, 1000 mA Solid state light engine and driver.
  5. Mounting: 12 – 15 ft. high aluminum pole.
  6. Voltage: [480] [277].
  7. Lamp: 85Watt, 89,000+ Lumen, LED array, 85cRI, 4000K, 60,000 hours @ LLD = 0.7.
  8. Quantity of luminaires per pole as shown on the design drawings.
  9. LabelPublished Life: UL listed for wet locations 60,000 hours at 70 percent lumen depreciation.
  10. Warranty: Full five (5) year factory replacement warranty (internal components).
  11. Alternate Manufacturers:
    - a. Gardco/Philips #ECF-S-32L-1A-NW-G2-AR Series.
    - b. Deco #D824-LED-80-40-UNV-LP-XX-PM Series.
    - c. McGraw-Edison #GLEON-AF-02-LED-E1-XXX-XX-800 Series.
- 11-d. As listed in paragraph 2.1 A.

Formatted: English (United States)

Formatted: USPS5

## 2.3 LUMINAIRES HIGH INTENSITY DISCHARGE (HID) BALLAST

- A. Provide luminaires as indicated in luminaire schedule and details on project plans. Provide luminaires complete with light sources of quantity, type and wattage indicated. Provide all luminaires of the same type by the same manufacturer. Luminaires must be specifically designed for use with the driver or ballast and light source provided. Manufacturers:
1. Advance Transformer Company, Rosemont, IL (847) 390-5000.
  2. General Electric Company, Nela Park, OH (800) 435-2677.
  3. Universal Lighting Technologies, Nashville, TN (615) 316-5100.
  4. Osram/Sylvania, Danvers, MA (800) 544-4828.
- B. LED Luminaires Description:
1. Install ballast/drivers, LED arrays and specified accessories at the factory ANSI C82.4, high intensity discharge and low pressure sodium lamp ballast.

2. Luminaires must have a minimum 5 year manufacturer's warranty. Metal halide electronic ballast for lamps shall be high efficiency, energy efficient, pulse start, electronic ballasts with a minimum power factor of .98, ballast factor of 1.0, capable of powering pulse start lamps. Multi-voltage capable and shall operate from a nominal voltage range of 277/120 Volts. System efficiency of greater than 93 percent under full lamp operation. Ballasts shall meet or exceed all EMI and RFI standards of the Federal Communications Commission (FCC) regulations parts 18.305 and 18.307. Total harmonic distortion of less than 5 percent. Lamp wattage shall not vary more than 0.5 percent for a 10 percent change in input line voltage. The lamp crest factor shall measure 1.7 or less. Ballast assembly shall be UL listed for damp locations, 40 degrees C, and comply with all local, state and federal efficiency standards.
3. Luminaires must have a minimum L70 lumen maintenance value of 50,000 hours as calculated by IES TM-21, with data obtained per IES LM-80 requirements.
2. All luminaires shall be fused. Locate fuses within handhole of pole for pole mounted luminaires.
- D-5. Voltage: [480] [277] [208] [120].

Formatted: USPS4

**NOTE TO SPECIFIER**

*Include paragraph 2.3 B.6.E below, if the lightning risk assessment calculation deems a building lightning protection system is required.*

- E-6. Provide individual surge protectors within handhole of each pole mounted luminaire. Branch circuit breakers feeding pole mounted luminaires shall also be equipped with surge protection.

Formatted: USPS4

**2.4 LED DRIVERS/LAMPS**

- A. NEMA SSL 1, UL 8750. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:
  1. Output power (watts) and luminous flux (lumens) as shown in luminaire schedule for each luminaire type to meet minimum luminaire efficacy (LE) value provided. General Electric Company, Nela Park, OH (800) 435-2677.
  2. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided. Osram/Sylvania, Danvers, MA (800) 544-4828.
  3. Current draw Total Harmonic Distortion (THD) of less than 20 percent. Philips Lighting Company, Somerset, NJ (800) 555-0050.
  4. Class A sound rating. Section 016000 – Product Requirements: Product options and substitutions: Substitutions: Not Permitted.
  5. Operable at input voltage of 120-277 volts at 60 hertz.
  6. Minimum 5-year manufacturer's warranty.
  7. RoHS compliant.
  8. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.
  9. UL listed for wet locations typical of exterior installations.
  10. LED driver shall tolerate sustained open circuit and short circuit output conditions without damage.
  11. LED driver shall comply with the requirements of the FCC rules and regulations, Title 47 CFR Part 15 Non-Consumer (Class A).

**2.5 LIGHT SOURCES**

- A. NEMA ANSLG C78.377, NEMA SSL 3. Provide type and wattage as indicated in luminaire schedule on project plans.
- B. LED arrays shall have a correlated color temperature (CCT) of 4000K; minimum color rendering index (CRI) value of 70.

Formatted: USPS3

- C. High power, white light output utilizing phosphor conversion (PC) process or mixed system of colored LEDs, typically red, green and blue (RGB).
- D. Provide light source color consistency by utilizing a binning tolerance within a 4 step McAdam ellipse.
- E. Luminaire shall have door frame and lens compatible for use with LED arrays and integral airflow ventilation system.

**2.6 EQUIPMENT IDENTIFICATION**

- A. Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
- B. Provide labeled luminaires in accordance with UL 1598 requirements. All luminaires must be clearly marked for operation of specific light sources and ballasts or drivers. Note the following light source characteristics in the format "Use Only \_\_\_\_\_":
- C. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.
- D. All markings related to light source type must be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when light sources are in place. Drivers must have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

Formatted: USPS3

**4.**

- B. NEMA CFT designated lamps must pass the federal Toxic Characteristic Leaching Procedure (TCLP) test and be classified non-hazardous waste.
- C. Lamp Types: As specified for luminaire.

**NOTE TO SPECIFIER**

*Pole height listed as basis of design. Edit to suit site conditions or comply with jurisdictional requirements. Pole manufacturer to match pole mounted luminaries selected.*

**2.52.7 POLES**

- A. Manufacturers:
  - 1. As listed in paragraph 2.1A.
  - 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Not permitted.
- B. Material and Finish: Aluminum. Finish by ~~contracting officer through~~ the USPS Project Manager.
- C. Section Shape [straight or tapered] [round or square].
- D. Height: [25 feet].
- E. Base: Nonbreakaway.
- F. Accessories:
  - 1. Handhole.
  - 2. Anchor bolts.
  - 3. Base cover.
  - 4. Bolt covers.

Formatted: Font color: Blue

5. Ground rod and conductor.

**NOTE TO SPECIFIER**

*Edit for Wind Loading.*

G. Approximate Loading Capacity Ratings:

1. Luminaire Weight: [2735 pounds].
2. Luminaire and Bracket Effective Projected Area: [1.5 square feet].
3. Steady Wind: [90] [ ] miles per hour minimum, with gust factor of [1.3] [ ].

Formatted: Font color: Blue

Formatted: Font color: Blue

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide 3000 PSI minimum concrete for lighting poles bases at locations indicated, in accordance with Section 033000 and details shown on drawings.
- B. Install poles plumb. Provide double nuts to adjust plumb. Grout around each base and provide bolt covers.

~~C. Install lamps in each luminaire.~~

D-C. Bond luminaires, metal accessories and metal poles to branch circuit equipment grounding conductor. Provide supplementary 3/4 inch x 10 foot copper clad rod with #2/AWG/copper grounding electrode conductor at each pole.

3.2 FIELD QUALITY CONTROL

- A. Conform to Section 014000: Quality Requirements.
- B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.
- C. Measure illumination levels to verify conformance with layout and performance requirements.
- D. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.3 ADJUSTING

- A. Aim and adjust luminaires to provide illumination levels and distribution as directed.

3.4 CLEANING

- A. Conform to Section 017300 -Execution: Cleaning and protecting installed work.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure, pole and base.
- D. Clean photometric control surfaces as recommended by manufacturer.

265600 - 10

E. Clean finishes and touch up damage.

3.5 PROTECTION OF FINISHED WORK

A. Conform to Section 017300 – Execution: Protecting installed work.

~~B. Relamp or re-ballast luminaires with defective or burned out lamps, just prior to final acceptance.~~

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018~~7~~  
Last revised: ~~9/4/2017~~9/31/2018

265600 - 11

USPS MPFS

Date: 10/1/2018~~7~~

EXTERIOR LIGHTING

*[This page intentionally left blank.]*

265600 - 12

Date: 10/1/2018

USPS MPFS

EXTERIOR LIGHTING

SECTION 270500

COMMON WORK RESULTS FOR COMMUNICATIONS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this section for Mail Processing Facilities (MPF).*

***\*\*THIS ENTIRE SECTION CONSISTS OF REQUIRED PARTS OR ARTICLES. DO NOT REVISE WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER AND RALEIGH IT SERVICE CENTER SUBJECT MATTER EXPERT FOR NEW CONSTRUCTION/BUILDING EXPANSIONS.***

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following structured cabling system provisions:

1. Pre-Construction Design Review/Monthly Status Meetings.
2. Pre-Work Submittals.
3. Contractor RCDD/Installer requirements.
4. Labeling.
5. Post-Work Close-Out Submittals.

B. Related Documents:

1. The Contract Documents, as defined in Section 011000 – Summary of Work, apply to the Work of this Section.
2. USPS LAN Infrastructure Best Practices, 01 October, 201~~8~~<sup>7</sup>.
3. USPS Requirements for Entrance Facilities and DEMARC – October 1, 2017.
4. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

C. Related Sections:

1. Section 078400 – Fire stopping.
2. Section 260500 – Common Work Results for Electrical.
3. Section 260533 – Raceway and Boxes for Electrical Systems.
4. Section 271100 – Communications Equipment Room Fittings
5. Section 271300 – Communications Backbone Cabling
6. Section 271500 – Communications Horizontal Cabling
7. Section 275116 – ~~IP Integrated, Public Accddress Zone~~ Paging Systems.
8. Section 281304 – Enterprise Physical Access Control System.
9. Section 281600 – Intrusion Detection System.
10. Section 282304 – ~~Security and Robbery Countermeasures~~-Analog CCTV System.
11. Section 282305 – Integrated Security and Investigative Platform (ISIP) CCTV System.

1.2 REFERENCES

A. Telecommunication Industry Association (TIA) Series (refer to current Edition):

1. TIA-568.0-D - Generic Telecommunications Cabling for Customer Premises.
2. TIA-568.1-D - Commercial Building Telecommunications Infrastructure Standard.
3. TIA-568-C.2 – Twisted-Pair Copper Cabling and Components Standard.
4. TIA-568.3-D – Optical Fiber Cabling and Components.

5. TIA-568-C.4 – Broadband Coaxial Cabling and Components.
6. TIA-569 - Telecommunications Pathway and Spaces.
7. TIA-570 - Residential Telecommunications Infrastructure Standard.
8. TIA-598 - Fiber Optic Color Codes.
9. TIA-607 - Generic Telecommunications; Bonding and Grounding (Earthing) for Customer Premises.
10. TIA-758 - Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
11. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.
12. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant.
13. [BicsiBICSI](#) Telecommunications Distribution Methods Manual (Latest Edition including all addendums).

B. National Electrical Manufacturer's Association (NEMA):

1. NEMA WC 26 - Wire and Cable Packaging. (Current Version)

C. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code. (Current Version)

D. Regulatory Requirements:

1. Conform to requirements of Current NFPA 70.
2. Products: Listed and classified by Underwriter's Laboratories Incorporated as suitable for the purpose specified and indicated.
3. Perform Work that interfaces with Telephone Utility Company in accordance with Telephone Utility Company rules and regulations.
4. Conform to current TIA standards and current [BicsiBICSI](#) TDMM for telecommunications installation.

E. Fire Stopping

1. Fire stop penetrations of fire-resistive rated assemblies as specified in Section 078400 – Fire Stopping.
  - a. Installed Fire Stopping system shall be a complete UL Fire Stopping System. Installer must provide UL letter describing the suitability of installed UL Fire Stopping System prior to installation. S.T.I. "EZ-Path" Fire Stopping is preferred firestopping U.L. system.

### 1.3 PRE-CONSTRUCTION DESIGN REVIEW/MONTHLY STATUS MEETINGS

A. Pre-Construction Design Review Meetings:

1. Convene 5% Design Review meeting with Raleigh IT Service Center representative.
2. Convene 30% Design Review meeting with Raleigh IT Service Center representative.
3. Convene 70% Design Review meeting with Raleigh IT Service Center representative.
4. Convene 95% Design Review meeting with Raleigh IT Service Center representative.
5. Convene 100% Design Review meeting with Raleigh IT Service Center representative.
6. Convene Issued for Construction (IFC) Design Review meeting with Raleigh IT Service Center representative.
7. Require attendance of parties directly affecting Work of this Section. The USPS telecommunications system representative for Mail Processing Facilities projects will be the Raleigh Information Technology Support Center (RITSC) Subject Matter Expert, Area Maintenance Representative, Local Maintenance Manager, and the District IS Manager or his representative.
8. Review conditions of operations, procedures and coordination with related Work.
9. Agenda:
  - a. Tour, inspect, and discuss building conditions relating to communications cabling and equipment.



- b. Coordination with Telephone Utility Company (LEC) and the USPS telecommunications system representative will be by the ~~Contracting Officer~~Raleigh Service Center IT SME through the USPS Project Manager.
  - c. Review exact location of each network related item within building construction, casework, and fixtures and their requirements.
  - d. Review/Approve required Pre-Work Submittals.
  - e. Review Drawings and Specifications.
  - f. Review and finalize construction schedule related to voice and data installation, verify availability of materials, personnel, equipment and facilities needed to complete project and avoid delays.
  - g. Review required labeling process, inspections and testing.
  - h. Review cable routing and support
- B. Convene re-occurring Monthly Status Meetings at the construction site with Local Maintenance Manager, Raleigh IT Service Center SME representative and District IS Mgr.

#### 1.4 PRE-WORK SUBMITTALS

- A. All of the following are required to be submitted immediately after contract award to General Contractor/Low Voltage installer who will then submit to the Raleigh IT SME for approval. No work can proceed or materials ordered without Raleigh IT Service Center representative approving all submittals.
- B. ~~Low Voltage company performing the cabling installation shall provide the following: Provide Full Time on staff RCDD Name, contact info and current Bicsi~~BICSI RCDD License Number.
  - 1. Name of full time BICSI RCDD on staff and copy of RCDD certification which can be verified at BICSI.
  - 2. Name of full time BICSI TECH on staff and copy of TECH certification for the Lead Installer on this project. The BICSI certification should be verified with BICSI. This Lead Installer will be onsite the entire project, 5 days a week minimum.
  - 3. Name of full time BICSI Installers (INST1 minimum certified). At least 50% of onsite installers are required to be BICSI INST1 certified within the last 3 years.
- C. Lead Low Voltage installer name and install certifications.
- D. Low Voltage installer names with installer certifications for system being installed (50% of installers need current certification within 3 year period).
- E. Product Data: Provide detailed data sheet clearly showing manufacturer Unit Price, Total Price, Model Number, Part Number, color, length, quantity for each material or equipment item specified. Backbone copper and fiber, horizontal copper, patch panels, Bonding busbars, wire baskets, ladder trays, wire managers (horizontal and vertical), equipment racks, patch cords, fiber interconnect panels, UPS's, rack mounted power strips, etc. are products requiring mandatory Submittals. Every different type of material being used for the project must have an approved Submittal submitted to the RITSC SME.
- ~~F. A/E to provide:~~
  - 1. ~~Point to point wiring diagrams for cables installed under this Section clearly showing both ends where ports terminate. Ports on both ends will be clearly labeled and placed on Rack Elevations to clearly show how many copper ports are actually being installed. Low Voltage installer will not provide Point to Point drawings.~~
  - 2. ~~Detailed plan views and elevations of telecommunications spaces showing racks, termination blocks, and cable paths. This will provide the total number of copper/fiber ports being terminated.~~
  - 3. ~~Minimum Scale for Details: 1/4 inch.~~
  - 4. ~~T/O (telecommunications outlet) identification.~~
  - 5. ~~Cable identification number.~~
  - 6. ~~Room location.~~

- 7. ~~Patch panel identification number.~~
- 8. ~~Patch panel port identification number.~~

## 1.5 LOW VOLTAGE CONTRACTOR COMPANY/RCDD/LOW VOLTAGE INSTALLER REQUIREMENTS

### A. Qualifications:

1. Low Voltage Contractor Company - Contractor shall have a minimum of one [BicsiBICSI](#) certified Technician on the job site at all times with documented formal training in the installation of Category 6, Category 6A and LOMF fiber optic cabling systems. 50% of onsite Installers shall possess a certification for a total systems solution being installed from the manufacturer of the cabling and terminating hardware. The contractor must present these certifications to the Raleigh IT SME before beginning work.
2. RCDD - General Contractor or Low Voltage Installer company must have a full time [BicsiBICSI](#) RCDD with current credentialing on staff.
3. Installer - Company specializing in the installation of Category 6, Category 6A, Laser Optimized Multi-Mode (LOMF) and Single-Mode Fiber Optic Structured Cabling Systems with a minimum of 5 years documented experience. Installation certification – 50% of Low voltage installers must be trained by the manufacturer and currently certified to install manufactures product line of copper/fiber wiring. Low voltage company must provide current installer certifications before doing any copper or fiber installations. This certification is part of the 15 year warranty.
4. Lead installer must have a minimum of [BicsiBICSI](#) Technician Certification.
5. Warranty: Total Systems Solution required providing a minimum 15 year warranty from both manufacturer of cabling as well as connecting hardware when installed together according to predetermined manufacturers' specifications. Installer shall possess certifications from manufacturers of the components installed as a total systems solution and must present said certifications to the ~~contracting officer through the~~ USPS Project Manager in advance of beginning the Work.

## 1.6 LABELING

### A. Common Work Results for Electrical; furnish and install machine generated labels.

1. Patch Panels, CP1 Enclosures, and Outlet Faceplates: Display outlet or cable identification number in uppercase lettering on permanent machine generated adhesive label stock. Each individual port requires a port number label. The faceplate cannot be labeled as a range and expect the end user to know which port is which.
2. Label the Consolidated Computer Room as CCR and TR/TE's as 1-01, 1-02, 1-03, etc. Example: 7<sup>th</sup> TR for mail processing on the first floor; TR 1-07; 3rd TE for mail processing on the first floor: TE 1-03.
3. Label all copper patch panel ports in a horizontal fashion left to right in numerical sequence. Example: If there are seven 48 port copper patch panels in a rack, the ports are numbered consecutively from port 1 all the way through 336.
4. Label all (TE) Workroom Floor locations with a minimum of 18 inch high letters, contrasting color, block letters mounted on all three sides of the TE. Black letters for the metal sides and orange for the glass door is acceptable. Example: TE 1-02 on the three visible sides in contrasting colors.

5. Label all (WRF) Workroom Floor CP-1 NEMA-12 housing units with a minimum of six inch, black, block letters.
6. All CP-1 type terminations will be labeled alphabetically per each TR/TE. Example: TR/TE ~~1-01~~ first CP-1 in TE 1-01 would be labeled 1-01-A, the second CP-1 would be labeled 1-01-B, the third 1-01-C, etc. The first TR/TE on second floor: First CP-1 would be labeled 2-012-A, the second 2-012-B, etc.
7. CP-1s will have the following Patch Panel Port assignments. Example: (1-01-A Ports 1-12), (1-01-B Ports 13-24) (1-01-C Ports 25-36), (1-01-D Ports 37-48), (1-01-E Ports 49-60) \* Note CP-1 1-01-E begins on the second patch panel numerically numbered ports 49 – 96.
8. Label Copper Patch Panel ports in the order the cables were terminated beginning with all CP type terminations, followed then by T/O terminations in the order of Six-plexes, Quads and, Triplexes ~~and lastly Duplexes for Wireless (Very end of Copper Patch Panel Field ports).~~
- ~~9. CP 1 (TR/TE # Zone A, B, C Port #'s) i.e. 01A 1 12, 01B 13 24, 01C 25 36, 01D 37 48, 01E 49 60 etc.~~
- ~~10. Six Plex (TR/TE # T/O # Port#) i.e. TE 2 04 S2 43, 44, 45, 46, 47, 48~~
- ~~11. Quad (TR/TE # T/O # Port#) i.e. TE 1 07 Q1 45, 46, 47, 48~~
- ~~12. Triplex (TR/TE # T/O # Port #) i.e. 1 01 T1 37, 38, 39, 1 T2 40, 41, 42, 1 T3 43, 44, 45, etc.~~
- 13.9. Label telecommunications outlet faceplate and CP-1 location in the same manner as the patch panel.
- 14.10. Display cable identification number in black uppercase lettering on machine generated permanent adhesive self-laminating label of contrasting color from cable sheath.
- 15.11. Place labels on each end of cable, maximum 6 inches from cable termination.

## 1.7 POST-WORK SUBMITTALS

- A. Assurance/Control Submittals:
  1. Test Reports: Submit the following reports directly to ~~the Contracting Officer~~ Raleigh Service Center IT SME through the USPS Project Manager from Testing Laboratory, with copy to General Contractor. Prepare reports in conformance with Section 014000 – Quality Requirements.
    - a. End-to-end tests.
  2. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
  3. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals. Deliver prior to Final Acceptance.
- C. Certification: Comprehensive test results for Category 6, Category 6A and fiber optic certification of cable plant per specifications of TIA/EIA-568-C, and all addendums. Immediately following new Category 6/6A copper and laser optimized multi-mode fiber installation, submit raw test results via e-mail to the Raleigh IT Service Center representative who will be performing copper and fiber site acceptance. All testing must be performed using an industry standard compliant test device. Test results must be furnished in format used by testing device. Vender generated spreadsheets or PDF's will not be accepted. No paper test results are ever acceptable. There is a USPS 10MB attachment limit. There should never be test results over 10MB. USPS cannot access DropBox.

- D. Project Record Documents: Accurately record the following:
  - 1. Cable pulling schedules, in printed form on CD-ROM.
  - 2. Cable routings (as-built drawings) shall be provided with cable plant depicted on floor plans prior to acceptance. The drawings must identify location of all T/Os (Telecommunications Outlets), TR/TE's (Telecommunication Rooms / Enclosures), Consolidated Computer Room (CCR) and any other installed component of the cabling solution. The actual routing of the cable bundles (pathways) and backbone cables on the floor plans shall also be shown. Provide master overall set plus one set for each TR/TE which will detail T/O's and CP's served by that TR/TE. As-built drawings will be provided to USPS IT by the installing Contractor electronically in a USPS compatible version of AutoCAD on a CD-ROM.
    - a. Labeling shall conform to the USPS labeling guidelines. For simplicity, all 48 port Copper Patch Panels in the CCR, TR's or TE's shall be labeled 1 thru the end port number. For any questions, contact RITSC SME for clarification.
    - b. A detailed cable termination record will be provided in sufficient detail, so that:
      - 1) Telephone Utility Company or telephone interconnect company can install cross connects.
      - 2) Postal Service users can install and maintain patch cords at patch panel fields.
      - 3) The location and size of the service entrance conduits are known.
- E. Operations and Maintenance Data: Data including wiring diagrams, parts lists, shop drawings, product data, manufacturer's instructions for cables and equipment and certifications identified above shall be provided.
- F. Manufacturers 15 year warranty for Fiber and Copper and all termination components.

~~G. Low Voltage Installer shall provide Full Size (30"x42"), color, Laminated AutoCAD drawing for the CCR and all TR's clearly showing the coverage area that that room provides. This laminated drawing will be mounted on one of the walls of the CCR and TR based on the Point to Point AE drawings.~~

## PART 2 - PRODUCTS

### 2.1 CONDUITS, BOXES AND CABLE TRAYS

- A. Specified in Section 260533 – Raceway and Boxes for Electrical Systems.

~~2.2 TELEPHONE HANDSETS: Provided by US Postal Service under separate contract.~~

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

### 3.2 INSTALLATION GUIDELINES

- A. Special requirements for cable routing and installation:

1. The majority of the structured cabling system wiring in this building will be installed above ceilings without conduit. All cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed.
  2. Sealing of openings between floors, through rated fire and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the contractor. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.
- B. Support cables installed in ceiling spaces with cable tray and/or wide-base ~~J-hookscanvas loop~~ Category 6/6A compliant suspension devices ~~such as the Erico Caddy #425 loop~~, anchored to building ceiling structural steel (red iron). ~~The use of wide-based J-hooks "Erico" Caddy Cable CAT series shall be permitted for no more than (4) category 6 cables.~~
1. Maximum spacing between supports: 4 feet.
  2. Maximum Number of 4 Pair Cables per support: 25.
  3. Furnish and install additional supports as required.
  4. Install complete cable support device system before starting installation of cable.
    - a. Installation of cable before completion of support system not permitted.
    - b. Unsupported cable not permitted.
  5. Organize and group cables. Install cable group as single run through ceiling spaces following column and building lines. Do not install cable group runs diagonally across center of building.
  6. Install armored fiber optic cabling in cable tray or approved support solution.
  7. Cabling will not be suspended from any electrical conduits, HVAC ducts, sprinkler systems, gas, or water pipes, etc.
  8. Cabling will not be attached to suspended ceiling grid system.
  9. Cabling system shall be installed in approved suspension devices for telecommunications cabling.
  10. Vertical runs of backbone and horizontal cabling (e.g.: cabling exiting thru-wall penetrations) shall be equipped with factory manufactured cable drop out fittings and kellums cord grips to properly support the cabling at the vertical bends.
- C. Cable trays shall be required for areas of heavy cable concentration including but not limited to CCRs, TR/TE's, and large administrative hallways.
1. Maximum spacing between each cable tray support: Specified by manufacturer of cable tray.
  2. Maximum number of cables supported by cable tray: Specified by manufacturer of cable tray not-to-exceed 40% fill ratio. Install additional cable tray or wire basket as needed to maintain 40% Maximum Fill Ratio.
  3. Install complete cable tray system before starting installation of cable.
    - a. Installation of cable before completion of tray system not permitted.
    - b. Cabling shall not be bundled within cable tray.

- c. Provide factory manufactured cable drop-out fittings for transportation of cabling entering or exiting the cable tray.
4. Cable/Ladder trays, wire mesh tray or solid bottom cable tray shall be provided as specified in USPS MPF specification section 260533, paragraph 2.12
- D. Cabling routed underground, exterior of the building or through inaccessible ceilings shall be contained in conduit. Provide flush boxes within finished areas and surface mounted, "FS" factory boxes in unfinished areas. Provide 1" conduit risers with 90 degree bend and bushing for all T/O's.
1. Conduit/EMT, cable tray or wire basket shall be used in the ceiling of the work room floor or wherever a suspended ceiling system is not present.
  2. All conduit stubs must have a plastic bushing/collar installed at each end.
  3. All conduit runs require an accessible pull-string in each conduit.
  4. Interior conduits shall be a minimum of 1 inch in diameter. Conduits shall adhere to the 40 per cent fill ratio.
  5. No conduit is to be buried directly in the slab.
  6. There shall be no more than 180 degrees of bend in a conduit longer than 30 feet. All conduits that are comprised of more than two (2) ninety degree bends or a reverse bend shall have a properly installed pull box. Pull boxes shall be 12"x 12" x 6" for up to 1" EMT, 18"x18"x8" for up to 1 ½"EMT Ninety degree bends in fiber runs shall be installed using dual forty-five degree bends.
  7. Under no circumstances shall a pull box be used to change direction of a conduit. All conduits shall be installed in a manner so that cabling passes directly through the pull box without changing direction.
  8. Underground service and interbuilding conduits shall be a minimum of 4 inch diameter, buried minimum of 24" BFG, equipped with heavy wall rigid galvanized steel conduit elbows and risers and marked with red magnetic warning tape, refer to Module 1, 5-2.7.2. Conduits shall adhere to the 40 per cent fill ratio and shall be provided with mesh innerduct and individual pull strings.
- E. Route cable for T/O (telecommunications outlets) as follows:
1. Wall Mounted: Through ceiling spaces to conduit stub-ups or junction boxes. Include drag lines.
  2. Furniture System Cable Raceway: Point of entry to outlet.
  3. Floor Outlet Box: Through under floor conduit to box. (This method is highly discouraged and requires approval from Raleigh IT SME).
  4. Column Mounted-Workroom Floor: Through surface mount conduit stubs to junction box or cable tray.
  5. Consolidated Computer Room: Along ladder rack from rack to locations to be run in ladder tray / basket tray.
- F. Communications cabling and fixtures shall have minimum separation from the following devices:
1. Non-Shielded Electrical Cables: 12 inches.
  2. Fluorescent Light Fixtures: 12 inches.

- G. Cross electrical cables with communications cables at 90 degrees only. Data cables shall not run parallel with electrical cables, unless separated by 12 inch minimum.
- H. Comply with cable manufacturers minimum bend radius requirements. For Category 6/6A, minimum bend radius shall be no less than 4 times diameter of outer sheath of cable. For Laser Optimized Multi-Mode Fiber cabling, minimum bend radius shall be no less than 10 times diameter of outer sheath of cable.
1. Do not stretch, stress, tightly coil, bend or crimp cables.
  2. Replace cables that are severely stressed during installation at no additional cost to USPS.
  3. Any armored cable that has had its armor sheathing broken shall be replaced in its entirety, end to end at no additional cost to USPS.
- I. Cabling installed in plenum or non-plenum air returns.
1. Plenum Environments: If the majority of the area for the cabling installation is deemed to be a return air plenum, all components of the installation in those areas shall be rated for the plenum environment in which they are installed. There shall be no installation of any non-plenum component of this cabling system in the plenum environment unless those components are enclosed in such a manner as to maintain the integrity of the plenum environment. If the area beneath a raised floor is considered a plenum environment, there shall be no installation of any components of the cabling system that are not rated for a plenum environment unless they are completely enclosed in such a manner as to maintain the integrity of the plenum environment. This includes outlets, jacks, patch cords, inner-duct, copper and fiber optic cabling or any other components that are not rated for installation in a plenum environment.
  2. Non-Plenum Environments: The work room floor is considered a non-plenum environment and all components of the Structured Cabling System shall be rated for installation in non-plenum area. If, at any point, the non-plenum cabling or inner-duct enters or passes through a plenum area, the cabling or inner-duct shall be encased in a continuous EMT conduit pathway throughout the entire plenum area.
- J. Cable Run Lengths: Route cables so that cable run length does not exceed recommended maximum distance.
1. UTP cabling from the back of the patch panel to the Telecommunications Outlet (T/O) is limited to a maximum total run of 90m (295 feet) ~~for Admin areas~~ and 70m (230 feet) for CP-1 Consolidation Points on the work room floor. ~~Any work room floor T/O locations that will need to exceed 230 feet will require prior USPS approval.~~
  2. UTP cable between back of patch panel and Types 1, 2 and 3 Consolidation Points or Multi-User Telecommunications Outlet Assembly are limited to a maximum total run of 70m (230 feet) per TIA-568-C. Minimum cable run length between back of patch panel and Types 1, 2 and 3 Consolidation Points or Multi-User Telecommunications Outlet Assembly shall be 15m (49 feet) per TIA-568-C.
  3. Cable conductors shall be continuous ("Homerun") from originating termination equipment to destination termination equipment.
- K. Cables: Furnish and install communications cables as specified, in accordance with Cable Pulling Schedules, manufacturer's published instructions, TIA-568-C including all addendums and as indicated on Drawings.
1. Dress cable to final location, remove sheath to point allowing splaying of conductor, and terminate. Make each termination uniform and precise. Hook and Loop "Velcro" cable ties shall be used for bundling and dressing all cabling on manufacturer supplied Strain Relief Bars. No nylon zip ties shall be used for cable bundling or attachment. No wire managers will be used/substituted for Strain Relief Bars.

2. Maintain sheath integrity. Remove minimum amount of sheath required for termination up to a maximum of 1 inch.
3. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify, or add to manufacturer's twisting of cable. Do not untwist more than ½ inch of the stripped cable.
4. Label each end with a machine generated, self-laminating label.
5. Mechanical couplers or splices not permitted in copper cabling.
6. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point in/on the wire basket/ladder tray. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 3 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturer's instructions.
7. When installing Armored Fiber Optic cabling, proper telecom bonding techniques to bond the metallic member of the Armored Fiber Optic Cable must be maintained. Armored fiber will be bonded on the CCR/TR/TE end only to the "SBB".

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~  
Last revised: ~~9/4/2017~~9/5/2018



SECTION 271100  
COMMUNICATIONS EQUIPMENT ROOM FITTINGS

\*\*\*\*\*  
**NOTE TO SPECIFIER**

*Use this section for Mail Processing Facilities.*

*\*\*THIS ENTIRE SECTION CONSISTS OF REQUIRED PARTS OR ARTICLES. DO NOT REVISE WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER AND THE RALEIGH IT SERVICE CENTER SUBJECT MATTER EXPERT FOR NEW CONSTRUCTION/BUILDING EXPANSIONS.*

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured cabling system components:
  - 1. Table of Contents
    - a. Open Relay/Equipment Racks for CCR/TR's
    - b. Cat6 / Cat6A (Wireless) 110 Style Copper Patch Panels
    - c. Wire Management Panels
    - d. PBB for TEF/CCR
    - e. SBB for TR/TE's
  - 2. Consolidated Computer Room (CCR).
  - 3. Telecommunications Room (TR).
  - 4. Telecommunications Enclosure (TE).
- B. Related Documents:
  - 1. Specified in Section 270500 – Common Work Results for Communications.
- C. Related Sections
  - 1. Sections 096536 – Static Control Resilient Flooring.

1.2 REFERENCES

- A. Specified in Section 270500 – Common Work Results for Communications.

1.3 SUBMITTALS

- A. Specified in Section 270500 – Common Work Results for Communications.

1.4 QUALITY ASSURANCE

- A. Specified in Section 270500 – Common Work Results for Communications.

271100 - 1

PART 2 - PRODUCTS

2.1 OPEN EQUIPMENT / RELAY RACKS WITH ~~VERTICAL WIRE MANAGERS~~CABLE CHANNELS FOR CCR/TR's

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

1. Chatsworth Products, Inc.
2. CommScope Uniprise
3. Hoffman
4. Ortronics (Legrand) Corporation
5. Panduit
6. Rittal
7. Product options and substitutions. Substitutions: Not permitted.

B. Constructed of aluminum extrusion framework. Dimensions: 84 inch high x 3 inch deep x 19 inch wide. Double sided, 12/24 tapped holes with universal EIA rack unit spacing. Black or Aluminum finish.

1. Each equipment rack shall have ~~a one-two~~ double depth vertical cable ~~channels~~/managers: Dimensions: No less than: 6 inch x 6 inch x 78 11/16 inch for the front side of the relay rack and no less than 6 inch x 6 inch x 78 11/16 inch for the back side of the relay rack. Black or aluminum finish. Attach to sides of relay racks. Must be able to cover and conceal patch cabling. Each end rack will have outside double depth vertical wire managers attached to each outside end.
2. Each equipment rack shall be connected to the overhead cable tray/wire basket system for added rigidity. Equipment racks shall be properly supported to avoid wobbling.

~~3. Vertical and horizontal wire managers shall be equipped with opaque covers to completely conceal the patch cords.~~

Formatted: 4

2.2 CATEGORY 6/6A 8-PIN MODULAR (IDC) "110" STYLE PATCH PANELS FOR CCR/TR/TE's

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

1. CommScope Uniprise
2. Hubbell, Inc.
3. Ortronics (Legrand)
4. Panduit
5. Product options and substitutions. Substitutions: Not permitted.

B. 48-port/24-port (Wireless) Copper Patch Panels:

1. Rack mounted 8-pin modular, Category 6/6A (Wireless), non-keyed.
2. Complies with ANSI/TIA/EIA-568-C "T568A" pinning configuration.
3. Install manufacturer supplied strain relief bar assemblies for every 24 and 48 port rear copper terminations. Secure Cat6/6A cable with Velcro straps. Plastic tie wraps are not acceptable.

2.3 WIRE MANAGEMENT PANELS

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

1. Chatsworth Products
2. CommScope Uniprise

3. Leviton
4. Ortronics (Legrand)
5. Panduit
6. Product options and substitutions. Substitutions: Not permitted.

B. Cable Management Panels: Rack mounted horizontally and vertically. USPS has final say on how each equipment rack is laid out. Ensure Raleigh IT contact approves of all Rack Elevations well before Issued for Construction (IFC) drawings are distributed. See latest USPS Best Practices document (located on most current USPS BDS DVD – folder F) for guidelines on rack layouts.

1. Horizontal management panel for use at top of each CCR equipment rack will be Quantity (2) two separate 2RU panels along the top of each equipment rack. See USPS Best Practices Diagram – Latest Version.
2. Horizontal management panels for use at top of TR equipment racks will be two (2) 2RU panels along the top of each equipment rack. See USPS Best Practices Diagram – Latest Version.

~~3. Install Fiber-Optic Interconnect Panel directly below the above horizontal wire managers.~~

~~4. Install one (1) 1RU horizontal wire manager next.~~

~~5. TR/TE's only – Install 24-port Cat3/5e Copper Patch Panel for Analog Voice connections next (one pair per port).~~

~~6. CCR only – Install 48-port Cat3/5e Copper Patch Panels in Voice Equipment Rack with (1) 1RU horizontal wire manager in between each 48-port Copper Patch Panel (one pair per port).~~

~~7. Install one (1) 1RU horizontal wire manager next.~~

~~8. Start 48-port Copper Patch Panel field terminations with (1) one 2RU horizontal wire manager in between each 48-port Copper Patch Panel.~~

~~9. Install one (1) 1RU horizontal wire manager next under last 48-port Copper Patch Panel.~~

~~10. Install one (1) 1RU horizontal wire manager next.~~

~~11. Install one 24-port Category 6A patch panel for Wireless Access Point Connections.~~

~~12-3.~~ Each vertical wire management panel will be at least 6"x~~12~~<sup>126</sup>" deep on the front side and at least 6"x~~6~~<sup>12</sup>" deep on the back side of the equipment rack to form a Full Height Double-depth Vertical Wire Management system. No exceptions.

#### 2.4 PRIMARY BONDING BUSBAR - PBB for TEF/CCR (REFER TO TIA-607-C)

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

1. Harger. P/N GBI14424TMGB
2. Chatsworth – P/N 40158-024
3. Legrand
4. Product options and substitutions. Substitutions: Not Permitted.

B. Provide and install one PBB at the Telecom Entrance Facility (TEF), below ceiling acoustic tile, with all bonding leads clearly labeled by machine labeler. All bonding leads shall be 2 hole compression lugs. This PBB shall be bonded to the building grounding electrode system using minimum #1/0/AWG/CU conductor. Size according to number/size of Telecom Bonding Backbone (TBB) leads being attached to

the PBB. Minimum size will be 4"H x 0.25"W x 24"L. The PBB shall be mounted as close as possible to the building grounding electrode system busbar to keep the Telecom Bonding Conductor (TBC) as straight and as short as possible.

- C. Each (2) lug compression connector shall have anti-oxidant coating applied to lug and busbar prior to attachment.
- D. The maximum value of resistance between any point in the Telecommunications bonding system and the building electrical grounding electrode system shall be 100 Milliohms or .1 ohm to comply with TIA-607-C standard. This resistance value shall be tested and certified, in the presence of the Raleigh IT SME, by an independent 3<sup>rd</sup> party testing agency, prior to applying power to any telecommunications equipment. Test meter shall be Micro-Ohmmeter Model 640 manufactured by AEMC Instruments or approved equal.

## 2.5 SECONDARY BONDING BUSBAR – SBB FOR CCR TR/TE's (REFER TO TIA-607-C)

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Harger – P/N GBI/14212 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 in the CCR and in every TR/TE, below ceiling acoustic tile (or within each TE), with all bonding leads clearly labeled by machine labeler. All bonding leads shall be 2 hole compression lugs. This SBB will connect to the PBB using minimum #6/AWG/CU via Telecom Bonding Backbone (TBB). Size according to number/size of bonding leads being attached to SBB. Minimum size will be 2"H x 0.25"W x 12"L.
- C. Each (2) lug compression connector shall have anti-oxidant coating applied to lug and busbar prior to attachment.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. CCR (Consolidated Computer Room):
  - 1. Do not use the CCR as a TR/TE. If utilized provide an additional, entirely separate wire basket or ladder tray to support all of the Cat6/6A copper for the TR/TE needs. Do not install Cat6/6A copper cabling inside wire basket used for any CCR equipment. Keep the two systems completely separate. A maximum fill ratio of 40% will be adhered to. No exceptions.
  - 2. Furnish, install, and bond, floor mounted, 84 inch high x 3 inch deep x 19 inch wide relay racks shoulder-to-shoulder separated by 6 inch vertical wide, double depth, full height, vertical wire managers perpendicular to wall housing plywood backboards.
    - a. Mount relay racks in a "side by side" fashion with one double-depth vertical wire management channel between each rack, and one double-depth wire management channel on outside side rail of both end racks.
      - 1) Place two 2RU horizontal wire managers at the top of each rack.

271100 - 4

USPS MPFS

Date: 10/1/2018

COMMUNICATIONS  
EQUIPMENT ROOM FITTINGS

- 2) Supply ~~four~~ ~~six~~ (46) 1RU wire managers for each rack containing 48 port patch panels for USPS use. These (46) 1RU wire managers are in addition to the 1RU wire managers placed between the patch panels and the 2RU wire managers at the top of each rack.
  - b. The 12 inch wide ladder tray/basket tray shall be mounted to top of relay racks and extend to plywood backboard or other ladder rack/basket tray for each relay rack installed. This ladder rack serves as additional support for relay racks as well as cable routing from relay rack to backboard.
  - c. Each rack will receive a separate #6 AWG bonding wire home run to the Secondary Bonding Busbar (SBB) in the CCR.
  - d. Each rack shall be equipped with a factory manufactured power strip equipped with (12) NEMA5-15R receptacles. Preferred rack mounted power strip: Tripp-Lite #RS-1215RA.
  - e. Each rack shall be provided with an installation kit and isolation pads for securing and isolating the rack to and from the floor.
3. Furnish and install a minimum of two (2) 4 ft. x 8 ft. plywood backboards along walls behind and perpendicular to CCR racks. Additional 4 ft. x 8 ft. plywood sheets may be required by RITSC IT SME.
  - a. Plywood: 48 inch x 96 inch x 3/4-inch A/C rated (A = smooth side; C = slight blemishes against wall), fire rated, void-free, smooth side out. Absolutely no knot holes or voids shall be visible on outer face of plywood, anywhere.
  - b. Install plywood with long dimension in vertical orientation with bottom of sheet 8 inches AFF.
  - c. Field paint with white or gray enamel fire resistant paint prior to installation of equipment.
  - d. Furnish and install an industry approved Secondary Bonding Busbar (SBB) and attach minimum #6 AWG bonding conductors using 2 hole compression type fittings for all bonding needs within the CCR. All bonding cable connections shall be clearly labeled on the SBB indicating where the connection is coming from/going to via machine made labels. All metallic components of CCR shall be bonded to the installed Secondary Bonding Busbar (SBB). Interconnect the SBB to the PBB utilizing minimum #2/AWG/CU bonding conductor.
4. Install 12 inch wide ladder rack/basket tray with 2 inch side bars the entire width of plywood backboards at 7'-6" to 8 feet AFF (Racks are 84 inches high).
  - a. Furnish and install 12 inch wide ladder rack/basket tray with 2 inch side bars at 7'-6" to 8 feet AFF between plywood backboards and relay racks (racks are 84 inches high). All sections of ladder rack and or basket tray shall be joined with manufacturer approved devices. No sections of ladder rack or basket tray shall be zip tied together. All sections of ladder rack and/or basket tray will be bonded. All wall connections will be made with factory wall mounts. No homemade connectors are permitted.
  - b. Provide (2) factory manufactured cable "drop out" fittings at each rack within the "CCR".
5. Install number of Category 6 48-port patch panels in relay rack(s) that the 4-pair cables serving only the CCR are to be terminated. It is recommended that Telecommunications Outlets within the CCR be installed using the ladder rack/basket tray system and terminated in work-boxes attached to the ladder rack/basket tray. USPS IT will specify final termination points. Furnish and install ~~Quantity (1)~~ one (1) ~~q~~Quad every 4' along entire length of ~~w~~Wire ~~b~~Basket/~~L~~Ladder ~~T~~Tray ~~on~~

271100 - 5

USPS MPFS

Date: 10/1/2018~~7~~

COMMUNICATIONS  
EQUIPMENT ROOM FITTINGS

~~back side of Wire Basket/Ladder Tray so that data drop comes down to the back of the MPE cabinets. Furnish and install six-plex Quad T/O's are not required above racks 1-9 and are only necessary in each of the MPE cabinets- areas on the back side of the wire basket/ladder tray so that the data drop comes down the back of the MPE cabinets.~~

6. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 10 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturers' instructions.
7. All metallic ladder tray, basket tray, equipment racks or enclosures shall be bonded using a #6 AWG stranded bond wire with green insulation using 2 hole compression type fittings approved for basket tray installation. All painted surfaces shall be fully burnished for paint removal to achieve maximum bonding connection. Provide all UL documentation on how the support system should be bonded to form a system.
8. All bonding in CCR shall be made at the Secondary Bonding Busbar (SBB) installed by Contractor. This SBB shall be below the acoustic ceiling if one is installed and all bonding wires will be on two lug compression fittings with full machine made labeling clearly showing where the bond originates.
9. Contractor shall provide enough 12/24 mounting screws or screws/square cage nuts for 32 connections per equipment rack in CCR, TR or TE rack for the installation of USPS PFE active electronic components. Example: If 8 new relay racks are installed, provide 256 12/24 pitch screws or 256 square cage nuts.

\*\*\*\*\*  
\*\*  
**NOTE TO SPECIFIER**  
Include paragraph 3.1 A.10. below if the "CCR" has been determined to be critical and essential to the operation of the facility. Installation of static control resilient flooring requires an approved deviation.  
\*\*\*\*\*  
\*\*

Formatted: Font: Bold  
Formatted: Centered

10. The floor surface of the "CCR" shall be covered with anti-static control resilient vinyl flooring tile. A sealed concrete floor is not acceptable. Refer to specification section 096536 for grounding provisions.

B. Telecommunications Room (TR):

1. Furnish and install appropriate number of 4-pair Category 6 UTP cables from each office area and workroom column mounted T/O (telecommunications outlets) to Telecommunications Rooms as indicated on drawings. Terminate 12 each 4-pair Category 6 UTP cables from each Type 1 Consolidation Point to Telecommunications Room as indicated on drawings.
2. Furnish and install two (2) each 4-pair Category 6A UTP cables from each Wireless Access Point (WAP) to Telecommunications Enclosures/Rooms as indicated on drawings to 24 port Category 6A copper patch panels.
3. Provide a minimum 20 foot service loop in a figure eight coil, in the ceiling/wire basket for all copper cables terminated in TE/TR's.
4. Furnish, install, and bond, floor mounted, 84 inch high x 3 inch deep x 19 inch wide relay racks shoulder-to-shoulder, separated by double-depth vertical wire managers, perpendicular to wall

271100 - 6

housing plywood backboards with double-depth vertical wire managers on each outer end of equipment racks.

- a. Racks will be used to house fiber/copper wiring and PFE.
  - b. Allow a minimum (16) empty rack units per rack for PFE data equipment.
  - c. Provide (1) factory manufactured cable "drop out" fitting at each rack within the "TR".
  - d. Each rack shall be equipped with a rack mounted power strip equipped with twelve (12) NEMA5-15R receptacles. Mount power strip below last 48 port copper patch panel. Preferred: Tripp-Lite #RS-1215RA.
  - e. Provide a minimum of (2) racks within each TR.
  - f. Each rack shall be provided with an installation kit and isolation pads for securing and isolating the rack to and from the floor.
5. Furnish and install one 2RU rack mounted wire manager at top of rack.
  6. Furnish and install one rack mounted, 24 strand fiber optic interconnect center below 2RU wire manager.
  7. Furnish and install one 1RU rack mounted, 24 pair Cat3 or Cat5e Copper Patch Panel for Analog Voice connections below the fiber optic interconnect panel.
  8. Furnish and install needed 48-port Copper Patch Panels separated by 2RU Wire Managers.
  9. Furnish and install one (1) plywood backboard on wall of Telecommunications Room.
    - a. Plywood: 48 inch x 96 inch x 3/4 inch A/C rated (A = smooth side; C = slight blemishes against wall), fire rated, void-free, smooth side out. Absolutely no knot holes or voids shall be visible on outer face of plywood, anywhere.
    - b. Field paint with white or gray enamel fire resistant paint prior to installation of equipment.
    - c. Install plywood with long dimension in vertical orientation with bottom of sheet 8 inches AFF.
    - d. Each rack shall be equipped with separate #6 AWG bond conductor homerun to the Secondary Bonding Busbar (SBB) in that TR.
    - e. Furnish and install an industry approved copper Secondary Bonding Busbar (SBB) and attach minimum #6 AWG bond conductor from this SBB to the "PBB" in the TEF using the Telecom Bonding Backbone (TBB) and 2 hole compression type fittings. All bonding cable connections shall be clearly labeled on the busbar indicating where the connection is coming from/going to via machine made labels. All metallic components of the "TR" shall be bonded to the installed SBB inside that TR.
  10. A fiber optic service loop of sheathed fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 10 feet, no more than 10 foot, of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturers' instructions.

Formatted: 5

271100 - 7

USPS MPFS

Date: 10/1/2018

COMMUNICATIONS  
EQUIPMENT ROOM FITTINGS

11. Provide a minimum of one 3KVA (120V - input/output) uninterruptible rack mountable power supply with 30 minute battery reserve in each TR. Mount on the lowest RU of the right-most open relay rack and ensure power plug is wired as NEMA 5-~~32~~0P, 3 wire.

12. Contractor shall provide enough 12/24 screws or screws/square cage nuts for 32 connections per rack for the installation of USPS PFE active electronic components. Example: If (3) new relay racks are installed, provide (96) 12/24 pitch screws or (96) square cage nuts/screws.

~~13. The floor surface of the "TR" shall be covered with anti-static vinyl floor tile. A sealed concrete floor is not acceptable.~~

C. Telecommunications Enclosure (TE) for Column Mounted Applications

1. Constructed of steel or aluminum with Safety Glass or Plexiglas front doors. Cabinet must be rated NEMA-12, designed for front and rear access, have forced fan with filtration for intake and exhaust ventilation, and adjustable vertical mounting rails. The intake fan with filter will be mounted 5 inches from the top center of the rear metal door and a filtered louvered exhaust vent will be mounted 4 inches from the bottom center of the rear door. The fan must be oriented to blow filtered air into the cabinet to create a positive pressure within the cabinet and will be plugged into the power strip (min. 12 outlet NEMA 5-15R with power switch guard) mounted inside of the cabinet; Basis of Design: Tripp-Lite #RS-1215-RA. Dimensions: 86 inches high x ~~36~~24 inches deep x 24 inches wide with 19 inch EIA rack width. The Telecommunications Enclosure and the installation of the enclosure must comply with area seismic zone rating.

a. Provide appropriate number of conduit risers equipped with 90 degree bends and bushings/collars for incoming backbone and outgoing horizontal cables. Conduit risers shall be minimum 2 inch diameter and sized for 40 percent fill and shall be sealed to maintain positive air pressure within the TE. Provide (1) spare 3 inch conduit riser for future expansion.

b. Allocate 16 RU's within the rack for PFE and provide a second separate NEMA 12 cabinet if less than 16 RU's for PFE is available in first TE. Two units can be "ganged/married" together (inner side panels removed and doors adjusted to open from center) to form one TE for workroom floor applications. The doors shall be adjusted to open in opposite directions from the center. Cabinets shall be bolted together in such a manner to maintain the NEMA-12 compliance, and the inner side panels will be removed from each unit creating an open pathway between cabinets. All copper connections will be placed in the left-most cabinet and the fiber along with the 1.5 kVA UPS will be installed in the right-most cabinet.

2. Each NEMA 12 TE Cabinet shall be attached to Work Room Floor Column via double-nutted 5/8" All-Thread/Uni-Strut or a metal platform welded to the column. The bottom of each NEMA-12 cabinet shall be 9' AFF. Uni-Strut/All-Thread/Platform shall be designed to support a minimum of 1000 lbs., be firmly connected to the column and or the overhead building support structure and shall meet all codes and seismic requirements. A structural engineer approved platform solution shall be provided to the USPS by the vendor during the Design Review Process and before the Issued For Construction drawings are distributed. There shall not be any installed Bollards blocking or interfering any Verti-Lift access into either the front or rear of the NEMA-12 cabinet TE. The mounted TE shall not sway or swing in any manner.

a. TE's shall not be mounted on the Workroom floor. TE's shall be column mounted. No exceptions.

3. Furnish and install four (4) each 4-pair Category 6 UTP cables from each office area and workroom column mounted Quad T/O (telecommunications outlet) to Telecommunications Enclosure as indicated on drawings. Terminate 12 each 4-pair Category 6 UTP cables from each Type 1 Consolidation Point to Telecommunications Enclosure as indicated on drawings.

271100 - 8



4. Furnish and install one rack/cabinet mounted, 1RU, 24 strand fiber optic interconnect center at top of cabinet. Fiber ports will be laid out ports 1-12, left to right on 1RU only. Duplex ports to be mounted vertically: Ports 1-12; left to right. Refer to USPS LAN Infrastructure Best Practices. No deviations.
5. Furnish and install one rack/cabinet mounted 24 port Cat3/Cat5e Copper Patch Panel for all Analog Voice/OSS connections terminating 1 pair per port.
6. Furnish and install two (2) each 4-pair Category 6A UTP cables from each Wireless Access Point (WAP) to Telecommunication Enclosure as indicated on drawings to Cat6A 24 port Copper Patch Panel, the bottom-most Copper Patch Panel.
7. Provide a minimum 10 foot service loop for all copper cables. Service Loop shall be placed inside TE in between the side TE panel and mounting railing with no obstruction to PFE.
8. All metallic basket tray, equipment racks or enclosures shall be bonded and grounded using a #6 AWG stranded bond wire with green insulation using 2-hole compression type fittings or bond fitting approved for basket tray installation. All painted surfaces shall be fully burnished for paint removal to achieve maximum bonding connection.
9. Furnish and install an industry approved Secondary Bonding Busbar (SBB) and attach minimum #6 AWG bond conductor from this SBB to the PBB in the TEF using the Telecom Bonding Backbone (TBB) and 2 hole compression type fittings. All bonding cable connections shall be clearly labeled on the busbar indicating where the connection is coming from/going to via machine made labels. All metallic components of the TE shall be bonded to the installed SBB inside that TE.
10. A fiber optic service loop of sheathed armored fiber no less than 20 feet at each end of a fiber optic cable shall be installed at each termination point. All service loops shall be installed so that the minimum bend radius (10 times the outside diameter of the fiber) shall not be exceeded. All service loops shall be installed outside of the fiber optic termination housing. Once the fiber reaches the entrance point of the fiber optic enclosure, there shall be no less than 10 feet of unsheathed fiber installed neatly in the fiber optic storage tray prior to terminations being installed. Unsheathed fiber shall be installed in the storage tray per the fiber optic enclosures manufacturers' instructions. Service Loop shall be placed inside TE in between the side TE panel and mounting railing with no obstruction to PFE.
11. Provide a minimum 1.5kVA uninterruptible power supply with 30 minute battery reserve rack mounted at the backrail within each TE.
12. Install conduit/EMT through top of cabinet to allow cable entry as needed. Seal openings with an intumescent fire-stop putty when all cables have been installed. Spray foam sealants not permitted.
13. Contractor shall provide enough 12/24 screws or screws/square cage nuts for 32 connections per rack for the installation of USPS PFE active electronic components. Example: If (2) new relay racks are installed, provide (64) 12/24 pitch screws or (64) square cage nuts
14. Maximum horizontal cabling distances shall not exceed 230 feet for ~~standard-CP-1~~ Consolidation Points. This horizontal distance is to include all vertical distances plus required service loops. Total workroom floor coverage is required when designing the TE placements throughout the workroom floor environment.
15. Maximum horizontal cabling distances for telecommunication outlets shall not exceed 295 ft. including vertical distances and required service loops.

271100 - 9

USPS MPFS

Date: 10/1/2018

COMMUNICATIONS  
EQUIPMENT ROOM FITTINGS

16. CCTV or ISIP equipment components of any kind shall not be mounted within a TE.

D. Patch Panels: Install 24-port and 48-port, 8-pin module Category 6/6A patch panels at main cross-connect and horizontal cross-connect for termination of cables installed as part of Work of this Section.

1. Install patch panels inside wall mounted data enclosure for retrofit column mounted TE applications. Install patch panels on floor mounted 19 inch wide by 84 inch high open relay racks at CCR and TR room locations, only.
2. Furnish and install wire management panel (1RU) on rack or cabinet mounting rails above and below each patch panel for all locations.
3. Furnish ~~46~~ additional 1RU wire managers to be used in between PFE.
4. Furnish manufacturers strain relieved bars sufficient to maintain UTP bend radius at rear of panels.
5. Terminate all 4 pairs of each horizontal 4 pair cable to each 8 pin ("T568A") patch panel port.
6. Consolidation Point One (CP-1) cabling will terminate starting on the first Category 6 copper patch panel followed by ~~the minimum of 24 spare ports for future CP locations. T/O cabling will terminate on the next available patch panel in consecutive order (1, 2, 3....). Followed with six-plexes, quads, triplexes and then duplex (Wireless) telecommunication outlets.~~

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~87~~  
Last revised: ~~8/25/2017~~8/1/2018

SECTION 271300

COMMUNICATIONS BACKBONE CABLING

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this section for Mail Processing Facilities.*

**\*\*THIS ENTIRE SECTION CONSISTS OF REQUIRED PARTS OR ARTICLES. DO NOT REVISE WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER AND THE RALEIGH IT SERVICE CENTER SUBJECT MATTER EXPERT FOR NEW CONSTRUCTION/BUILDING EXPANSIONS.**

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured cabling system components:
  - 1. Fiber Optic Cabling.
  - 2. Termination equipment.
  - 3. Patching equipment.
  - 4. Fiber Optic Testing.
- B. Related Documents:
  - 1. Specified in Section 270500 – Common Work Results for Communications.
- C. Related Sections:
  - 1. Specified in Section 270500 – Common Work Results for Communications

1.2 REFERENCES

- A. Specified in Section 270500 – Common Work Results for Communications.

1.3 SYSTEM DESCRIPTION

- A. Specified in Section 270500 – Common Work Results for Communications.

1.4 SUBMITTALS

- A. Specified in Section 270500 – Common Work Results for Communications.

1.5 QUALITY ASSURANCE

- A. Specified in Section 270500 – Common Work Results for Communications.

1.6 DELIVERY, STORAGE, AND HANDLING

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

- B. Deliver in accordance with NEMA WC 26.

## PART 2 - PRODUCTS

### 2.1 CONDUITS, BOXES AND CABLE TRAYS

- A. Specified in Section 260533 – Raceway and Boxes for Electrical Systems.

### 2.2 CATEGORY 3/5e BACKBONE (RISER) CABLING (FOR TR AND TE CABLE APPLICATIONS ONLY)

- A. Manufacturers:

1. Belden
2. Berk-Tek, Inc.
3. CommScope Uniprise
4. General Cable
5. Mohawk/CDT
6. NORDX/CDT
7. Superior Essex
8. Tyco Electronics AMP NETCONNECT
9. Product options and substitutions. Substitutions: NOT permitted.

- B. Conductors: ~~25~~<sup>or 50</sup> pair twisted – 24 AWG, solid copper.

1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is contained with conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
2. Complies with individual characteristics established in TIA-568-B for Category 3/5e cable performance specification.
3. Nominal Impedance: 100 ohms plus or minus 15 percent.

### 2.3 ~~OM3~~, OM4+, OS1, OS2 ARMORED BACKBONE LOMF

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

1. Belden
2. Berk-Tek
3. CommScope Uniprise
4. Corning Cable Systems - Preferred
5. General Cable
6. Leviton
7. Optical Cable Corp.
8. Ortronics (Legrand)
9. Superior Essex
10. Product options and substitutions. Substitutions: NOT permitted.

- B. Conductors: 24 / 48 strands

1. Terminate fiber strands onto “SC” ports, vertically mount, ports 1 through 12, left to right. No deviation allowed.
2. Fiber strands are required to be installed on (1) one 1RU Fiber Optic Interconnection panel, ports 1-12, no exceptions.
3. The same port layout orientation must be preserved on the far end strand terminations. All ports must be installed vertically. No horizontal orientation allowed. No exceptions.

4. All individual Armored Fiber runs are required to be bonded on the CCR end only, connected to the SBB in the CCR and clearly labeled with machine labels.
5. All backbone fiber strands shall be installed using reverse-pair positioning which allows the use of have their Polarity Reversed so that straight through A-B fiber patch cords can be used. ~~Ex: Strand 1 on the near end is Strand 2 on the far end. Strand 2 on the near end is Strand 1 on the far end.~~ Refer to ANSI-TIA-568.3.D-C-0, Annex BC.
6. Provide individually insulated plenum rated strands under common plenum rated sheath unless entire cable is contained within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
7. Complies with individual characteristics established in TIA-568-C including all addendums for fiber optic cable performance specification.
8. All underground fiber cable shall be indoor/outdoor rated. Loose tube fiber cable, if utilized, shall be equipped with furcation kits.

#### 2.4 FIBER OPTIC RACK MOUNT INTERCONNECT CENTER

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  1. CommScope Uniprise
  2. Corning Cable Systems - Preferred
  3. Ortronics (Legrand)
  4. Panduit
  5. Product options and substitutions. Substitutions: Not permitted.
- B. Enclosure connector and adapter panels:
  1. SC type Laser Optimized connectors
  2. 12 port coupler panels with SC connectors; 18 port panels are not acceptable.
  3. Each rack mount enclosure used in CCR will be 1.75 inches (1 RU) with (12) 12-Port SC/SC style laser optimized coupler panels to house the backbone fiber. Each individual TR/TE will receive a dedicated rack mount enclosure.
  4. Rack mount enclosure used in TR/TE locations will be 1.75 inches (1 RU) with (12) 12-Port SC/SC style laser optimized coupler panels. ~~Supply one (1) 1RU wire manager directly below the enclosure.~~
  5. Complies with TIA-568-C specification.

#### 2.5 ~~OM3, OM4~~, OS1, OS2 FIBER OPTIC PATCH CORDS: 2 STRAND, TIGHT BUFFERED

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  1. Belden
  2. Berk-Tek
  3. CommScope Uniprise
  4. Corning Cable Systems – Preferred
  5. General Cable
  6. Leviton
  7. Optical Cable Corp.
  8. Ortronics (Legrand)
  9. Superior Essex
  10. Product options and substitutions. Substitutions: Not permitted.
  11. Fiber patch cord manufacturer shall be the same manufacturer furnishing the backbone fiber. Mixing of manufacturers is not acceptable.
- B. Fiber optic duplex patch cords.

1. USPS to specify connector type and length for patch cords based on the total number of fiber ports being installed. Connectors could be SC/LC, SC/SC or LC/LC.
2. Complies with individual characteristics established in TIA-568-C including all addendums for fiber optic patch cable performance specification.
3. Patch cords shall be factory made and factory tested individually, and factory wrapped within non-clear plastic bags. The plastic bag shall clearly identify the manufacturer/testing agency with silk screen on the outside and shall contain the cable test results. Plastic bags shall have perforated or zip-lock top for easy removal of cord. Clear plastic, unlabeled bags are not permitted.
4. Contractor shall provide fiber patch cords for 75 percent of the total fiber ports installed. Example: (5400) Duplex fiber ports (1200 strands) installed, provide (75) Duplex fiber patch cords. All fiber patch cord colors, lengths and quantities shall be determined by Raleigh IT SME.
5. Fiber optic patch cord connector types, lengths and quantities shall be specified by U.S. Postal Service personnel prior to procurement.
6. Match performance characteristics of installed fiber optic backbone.

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Delete the following Section if FP-1 is not used.*

\*\*\*\*\*

2.6 TYPE 1 FIBER OPTIC POINT (FP-1) FOR WORKROOM FLOOR ENCLOSURES (TYPICAL FOR FSS SITES)

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  1. Hoffman Enclosures, Inc.
  2. Rittal Corporation: (AE, or EB Series enclosures)
  3. Product options and substitutions. Substitutions: Not permitted.
- B. Enclosures:
  1. Must be metal, no plastic allowed. Minimum 12 inches high x 12 inches wide x 8 inches deep sheet steel NEMA-12 enclosure with hinged, lockable door with rubber gasket, mounted at 14 ft. AFF. Alternate size: 14 inches high x 16 inches wide x 6 inches deep.
  2. Door must be oriented so that it opens in a horizontal manner. Enclosure may not be mounted in a manner so that the door opens downward.
- C. Connectors and adapter plates:
  1. SC type Laser Optimized connectors.
  2. 3 port coupler panel with laser optimized SC adapters for each FP.
  3. 6 Strands x Number of FPs = size of enclosure needed, and amount of SC adapters for CCR.
  4. Rack mount enclosure is 1.75 inches high. (1 Rack Unit)
  5. Complies with TIA-568-C specification.

PART 3 - EXECUTION

3.1 INSTALLATION - COMPONENTS

- A. Type 1 Fiber Optic Point: Furnish and install 6 port fiber optic enclosures (FP-1) at each location identified on Electrical Drawings using NEMA 12 rated enclosures. Mount fiber optic points with uni-strut or equivalent fastening devices to steel ceiling structure (red iron) so that box is vertical and installed between 20 to 23 feet above the finished floor. Door must be oriented so that it opens in a horizontal manner. Enclosure may not be mounted in a manner so that the door opens downward. Contractor must ensure all minimum bend radius specifications for cables can be achieved inside the

enclosures. All terminating components shall match the requirements/performance specifications of the cable specified. Install cables from Fiber Optic Points to CCR in wire basket tray, support loops or J-Hooks with a maximum span of 4 ft.

### 3.2 FIBER OPTIC TESTING

- A. 10Gb 50/125 micron ~~OM3~~, OM4 ~~or OM4+~~ Laser Optimized Multi-Mode Fiber (LOMF) Optic Cable Testing / OS1, OS2 Single Mode Testing
1. Fluke testers are the only allowed fiber tester manufacturer. Tester must be Encircled Flux Compliant.
  2. Test Reference Cords (TRC's) must be used. Test Reference Cord verification must be shown in the final test result submission.
  3. Tier 1, Tier Method B (one jumper) and Tier 2 OTDR testing is required. The Tier 2 OTDR requires bi-directional testing.
  4. The installer shall Set a Reference based on Method B (Single Jumper) which includes both mated connector losses and the loss of the link under test.
  5. The installer shall perform Tier 1 Testing with Optical Loss Test Set (OLTS) that includes testing for length.
  6. The installer shall perform Tier 2 testing with OTDR to show all ~~fusion~~ splices.
  7. The supplier shall perform Bi-directional testing on all installed fiber optic cabling. Supplier test equipment shall perform testing of fiber in accordance with the fiber type being tested, 10Gb 50/125 micron laser optimized multi-mode using the procedures outlined in TIA-568-C.0 and TIA-526-14-A, Method B for Multimode fiber (One Jumper/Two Adapters), TIA-526-7 for Single mode fiber.
  8. The fiber testers and test heads shall have passed calibration within one year of actual test date. Any calibration in excess of one year is not acceptable. Each test set and fiber head must have the recent calibration paper printout from the calibration lab for inspection by USPS, prior to testing. The calibration printout must show actual serial numbers of test sets (main and remote and each fiber tested).
    - a. The current calibration for the main and remote fiber units MUST be supplied to Raleigh IT SME PRIOR to any testing.
    - b. USPS RITSC representative will determine test labeling format inside the fiber tester prior to actual testing. The Main Unit must be in the CCR or "MC".  
Example for fiber strand test: CCR to TE 1-06 14 (for strand 14), or MC to HC 1-06 14 (for strand 14). All fiber strands will be tested bi-directionally. Any fiber test results that only show testing in one direction will be rejected.
  9. Multimode fiber optic cable shall be tested bi-directionally at wavelengths of 850nm and 1300nm. Single mode fiber optic cable shall be tested bi-directionally at 1310nm and 1550 nm.
  10. Cable tester test parameter shall be set to correct values for:
    - Actual manufacturer of fiber being installed. Tester cannot be a generic 10Gb fiber type and must be specific to the manufacturer's model of fiber cable being tested.
    - Index of Refraction based on manufacturer specifications for cable type being tested.
    - Quantity of adapters (typically 2). Test Method B. One Jumper, 2 adapters.
    - Fiber Type.
    - Test to Tier 1 as mandated by TIA-568-C.0.
    - Preferred tester is ~~Fluke DTX series or~~ Fluke Versiv series with Encircled Flux.
  11. The Low Voltage Installer shall provide all Fiber tests in one, single file. No multiple files will be accepted.
  12. The Supplier shall review test settings with the USPS technical representative. Supplier shall have cable specifications on site for USPS technical review to verify settings are correct on test equipment.
  13. Fiber optic cables shall pass all attenuation tests referenced to formulas presented in the listed standards.
  14. Perform end-to-end tests of each fiber optic backbone cable as follows (applies to CCR/TR/TE applications only):

- a. Tier 1 Test: Light Source Power meter tests per TIA-568-C specification.
  - b. Optical Time Domain Reflectometer (OTDR) tests per TIA-568-C specification including all addendums.
  - c. Both the Tier 1 test and the Tier 2 OTDR test results must be uploaded to the "Link Ware Live" cloud based repository for USPS RITSC access.
  - d. Performing one test and not the other does not satisfy a complete fiber test. Both tests must be submitted in one file, all at the same time.
  - e. Measured effective cable run length.
15. Optical photographs of each fiber end shall be submitted for documentation and warranty purposes.

### 3.3 CONSTRUCTION

- A. Specified in Section 270500 – Common Work Results for Communications.

### 3.4 FIELD QUALITY CONTROL

- A. Specified in 270500 – Common Work Results for Communications.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018~~7~~  
Last revised: ~~8/25/2017~~8/29/2018



SECTION 271500

COMMUNICATIONS HORIZONTAL CABLING

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Specification section for Mail Processing Facilities.*

*THIS ENTIRE SECTION CONSISTS OF REQUIRED PARTS OR ARTICLES. DO NOT REVISE WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER AND THE RALEIGH IT SERVICE CENTER SUBJECT MATTER EXPERT FOR NEW CONSTRUCTION/BUILDING EXPANSIONS.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following structured cabling system components:
  - 1. CAT-6/6A copper communication cable.
  - 2. Termination equipment.
  - 3. Patching equipment.
  - 4. CAT-6/6A copper testing.
- B. Related Documents:
  - 1. Specified in Section 270500 – Common Work Results for Communications.
- C. Related Sections:
  - 1. Specified in Section 270500 – Common Work Results for Communications.

1.2 REFERENCES

- A. Specified in Section 270500 – Common Work Results for Communications.

1.3 SYSTEM DESCRIPTION

- A. Specified in Section 270500 – Common Work Results for Communications.

1.4 SUBMITTALS

- A. Specified in Section 270500 – Common Work Results for Communications.

1.5 QUALITY ASSURANCE

- A. Specified in Section 270500 – Common Work Results for Communications.

1.6 DELIVERY, STORAGE, AND HANDLING

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

- B. Deliver in accordance with NEMA WC 26.

## PART 2 - PRODUCTS

### 2.1 CATEGORY 6/6A (CATEGORY 6A IS FOR WIRELESS USE ONLY) HORIZONTAL CABLING

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Belden
  - 2. Berk-Tek
  - 3. CommScope Uniprise
  - 4. General Cable
  - 5. Leviton
  - 6. Ortronics (Legrand) - Preferred
  - 7. Panduit
  - 8. Product options and substitutions. Substitutions: Not permitted.
- B. Conductors: 4 twisted pair, minimum 24 AWG, solid copper.
  - 1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
  - 2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6/6A cable performance specification.
  - 3. Nominal Impedance: 100 ohms plus or minus 15 percent.
  - 4. Certified and capable of performing to a minimum of 250 MHz.

### 2.2 CATEGORY 6/6A / (CATEGORY 6A WIRELESS USE ONLY), COPPER PATCH CORDS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Belden
  - 2. Berk-Tek
  - 3. CommScope Uniprise
  - 4. General Cable
  - 5. Leviton
  - 6. Ortronics (Legrand) - Preferred
  - 7. Panduit
  - 8. Product options and substitutions. Substitutions: Not permitted.
- B. Conductors: Straight through type 4 twisted pair minimum 24 AWG, stranded copper.
  - 1. Terminated with male 8-pin modular plugs.
  - 2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6/6A cable performance specification.
  - 3. Nominal Impedance: 100 ohms plus or minus 15 per cent. Certified and capable of performing to a minimum of 250 MHz.
  - 4. Match performance and impedance characteristics of the installed horizontal unshielded twisted pair cable.
  - 5. Contractor shall provide Category 6/6A copper patch cord for 75 percent of the total copper ports installed. Example: (1000) copper ports installed, provide (750) Category 6/6A copper patch cords. Contractor shall provide manufacturer terminated patch cables. All copper patch cord colors and lengths shall be determined by Raleigh IT Service Center SME.
  - 6. Each patch cord shall have a plastic arch for ease of removal of the connector (rubber boots are not acceptable). Preferred Copper Patch type: Ortronics (Legrand) #OR-MC615-06.

7. Patch cords shall be factory made, tested and individually factory wrapped within non-clear plastic bags. The plastic bag shall clearly identify the manufacturer/testing agency with silk screen on the outside and shall contain the cable test results. Plastic bags shall have perforated or zip-lock top for easy removal of cord.
  8. All Category 6A wireless patch cords will be white in color. All WAP Category 6A patch cords will be 3 ft. on the WAP end.
- C. Connector:
1. 8-pin modular, Category 6/6A, non-keyed.
  2. Complies with TIA-568-C "T568A" pinning configuration.
  3. Color: Clear.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Delete Sections 2.3, 2.4 and 2.5 if CP-1 is not used.*  
 \*\*\*\*\*

2.3 CATEGORY-6 12 PORT MODULAR SURFACE-MOUNTED "110"-STYLE PATCH PANELS CONSOLIDATION POINTS (CP-1). TYPE 1

- 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. Substitutions: Not permitted.
- B. Boxes/Panels:
1. Capable of terminating (12) Category 6 cables.
  2. Equipped with an 89D surface mounting bracket.
  3. Complies with TIA-568-C "T568A" pinning configuration.
- C. Connector:
1. 8-pin modular, Category 6, non-keyed.
  2. Complies with TIA-568-C "T568A" pinning configuration.
  3. Color: Selected by ~~Contracting Officer through~~ the USPS Project Manager.
  4. Attached to backboard of CP-1 with 89-D type bracket.
- D. Housing
1. Wall or raceway mounted outlet enclosure, CP-1.
  2. Able to contain 12 modular 8-pin connectors
  3. Installation over single gang junction box, double gang junction box, or raceway knockout as indicated on Drawings.
  4. Color: Selected by ~~Contracting Officer through~~ the USPS Project Manager.

2.4 TYPE 1 CONSOLIDATION POINT (CP-1) FOR WORKROOM FLOOR ENCLOSURES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Hoffman Enclosures, Inc.
  2. Rittal Corporation: (AE, or EB Series enclosures).
  3. Product options and substitutions. Substitutions: Not permitted.
- B. Enclosures:

1. Must be metal, no plastic allowed. Minimum 12 inches high x 12 inches wide x 8 inches deep sheet steel NEMA-12 enclosure with hinged, lockable door with rubber gasket, mounted at 14 ft. AFF. Alternate size: 14 inches high x 16 inches wide x 6 inches deep.
2. Door must be oriented so that it opens in a horizontal manner. Enclosure may not be mounted in a manner so that the door opens downward.

## 2.5 OUTLET FACEPLATES/MOUNTING FRAMES

- A. Wall mounted, or raceway mounted outlet faceplates or mounting frames, suitable for the following:
  1. Mounting required number of 8-pin modular connectors.
  2. Use with approved 8-pin modular connectors.
  3. Installation over single gang junction box, double gang junction box, or raceway knockout as indicated on Drawings.
- B. Color: White with Machine manufactured permanent labeling with Black lettering.

## 2.6 CONDUITS, BOXES AND CABLE TRAYS

- A. Specified in Section 260533 – Raceway and Boxes for Electrical Systems.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Specified in Section 270500 – Common Work Results for Communications.

### 3.2 INSTALLATION

- A. Cables: Furnish and install communications cables as specified, in accordance with Cable Pulling Schedules, manufacturer's published instructions, TIA-568-C including all addendums and as indicated on Drawings.
  1. Dress cable to final location, remove sheath to point allowing splaying of conductors, and terminate. Make each termination uniform and precise. Hook and Loop "Velcro" cable ties shall be used for bundling and dressing all cabling. No nylon zip ties shall be used for cable bundling or attachment.
  2. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify, or add to manufacturer's twisting of cable. Do not untwist more than 1/2 inch of the stripped cable.
  3. Label each end with a machine generated, self laminating label.
  4. Mechanical couplers or splices not permitted in copper cabling.
  5. Cable conductors shall be continuous from originating termination equipment to destination termination equipment.
- B. Telecommunications Outlet: Furnish and install appropriate number of female 8-pin modular jack connectors on one face plate at each T/O (telecommunications outlet) as indicated on Drawings.
  1. Install faceplate over duplex outlet box, double duplex outlet box, or raceway knockout, level and in alignment with adjacent faceplates.
  2. Except where entire cable run is in conduit/EMT, provide a minimum 20-foot service loop in the ceiling at the end of the conduit/EMT riser before the cable enters the outlet box.
  3. Coordinate color with Raleigh IT Service Center POC.

### 3.3 CAT-6/6A COPPER TESTING

- A. Section 014000 – Quality Requirements: Field testing and inspection.
- B. Testing and Certification Overview
  - 1. The Contractor shall provide Fluke Copper/Fiber equipment and materials for the testing of all installed copper and fiber transmission media. For Category 6 copper, the supplier shall employ Level III compliant test equipment that stores the test results in internal memory and produces test result reports. For Category 6A, the supplier shall employ Level IV compliant test equipment that stores the test results in internal memory and produces test result reports. The supplier shall provide the USPS, test results in test equipment format (raw electronic). Supplier prepared spread sheets and PDF files are NOT ACCEPTABLE. There is a USPS 10MB attachment limit. There should never be test results over 10MB. USPS cannot access DropBox.
    - a. The USPS technical representative may conduct random tests of copper and fiber cable with USPS test equipment as part of the final inspection. The Contractor shall re-terminate and retest any cable found to be defective.
    - b. The Contractor shall provide all equipment and services necessary to secure and provide the USPS a system warranty. Inspect installation of cables and equipment during and at completion of installation.
    - c. Test results indicating “Pass\*(Star)” or “Fail” shall not be accepted and must be repaired/retested with 2<sup>nd</sup> set of test results submitted to Raleigh IT SME.
    - d. Test results must be uploaded to the “Link Ware Live” cloud based repository for USPS RITSC access.
- C. Copper Cable Testing
  - 1. Test parameters include, but are not limited to:
    - Wire Map
    - Length
    - Propagation Delay
    - Delay Skew
    - DC Loop Resistance
    - Insertion Loss (Attenuation)
    - Return Loss (RL), RL @ Remote
    - NEXT, NEXT @ Remote
    - Attenuation-to-crosstalk Ratio (ACR-N), ACR-N @ Remote
    - ACR-F (ELFEXT), ACR-F @ Remote
    - Power Sum ACR-F (ELFEXT), PS ACR-F @ Remote
    - Power Sum NEXT, PS NEXT @ Remote
    - Power Sum ACR-N, PS ACR-N @ Remote
    - Power Sum Alien Near End Xtalk (PS ANEXT)
    - Power Sum Alien Attenuation Xtalk Ratio Far End (PS AACR-F)
    - Alien Cross-talk
  - 2. Cable test parameters shall be set to the manufacturer’s values for NVP and Test Limit (TIA-568-C, Category 6/6A, Permanent Link). If the NVP is not set correctly, test results will be rejected.
  - 3. Perform end-to-end tests of each 4-pair cable as follows:
    - a. Pair/conductor for proper pinouts and continuity.
    - b. Ground fault.
    - c. Proper termination, shorts, and crossed pairs.
    - d. Channel attenuation per TIA-568-C, including all addendums.
    - e. Channel bi-directional worst case near end cross talk (NEXT) at frequencies up to 250 MHz, per TIA-568-C, including all addendums.
    - f. Measured effective cable run length.

### 3.4 INSTALLATION COMPONENTS

A. Specified in Section 270500 – Common Work Results for Communications.

3.5 CONSTRUCTION

A. Specified in Section 270500 – Common Work Results for Communications.

3.6 FIELD QUALITY CONTROL

A. Specified in Section 270500 – Common Work Results for Communications.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~  
Last revised: ~~8/25/2017~~8/24/2018

SECTION 272133

DATA COMMUNICATIONS – WIRELESS ACCESS POINTS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this section for Mail Processing Facilities (MPF).*

***\*\*THIS ENTIRE SECTION CONSISTS OF REQUIRED PARTS OR ARTICLES. DO NOT REVISE WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER AND RALEIGH IT SERVICE CENTER SUBJECT MATTER EXPERT FOR NEW CONSTRUCTION/BUILDING EXPANSIONS.***

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following:
  - 1. This section specifies requirements for the design/layout, and installation of Telecommunications outlets (T/Os) that are to serve IEEE 802.11 wireless access points (WAPs).
- B. Related Documents:
  - 1. The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section.
  - 2. USPS LAN Infrastructure Best Practices, 01 October 2018~~7~~.
  - 3. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
  - 1. Section 078400 – Fire stopping
  - 2. Section 270500 – Common Work Results for Communications
  - 3. Section 271100 – Communications Equipment Room Fittings
  - 4. Section 271300 – Communications Backbone Cabling
  - 5. Section 271500 – Communications Horizontal Cabling

1.2 REFERENCES

- A. Specified in Section 270500 – Common Work Results for Communications

1.3 DESIGN REQUIREMENTS

- A. Coverage areas
  - 1. All building spaces shall have full “Workroom” and “Administrative” area coverage for currently supported Wi-Fi standards. This includes 802.11a/g/n/ac.
  - 2. Coordinate with Raleigh Telecom Service Wireless Team during design for indoor and outdoor locations.
- B. Identification on drawing floor plans
  - 1. Duplex telecommunications outlets (T/Os) for WAPs shall have a distinct symbol on the drawings; preferably a number 30 orange dot.

- C. Cabling infrastructure
  - 1. Each Telecommunications outlet (T/O) for a WAP is to be served by two (2) category 6A cables terminated with an 8P8C connector onto a 24 port Cat6A Copper Patch Panel.
  - 2. Cable locations/mounting will be designed in the Admin areas for below ceiling and flush mounted WAPs. Any exceptions, such as high-density locations, shall be approved by Raleigh IT.
- D. Power requirements: All USPS WAP's utilize PoE (Power over Ethernet). No power outlets (120 Volt) are required to support wireless access points.

#### 1.4 SUBMITTALS

- A. The following submittals are due at the Pre-Construction Phase, in accordance with submittal requirements in Section 270500 – Common Work Results for Communications.
  - 1. Shop Drawings:
    - a. Provide scaled drawings (not less than 1/8" = 1'-0") indicating location of Cat6A telecommunications outlets (T/O's) for the WAPs and locations of all pull points. These locations shall be coordinated with all other trades.
- B. The following submittals are due Post-Construction, in accordance with the submittal requirements in Section 270500 – Common Work Results for Communications:
  - 1. Record Drawings.
    - a. Provide scaled AutoCAD and PDF drawings (not less than 1/8" = 1'-0") indicating actual location of communications outlets for the WAPs, as well as the actual installed routing of cable, conduits and locations of all pull points. Design or shop drawings with field notes will not be accepted.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Raleigh Telecom Services Wireless Team will provide the WAPs and related equipment (PoE switches, patch cables, controllers) for the scope of the project, and can provide the architects specifications for aesthetic concerns.
- B. Typically used WAP models are 802.11ac capable and operate on a 5 GHz radio frequency operating mode.
- C. Exposed structure mounting:
  - 1. The General Contractor shall provide fire-resistant wooden mounting base, dedicated duplex CAT 6A, telecommunication outlet and satellite arm with "L" shaped adapter.
    - a. The satellite mounting arm shall be provided by the Contractor; "L-com", universal tube mount #HGX-UMOUNT.
    - b. The "L"-shaped bracket adapter shall be provided by the Contractor; "L-com" 60-degree tilt and swivel mount kit #HGX-PMT06.
    - c. The plywood and appropriate mounting channels are to be provided by the Contractor.
    - d. The "WAP" is factory equipped with a low profile, mounting bracket (Cisco #AIR-AP-BRACKET-1).
- D. Acoustic ceiling tile grid mounting:
  - 1. The mounting bracket and ceiling grid clip assembly for ceiling tile grid mounted WAP's are factory furnished as part of the WAP.
    - a. WAP's to be installed in acoustic ceiling tile grids require a dedicated duplex, CAT 6A, telecommunications outlet.



- b. The "WAP" is factory equipped with a universal, mounting bracket and ceiling grid clip assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 GENERAL

- A. Exposed structure mounting:
  - 1. Contractor shall provide fire-resistant wooden mounting base. Mount duplex telecommunication outlet on wooden base, attach satellite arm and "L" shaped adapter to wooden base, and mount attached WAPs at 12' AFF on the Work Room Floor via uni-strut mounted from the structure above. No column mounts are acceptable with the exception of the mounting for the monitor WAP's. If Satellite arm is mounted in a vertical orientation, ensure the arm rests against the stop without a need for a securing bolt.
    - a. WAP's are normally mounted at 12 ft. A.F.F. within the workroom, except immediately around FSS machines where the WAP's are mounted no lower than 16 ft. A.F.F.
    - b. WAP shall be secured to its mount using locking key and tie-wrap fastened through the security hasp.
- B. Acoustic ceiling tile grid mounting:
  - 1. WAP's to be installed in acoustic ceiling tile grids require a duplex, CAT 6A, telecommunications outlet securely mounted above the accessible ceiling located within 2 ft. of the WAP.
  - 2. WAP shall be secured to its mount using locking key and tie-wrap fastened through the security hasp.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Refer to standard details G5-4-3a, G5-4-3a1, G5-4-3a2 and G5-4-3b for exposed structure and acoustic ceiling tile grid mounting provisions. Pay close attention to the "Notes to A/E" associated with those details. Be sure to include the applicable details in the project drawing set.*  
\*\*\*\*\*

- C. Utilize a 3 ft. long white colored, copper patch cord. Patch the WAP into the first port of the duplex T/O and into the ethernet port (not console port) of the WAP. Contractor shall fill out all needed spreadsheet documentation and submit to Raleigh IT POC. This includes MAC address, Workroom floor location, duplex port WAP is patched to, (the first of the two data ports) TR/TE connected to, etc.
- D. All WAP's shall be mounted with the ethernet and console ports oriented as close as possible to the "true north" direction for optimal GPS map reading.
- E. WAP's are furnished by Raleigh Telecom Services Wireless Team and installed by the Contractor. The Contractor shall install and complete the necessary mounting assemblies prior to the attachment of the WAP's.

- F. Wireless Spectrum Survey shall be performed by the Raleigh Wireless Team after installation to validate the wireless design.

END OF SECTION

USPS Mail Processing Facility Specification issued: [1006/1/2018](#)  
Last revised: ~~0893/5278/2018~~

SECTION 275116

~~IP INTEGRATED, PUBLIC ADDRESS ZONE AND PAGING SYSTEMS~~

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction and. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

EDIT THIS SECTION BY ADDING AND/OR DELETING TEXT FOR THE SPECIFIC CONDITIONS AND REQUIREMENTS OF THE PROJECT SITE.

*Text in [brackets] indicates a choice must be made. Brackets with [ \_\_\_\_-] indicates information may be inserted at that location.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. ~~IP integrated, public address zone~~ paging system.

B. Related Documents:

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

B.C. Related Sections:

- 1. ~~Section 260500 - Common Work Results for Electrical;~~
- 2. ~~Section 260533 - Raceway and Boxes for Electrical Systems;~~
- 3. ~~Section 270500 - Common Work Results for Communications: Telecommunications cables, termination, and patching equipment.~~

Formatted: Normal

1.2 REFERENCES

A. ~~As specified in section 260500 - Common Work Results for Electrical~~Electronic Industries Association (EIA);

- 1. ~~ANSI/TIA/EIA-568-A - Commercial Building Wiring Standard.~~

B. ~~As specified in section 270500 - Common Work Results for Communications~~National Fire Protection Association (NFPA);

- 1. ~~NFPA 70 - National Electrical Code.~~

1.3 GENERAL

- A. ~~The Contractor shall deliver a complete and working system, fully tested, that meet the requirements of this specification. The zone paging system shall seamlessly integrate with the USPS BroadWorks VoIP equipment. All systems shall be completed and ready for immediate use.~~

B. The Contractor shall review specifications and prints sufficient to become familiar with the interface requirements for this project. The Contractor shall provide any items not included, but required, to make this a complete and working system.

C. Cabling plant consists of an Equipment Room or Consolidated Computer Room (ER or CCR) (which shall mean the same as Main Cross-Connect (MDF or MC or MXC)) and multiple Telecommunication Rooms (TRs) (which shall mean the same as Intermediate Cross-Connects (IDF or HCs or IXC). All cable, which interconnects the MC or HC's to the end point devices, shall be provided.

#### 1.4 SCOPE OF WORK

A. Provide an IP integrated, multicast, zone paging communications system to include the sub-systems as required in Part 2, Products, of this specification:

B. The Contractor shall provide coordination services with the Owner's telephone installer (throughout the warranty period) in order to achieve a functional interface between the two systems.

C. The intent is to utilize the facility LAN (and USPS WAN). The Contractor shall provide any cross connects or hardware requirements (excluding USPS furnished LAN switches) to provide a complete and working paging system. The Contractor shall be responsible for providing and installing the equipment and connections for an integrated and operational system and coordination of the programming with the Raleigh IT Group.

#### 1.5 ZONE PAGING FUNCTIONAL DESCRIPTION

A. Provide fully-operational IP platform for zone paging communications system incorporating safety notifications and general communications. The paging system shall consist of software and IP addressable hardware that shall reside in MC or HC equipment racks (provided and configured by the SCS Integrator).

B. The platform shall provide communications employing state-of-the-art IP technology including the following minimum functions.

1. IP paging

2. Emergency announcement that shall override any pre-programmed zones assuring that Emergency/Lockdown etc. are heard at every speaker location utilizing pre-recorded audio - tones, music and voice or live voice paging.

3. Capability of pre-recording emergency announcements.

4. Utilization of computers and telephones throughout the facility for zone paging function.

5. System software to synchronize time with network timeserver or web-based time server.

6. Capability for paging configurability ranging from Plant-wide to individual end-point.

7. The solution must be capable of sending synchronized pages to all BroadWorks Phone types used in the facility.

8. The Contractor's solution must be recommended by and supported as integrated partner with the "BroadWorks" Cloud PBX and Unified Communications IT Management Platform utilized in the facility.

9. System software shall interface with the facilities Motorola Mobile Radio System using analog DTMF connection and dialer.

#### 4.41.6 SUBMITTALS

A. Submit electronic copy of required information prior to proceeding with the work. Procedures for submittals.

1. ~~Provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, location of each field connection, and a complete schedule of all equipment and materials with associated manufacturer's product information n which are to be used.~~Product data: For each type of equipment.
2. ~~Indicate that the rack space and power requirements for equipment are adequate.~~Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection.
3. ~~Provide a Visio, or simpler diagram, describing IP addressing and proposed VLAN scheme and multicast containment.~~Control equipment.
4. ~~Submit termination schedule (matrix) of PoE ports utilized for proposed IP speakers, and zone adapters (immediately after award of contract) to the USPS. The quantity of ports will determine the number of USPS furnished PoE network switches required. Termination schedule shall include:~~Rack arrangements:
  - a. Speaker or zone adapter identification.
  - b. Cable identification number.
  - c. Room location.
  - d. Patch panel identification number.
  - e. Patch panel port identification number.
5. ~~Provide UPS consumption power chart and product specifications.~~Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance. Include a single-line diagram showing cabling interconnection of components.
6. ~~Indicate quantities of patch panels and port counts.~~
7. ~~Indicate patch cords count.~~
8. ~~Provide wiring diagrams. Each diagram shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project as well as System Installation Company's name in the title block.~~
9. ~~Provide details and descriptions of any other aspect of the system, which would differ from the contract documents due to field conditions or equipment furnished.~~

Formatted: 4

- B. ~~Review and approval of shop drawings by the Engineer does not supersede the requirement to provide a complete and functioning system in compliance with the Contract Documents.~~Calculations: For sizing backup battery.
- C. ~~Field Test Reports:~~ Indicate and interpret test results for compliance with performance requirements. Include record of final speaker-line matching transformer-tap settings, and signal-ground-resistance measurement certified by Installer.
- D. ~~Maintenance Data:~~ For equipment to include in maintenance manuals specified in Division 1.
- E. ~~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.
- F. ~~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.~~

#### 1.51.7 CONTRACTOR QUALIFICATIONSQUALITY ASSURANCE

A. ~~The Paging System Contractor shall have successfully completed installations of similar network equipment and project magnitude to that specified herein within the last three years of the bid submittal.~~ Qualifications:

1. ~~The Contractor (installing the IP paging system herein specified) shall be an experienced IP PAGING SYSTEM CONTRACTOR and bondable. "Experienced" shall mean that the Contractor is an authorized representative of the equipment manufacturer and can demonstrate they have personnel that have experience in the design, installation, testing, and maintenance of IP paging systems.~~ Manufacturer: Company specializing in manufacturing Products specified with minimum 5-years documented experience.
2. ~~The Contractor shall have experience as an IP TELEPHONY CONTRACTOR. "Experienced" shall mean that the Contractor has been certified in the installation of IP Phone systems to be deployed in conjunction with the IP paging system.~~ Installer: 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.
3. If requested, the Contractor shall submit to the Owner or A/E, before work begins, certificates of successfully completed manufacturers' training classes, specifically related to the equipment being installed.

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.~~

#### 1.8 DELIVERY, STORAGE, AND HANDLING

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

#### 1.9 MAINTENANCE

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

Formatted: 3

### **PART 2 - PRODUCTS**

\*\*\*\*\*

#### **NOTE TO SPECIFIER**

*Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.*

\*\*\*\*\*

#### **2.1 MANUFACTURERS**

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

1. Algopha Communications Products, LTD, Burnaby BC, Canada (604) 454-3792.
2. ~~Altec Lansing/University Sound.~~
3. ~~Atlas Soundolier; Atapco Security & Communications Group.~~
4. ~~Bogen Communications, Incorporated.~~
5. ~~Dukane Corp.; Communications Systems Division.~~
6. ~~Electro-Voice, Incorporated.~~
7. ~~Executone Information Systems Incorporated.~~
8. ~~Federal Signal Corporation; Signal Div./Electrical Products.~~
9. ~~Lucent Technologies, Silver Spring, MD (301) 608-4765.~~
10. ~~Peavey Electronics Corporation.~~

275116 - 4

USPS MPFS

Date: 10/1/2017~~8~~

IP INTEGRATED, PUBLIC ACCESS AND ZONE PAGING SYSTEMS

- 11. ~~Rauland-Borg Corporation.~~
- 12. ~~Valcom, Incorporated, Roanoke, VA (540) 427-3900.~~
- 13. ~~Whelen Engineering Company, Incorporated.~~

B. ~~Alternate manufactures compatible with "BroadWorks" IP Telephony may be considered for prior approval.~~

Formatted: 3

## 2.2 ACCEPTABLE ZONED PAGING SYSTEM MANUFACTURERS

A. ~~The zoned paging system software and hardware shall seamlessly integrate with the "BroadWorks" Cloud PBX and Unified Communications IT Management Platform utilized by the facility.~~

B. ~~Basis of Design: Algo SIP Endpoints, Algo Communication Products, Ltd.~~

## 2.3 PAGING ZONES

A. ~~Provide configuration for the zones, as directed by the Owner. System shall not limit the number of zones.~~

## 2.4 ACCEPTABLE SYSTEMS MUST MEET THE FOLLOWING MINIMUM FUNCTIONS

A. ~~Paging system shall function with the facilities BroadWorks VOIP equipment and shall leverage multicast technology on the network to efficiently send messages to all devices without flooding the network. SIP communications are acceptable for devices initiating a page or for non-page device communication messages. Actual pages must be via multicast to ensure synchronization and illuminate echo effect as well as unneeded network traffic.~~

B. ~~Paging system shall be able to reach all designated IP endpoints, IP phones, overhead speakers, email, SMS, and integrate with outbound dialers from one send event.~~

C. ~~Paging software shall override the physical volume setting on the phones.~~

D. ~~Paging software shall send site-based page to all phones, speakers, and/or zones synchronously to ensure audio clarity when multiple phones are near each other.~~

E. ~~System shall be able to monitor all telephones and trigger a page to a distribution list when specified number, such as 911, is dialed. When 911 is dialed, the system shall automatically derive the origination point of the call from the Call Manager appliance and inform the recipients of the message and of that location. This functionality or call awareness must be seamless from the phone system to the paging system and correctly identify the source of the call.~~

F. ~~The system shall have the ability to interface with "BroadWorks" to send instant messages to all users or have screen popups available that do not take excessive system resources.~~

G. ~~System shall include the ability to pre-record and auto-trigger a notification (i.e., pre-recorded message, text alert, email, etc.). System shall provide hands free, two way intercom between all phones.~~

## 2.5 ZONE PAGING EQUIPMENT AND MATERIAL

A. ~~Server Software/Hardware~~

275116 - 5

USPS MPFS

Date: 10/1/2017~~8~~

~~IP INTEGRATED, PUBLIC ACCESS AND  
ZONE PAGING SYSTEMS~~

1. ~~Contractor shall accept server (provided by Owner). Contractor shall install in Owner's rack and coordinate to provide software programming, as needed, to complete the system. Server shall be installed within the "MC" rack or location, as designated by Owner.~~
2. ~~Facility shall have a locally-survivable solution for IP paging and local emergency notification, such as lockdowns.~~
3. ~~System shall be configured to provide local live paging and additional scheduling, as determined by Owner.~~
4. ~~Additional configuration shall be provided to include system configuration to broadcast pre-recorded emergency notifications triggered by calling a specified extension on a local IP phone; sending an all clear broadcast to notifications triggered by calling a specified extension; and sending a pre-recorded all-clear page following a fire alarm drill.~~
5. ~~Reports on feature usage, system activity, etc. shall be provided via web-based interface.~~
6. ~~Configuration of system and initiation of system features shall be provided via web-based interface.~~
7. ~~System shall sync the time to the facility's network time server or network-based time server.~~
8. ~~Web-browser shall be provided to deliver facility-wide emergency paging and pre-recorded messages from any authorized user in the Plant. The software shall be capable of automatically notifying facility personnel via pre-recorded page, text, and or email over available LAN/WAN network.~~
9. ~~Provide and install an IP speaker and RJ45 jack and install Owner-provided telephone, at the main server location, to be zoned and used for web-interface to test source material or microphone inputs.~~
10. ~~Initially, Contractor shall set volume through software and provide documentation to the facility staff for further adjustments. IP speakers shall not use manual or in-room volume attenuation.~~
11. ~~The Contractor shall connect system to the facility-provided IP telephone network. See integration and configuration steps below.~~
12. ~~System shall support a flexible numbering plan allowing two, three, four, five, or six digit extensions to activate various paging activities, according to facility's dial plan.~~
13. ~~Server shall not need direct connection to any speaker via home run or distributed wiring. The intent is to communicate solely through the IP LAN network.~~
14. ~~Server shall store all Plant specific messages, schedules etc. The server shall have a backup and restore capability accessible via web interface.~~
15. ~~System's Voice Interface shall provide:~~
  - a. ~~Live audio paging access from any IP telephone to any IP endpoint. This shall include all zone controllers or any combination of IP endpoints.~~
  - b. ~~Triggering of pre-recorded notifications, emergency and non-emergency, from any IP telephone to any IP endpoint. This shall include all zone adapters or any combination of IP endpoints registered to the server.~~
16. ~~System shall utilize a web-browser and audio input device (like a USB microphone) to deliver facility-wide, live emergency paging, pre-recorded messages, and tones from any authorized computer in the facility.~~
17. ~~System shall be capable of automatically broadcasting page emergency instructions throughout the entire facility when an alarm (i.e., lockdown, lockout, security, fire, etc.) is tripped or manually activated. The emergency instructions shall be pre-programmed and shall require no user intervention. The system shall provide redundant, alarm annunciation over the paging speakers and shall not be meant to replace primary fire alarm or security systems.~~

~~B. IP Addressable Endpoints~~

1. ~~IP Speakers shall interface to each facility's data network.~~
  - a. ~~Provide the ability to belong to one or more independent zones for zone paging, program distribution, and tone reception. This assignment shall be a programmable function. Each IP speaker location or common zone shall be programmed in software and shall be able to belong to any combination of software defined zones.~~
  - b. ~~Basis of design for the IP speakers shall be non-plenum rated. However, Contractor shall supply plenum-rated, where required. Contractor may propose an all plenum-rated solution.~~

275116 - 6

USPS MPFS

Date: 10/1/2017~~8~~

~~IP INTEGRATED, PUBLIC ACCESS AND ZONE PAGING SYSTEMS~~



- c. Provide a contact that shall detect a closed/open switch activity that may be programmed to trigger a function such as strobe, panic, or other urgent message.
- 2. SIP Audio Alerter (interior wall mount) – Provide high efficiency integrated amplifier and tuned high quality loudspeaker with polycarbonate enclosure suitable for surface wall mounting and the following features:
  - a. Networked Managed SIP Endpoint.
  - b. Voice Paging with talk back capability.
  - c. Multicast receive or broadcast capability.
  - d. Outputs for external speaker and slave Amp.
  - e. Power Input: 48V PoE, 12 Watts (max).
  - f. SPL: 106 dBA at 1m internal speaker.
  - g. Speaker Output: 8 Watts rms, 8 ohm.
  - h. Configuration: TFTP, FTP, HTTP.
  - i. Dimensions: 7"H x 4"W x 2.6"D.
  - j. Basis of Design: Algo Communications Products #8180
- 3. SIP Ceiling Speaker (interior, recess ceiling mount) – Provide high efficiency integrated amplifier and tuned high quality, 8-inch round loudspeaker with 2 ft. x 2 ft. drop-in ceiling panel suitable for recess mounting within an acoustical dropped ceiling and the following features:
  - a. Networked Managed SIP Endpoint.
  - b. Voice Paging with talk back capability.
  - c. Multicast receive or broadcast capability.
  - d. Outputs for external speaker and slave Amp.
  - e. Power Input: 48 V PoE IEEE 802.3af Class 0 (Max 12.95 W - Idle nominal 2W)
  - f. Dimensions:
    - 1) 8" Diameter without trim ring
    - 2) 9.8" Diameter with trim ring
    - 3) Total height 7.0"
  - g. Weight: 6 lb
  - h. Speaker: 6.5" Coaxial with PEI Dome Tweeter Mica filled outdoor rated polypropylene cone
  - i. SPL: 102 dBA at 1m (1 kHz tone)
  - j. Frequency Response: 55 - 18,000 Hz (+/- 10 dB)
  - k. Microphone: Electret omnidirectional wideband
  - l. Audio Delay: 10 to 1000 ms selectable for synchronization
  - m. Audio Memory: 1 GByte available
  - n. Relay Output: Normally open, activated when 8188 is in use; Max 30 V 50 mA.
  - o. Relay Input: Normally open or normally closed dry contact
  - p. Configuration: TFTP, FTP, HTTP.
  - q. Environmental: 32 to 104 deg F, 10-95% RH non-condensing. Dry indoor locations only.
  - r. Basis of Design: Algo Communication Products #8188/#8188T2X2.
- 4. SIP Ceiling Speaker (interior, surface ceiling mount) – Provide high efficiency integrated amplifier and tuned high quality, 8" round loudspeaker with 12" square polycarbonate enclosure suitable for surface mounting to a hard ceiling and the following features:
  - a. Networked Managed SIP Endpoint.
  - b. Voice Paging with talk back capability.
  - c. Multicast receive or broadcast capability.
  - d. Outputs for external speaker and slave Amp.
  - e. Power Input: 48 V PoE IEEE 802.3af Class 0 (Max 12.95 W - Idle nominal 2W)
  - f. Dimensions:
    - 1) 12" square
    - 2) Total height 7.0"
  - g. Weight: 6 lb
  - h. Speaker: 6.5" Coaxial with PEI Dome Tweeter Mica filled outdoor rated polypropylene cone
  - i. SPL: 102 dBA at 1m (1 kHz tone)
  - j. Frequency Response: 55 - 18,000 Hz (+/- 10 dB)
  - k. Microphone: Electret omnidirectional wideband

275116 - 7

- l. Audio Delay: 10 to 1000 ms selectable for synchronization
- m. Audio Memory: 1 GByte available
- n. Relay Output: Normally open, activated when 8188 is in use; Max 30 V 50 mA.
- o. Relay Input: Normally open or normally closed dry contact
- p. Configuration: TFTP, FTP, HTTP.
- q. Environmental: 32 to 104 deg F, 10-95% RH non-condensing. Dry indoor locations only.
- r. Basis of Design: Algo Communication Products #8189 with [recessed] [surface] backbox.
- 5. SIP Horn Speaker (indoor/outdoor, wall or ceiling mount) – Provide high efficiency integrated amplifier and tuned high quality, double re-entrant, rectangular horn speaker with UV stabilized plastic weatherproof housing and the following features:
  - a. Networked Managed SIP Endpoint.
  - b. Voice Paging with talk back capability.
  - c. Multicast receive or broadcast capability.
  - d. Outputs for external speaker and slave Amp.
  - e. Power Input: 48 V PoE IEEE 802.3af Class 0 (Max 12.95 W - Idle nominal 2W)
  - f. Dimensions: 11.8" x 6.6" x 10.2".
  - g. Weight: 6 lb
  - h. SPL: 116 dBA at 1m (1 kHz tone)
  - i. Frequency Response: 350 - 9,000 Hz (+/- 10 dB)
  - j. Microphone: Electret omnidirectional wideband
  - k. Audio Delay: 1 to 1000 ms selectable for synchronization
  - l. Audio Memory: 1 GByte available
  - m. Relay Output: Normally open or normally closed; Max 30 V 50 mA.
  - n. Relay Input: Normally open or normally closed dry contact
  - o. Configuration: TFTP, FTP, HTTP, HTTPS.
  - p. Environmental: -40 to 122 deg F, suitable for wet locations.
  - q. Basis of Design: Algo Communication Products #8186.
- 6. IP-Addressable Zone Paging Adapter
  - a. Provide PoE IP Paging Adapters for integrating analog speakers and amplifiers into a Unified Communication Environment as a third party SIP endpoint. Paging adapters shall support all page, zone paging, audio events, and emergency notifications and shall meet the following specifications:
    - 1) SIP: 50 page extensions; 10 Alerting Extensions.
    - 2) Multicast: Receive or transmit.
    - 3) Code Support: G.711 A-law, G.711 u-law, G.722, Polycom Group Page.
    - 4) Processor: Linux OS ARM Cortex-A8 32-Bit RISC Processor.
    - 5) AUX Input: 3.5mm jack for analog music input.
    - 6) AUX Output: 3.5mm jack for headset or PC speakers.
    - 7) Line Input:
      - i. Female mini-XLR 10 kOhm balanced maximum level +4 dBu.
      - ii. Transformer isolated internally.
    - 8) Line Output:
      - i. Low impedance balanced output.
      - ii. Line level – 10 dBm / 0 dBm / +4 dBu.
      - iii. Transformer isolated internally.
      - iv. Male mini XLR connector and pluggable terminal block.
      - v. Frequency response 100-7000 Hz +/- 3dB.
    - 9) Audio Memory: 1 GByte.
    - 10) Relay Output: Normally open or normally closed; Max 30 V 50 mA.
    - 11) Relay Input: Normally open or normally closed dry contact supervision.
    - 12) Configuration: Web interface (HTTP or HTTPS).
    - 13) Power Requirements: PoE IEEE 802.3af Class 0 Nominal 2W Maximum 3.9W.
    - 14) Environmental: +32 to +122 deg F.
    - 15) Dimensions: 6.5" x 4.3" x 1.3" (16.5 cm x 10.9 cm x 3.3 cm)
    - 16) Basis of Design: Algo Communication Products #8301.

275116 - 8

7. Shall be end user configurable (with respect to accepting a Dynamic or Static IP address) must provide support for variable length subnet masks according to the facility's IP addressing scheme and allow an interface to manually set the zone controller to a static IP.
8. Basis of Design: Algo Communication Products #8301.

\*\*\*\*\*

**NOTE TO SPECIFIER**

Individual IP speakers do not provide the speaker coverage or voice intelligibility required within large, open areas with high ambient noise levels. Medium power speaker arrays shall be provided within large workrooms or platforms with ceiling heights exceeding 25' AFF.

Include paragraph 2.5C. below when MPSA clusters are to be utilized.

\*\*\*\*\*

C. Interior Medium Power Speaker Arrays (MPSA's):

1. Provide UL864 interior medium power speaker arrays MPSA at the locations shown on the drawings.
2. Each MPSA site shall include a local control unit, amplifier, standby batteries, charger, power supply, mounting bracket.
  - a. Sound levels at any location where personnel may be located shall be at least 15dBA above ambient but not exceed 120 dBA when measured on the A-scale of a standard sound level meter at slow response.
3. Speakers and control unit
  - a. 650 Watt Omni-directional MPSA Assembly (5 of 5 Active Panels) with lockable cabinet, 250 Watt amplifiers, amplifier terminal panel(s), universal riser supervisory module(s) and 110V/60 Hz. battery backup.
  - b. Provide MPSA amplifier cabinets and components as indicated on the drawings.
  - c. A paging adapter shall be provided for integration with the analog amplifier.
4. Basis of Design: Edwards MN-HSMP650G70 series.

D. IP Paging Administrative Computer (PC)

1. Contractor shall accept an Owner-supplied Windows 10 PC. This PC shall be configured with shortcuts to access the paging software and provide full functionality including recording messages and live paging. This PC is intended to serve as the primary access tool for managing the paging system. Vendor specific hardware shall not be acceptable.
2. Provide audio paging access from any PC to any zone (i.e., group) of paging speakers or all speakers/paging horns throughout the entire facility. Access controlled by User ID and/or password.

E. Audio Paging Components

1. Category 6 cable and cabling from IP Endpoints to the Owner-furnished PoE network switches shall be provided. Total cable length shall not exceed 295 ft. Refer to spec sections 270500 and 271500 for applicable requirements.
2. Contractors shall accept Owner-pre-configured PoE network switches. Contractor shall install in rack, power and cable the switches with Contractor-supplied cables.
3. Contractor shall coordinate testing switches' connectivity with USPS Raleigh IT network staff.
4. Provide a line-interactive UPS unit adequate to operate the system for a period of 30 minutes during a power outage. Tripp-Lite, APC or prior approved equal.

2.6 IP PHONE INTEGRATION

- A. Contractor shall coordinate with the facility to integrate with IP Phone hardware supplier and software supplier.

275116 - 9

USPS MPFS

Date: 10/1/2017~~8~~

~~IP INTEGRATED, PUBLIC ACCESS AND ZONE PAGING SYSTEMS~~

B. Telco Interface and Cutover – Contractor shall coordinate testing and eventual cutover of pre-determined numbers to new SIP service. Configure and support testing of new SIP service with Raleigh Information Telecommunications Support Center (RITSC) Subject Matter Expert and the District IS Manager.

## 2.7 CATEGORY 6 HORIZONTAL CABLING

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

1. Belden
2. Berk-Tek
3. CommScope Uniprise
4. General Cable
5. Leviton
6. Ortronics (Legrand) - Preferred
7. Panduit
8. Product options and substitutions. Substitutions: Not permitted.

B. Conductors: 4 twisted pair, minimum 24 AWG, solid copper.

1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6 cable performance specification.
3. Nominal Impedance: 100 ohms plus or minus 15 percent.
4. Certified and capable of performing to a minimum of 250 MHz.

C. Connector:

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

D. Cable Testing: Provide Category 6 copper testing as outlined in Section 271500 – Communications Horizontal Cabling.

## 2.8 CATEGORY 6 COPPER PATCH CORDS

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

1. Belden
2. Berk-Tek
3. CommScope Uniprise
4. General Cable
5. Leviton
6. Ortronics (Legrand) - Preferred
7. Panduit
8. Product options and substitutions. Substitutions: Not permitted.

B. Conductors: Straight through type 4 twisted pair minimum 24 AWG, stranded copper.

1. Terminated with male 8-pin modular plugs.
2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6 cable performance specification.
3. Nominal Impedance: 100 ohms plus or minus 15 per cent. Certified and capable of performing to a minimum of 250 MHz.

275116 - 10

USPS MPFS

Date: 10/1/2017~~8~~

~~IP INTEGRATED, PUBLIC ACCESS AND  
ZONE PAGING SYSTEMS~~

4. ~~Match performance and impedance characteristics of the installed horizontal unshielded twisted pair cable.~~
5. ~~Each patch cord shall have a plastic arch for ease of removal of the connector (rubber boots are not acceptable). Preferred Copper Patch type: Ortronics (Legrand) #OR-MC615-06.~~
6. ~~Patch cords shall be factory made, tested and individually factory wrapped within non-clear plastic bags. The plastic bag shall clearly identify the manufacturer/testing agency with silk screen on the outside and shall contain the cable test results. Plastic bags shall have perforated or zip-lock top for easy removal of cord.~~

C. ~~Connector:~~

1. ~~8-pin modular, Category 6/6A, non-keyed.~~
2. ~~Complies with TIA-568-C "T568A" pinning configuration.~~
3. ~~Color: Clear.~~
4.

2.2 ~~SYSTEM FUNCTIONS~~

A. ~~Include the following:~~

1. ~~Selectively connecting separate zones to different signal channels.~~
2. ~~Selectively amplifying sound among various microphone outlets and other inputs.~~
3. ~~Communicating simultaneously to all zones regardless of zone or channel switch settings.~~
4. ~~Paging, by dialing an extension from any local telephone instrument and speaking into the telephone.~~
5. ~~Producing a program signal tone that is amplified and sounded over all speakers, overriding signals currently being distributed.~~
6. ~~Reproducing high quality sound that is free from noise and distortion at all loudspeakers at all times during equipment operation, including standby mode with inputs off; and output free from non-uniform coverage of amplified sound.~~

\*\*\*\*\*

***NOTE TO SPECIFIER***

*Delete paragraph below if Postal Service will contract separately for this service.*

\*\*\*\*\*

7. ~~On-Site Assistance: Engage a factory authorized service representative to provide on-site assistance in adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions. Provide up to three on-site assistance visits within one year of Substantial Completion.~~

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 ~~PREAMPLIFIERS~~

- A. ~~Comply with EIA #SE-101-A; either separately mounted or as an integral part of power amplifier.~~

- B. ~~Output Power: Plus 4 dB above 1 mW at matched power amplifier load.~~
- C. ~~Total Harmonic Distortion: Less than 1 percent.~~
- D. ~~Frequency Response: Within plus or minus 2 dB from 20 to 20,000 Hz.~~
- E. ~~Input Jacks: Minimum of two. One matched for low impedance microphone; the other matchable to cassette deck, CD player, or radio tuner signals without external adapters.~~
- F. ~~Minimum Noise Level: Minus 55 dB below rated output.~~
- G. ~~Controls: On/off, input levels, and master gain.~~

2.5 ~~POWER AMPLIFIERS~~

- A. ~~Comply with EIA #SE-101-A.~~
- B. ~~Mounting: Rack mounted.~~
- C. ~~Output Power: 70-W balanced line.~~
- D. ~~Frequency Response: Within plus or minus 2 dB from 50 to 12,000 Hz.~~
- E. ~~Minimum Signal-to-Noise Ratio: 60 dB, at rated output.~~
- F. ~~Total Harmonic Distortion: Less than 3 percent at rated power output from 50 to 12,000 Hz.~~
- G. ~~Output Regulation: Less than 2 dB from full to no load.~~
- H. ~~Controls: On/off, input levels, and low-cut filter.~~
- I. ~~Input Sensitivity: Matched to preamplifier and providing full rated output with a sound pressure level of less than 10 dynes/sq. cm impinging on a speaker microphone or handset transmitter.~~

2.6 ~~COMPONENTS~~

\*\*\*\*\*

***NOTE TO SPECIFIER***

*Edit paragraph below to suit Project. Console can vary from a small switch and pilot light panel to a large, complex unit. Coordinate with Drawings for identification of items to be mounted and for console mounting provision: desk, counter, wall, etc.*

\*\*\*\*\*

- A. ~~Control Equipment: Complying with EIA-310.~~
  - 1. ~~Panel for Equipment and Controls: Each module is nominal 19 inches (48 cm) wide by 8-3/4 inches (22 cm) high for installation in equipment rack.~~
  - 2. ~~Controls: Include the following:~~
    - a. ~~Switching devices to select signal sources for distribution channels.~~
    - b. ~~Program selector switch to select source for each program channel.~~
    - c. ~~Switching devices to select zones for paging.~~
    - d. ~~All-call selector switch.~~
  - 3. ~~Indicators: A visual annunciation for each distribution channel to indicate source being used.~~
  - 4. ~~Spare Positions: 20 percent spare zone control and annunciation positions on console.~~
  - 5. ~~Microphone jack.~~

- B. Telephone Paging Adapter: Arranged to accept voice signals from telephone extension dialing access and to automatically provide amplifier input and program override for preselected zones.
1. Minimum Frequency Response: Flat, 200 to 2500 Hz.
  2. Impedance Matching: Adapter matches telephone line to public address equipment input.
- C. Equipment Rack: Comply with EIA-310-D. House amplifiers, control equipment and auxiliary equipment in standard EIA 19-inch (483-mm) racks.
1. Group items of same function together, either vertically or side by side, and arrange controls symmetrically.
  2. Power Supply Connections: Approved plugs and receptacles.
  3. Arrange all inputs, outputs, interconnections, and test points so they are accessible at rear of rack for maintenance and testing, with each item removable from rack without disturbing other items or connections.
  4. Blank Panels: Cover empty space in equipment racks so entire front of rack is occupied by panels.
  5. Enclosure Panels: Ventilated rear and sides and solid top. Use louvers in panels to ensure adequate ventilation.
  6. Finish: Uniform, baked enamel factory finish over rust-inhibiting primer.
  7. Power Control Panel: On front of equipment housing, with a master power on/off switch and pilot light, and socket for a 5-A, indicating, cartridge fuse for rack equipment power.
  8. Vertical Plug Strip: Metal wireway with integral grounded receptacles, 12 inches (30 cm) o.c. the full height of rack, to supply rack-mounted equipment.
  9. Spare Capacity: [20] [ ] percent spare space capacity in rack for future equipment.
- D. Cone Type Loudspeakers: Comply with EIA SE-103.
1. Minimum Axial Sensitivity: EIA pressure rating of 45 dB.
  2. Frequency Response: Within plus or minus 3 dB from 50 to 15,000 Hz.
  3. Size: 8 inches (200 mm) with 1-inch (25 mm) voice coil and minimum 5-oz. (140-g) ceramic magnet.
  4. Minimum Dispersion Angle: 100 degrees.
  5. Rated Output Level: 10 W.
  6. Matching Transformer: Comply with EIA-160. Full power rated with four EIA standard taps. Maximum insertion loss of 0.5 dB.
  7. Surface Mounting Units: Ceiling, wall, or pendant mounting, as indicated on drawings, in steel back boxes, acoustically dampened. Front face of at least 0.0478-inch (1.2 mm) steel and whole assembly rust proofed and shop primed for field painting.
  8. Flush Ceiling Mounting Units: In steel back boxes, acoustically dampened. Metal ceiling grille with baked, white enamel finish.
- E. Horn Type Loudspeakers: Comply with EIA SE-103.
1. Type: Single horn units, double-reentrant design, with minimum full-range power rating of 15 W.
  2. Matching Transformer: Comply with EIA-160. Full power rated with four EIA standard taps. Maximum insertion loss of 0.5 dB.
  3. Frequency Response: Within plus or minus 3 dB from 250 to 12,000 Hz.
  4. Dispersion Angle: 130 by 110 degrees.
  5. Mounting: Integral bracket.
  6. Units in Hazardous (Classified) Locations: Listed and labeled for the environment in which they are located.
- F. Noise Operated Gain Controller: Units continuously sense space noise level and automatically adjust signal level to local speakers.
1. Frequency Response: 20 to 20,000 Hz, plus or minus 1 dB.
  2. Level Adjustment Range: 20 dB minimum.
  3. Maximum Distortion: 1 percent.
  4. Control: Permits adjustment of sensing level of device.
- G. Volume Attenuator Stations: Wall plate mounted autotransformer type with paging priority feature.

275116 - 13

1. ~~Wattage Rating: 10 W, unless otherwise indicated.~~
2. ~~Attenuation per Step: 3 dB, with positive off position.~~
3. ~~Insertion Loss: 0.4 dB maximum.~~
4. ~~Attenuation Bypass Relay: Single pole, double throw. Connected to operate and bypass attenuation when all call, paging, program signal, or prerecorded message features are used. Relay returns to normal position at end of priority transmission.~~
5. ~~Label: "PA Volume."~~

- H. ~~Cable and Conductors: Jacketed, twisted pair and twisted multipair, untinned, solid copper conductors.~~
1. ~~Insulation for Wire without Conduit: Thermoplastic, not less than 1/32 inch (0.8 mm) thick.~~
  2. ~~Microphone Cables: Neoprene jacketed, not less than 2/64 inch (0.8 mm) thick over shield with filled interstices. Shield No. 34 AWG tinned, soft copper strands formed into a braid or approved equivalent foil. Shielding coverage on conductors is not less than 60 percent.~~
  3. ~~Plenum Cable: Listed and labeled for plenum installation.~~

## 2.9 MISCELLANEOUS

Formatted: 2

- A. ~~Contractor shall cooperate in the integration and programming of telephone and paging system to create the functions specified in this bid. Paging system and telephone system shall be individually tested but acceptance of the service shall only occur when a fully integrated system is delivered. This shall include testing of all notification features and calls that are to be configured.~~

### I.B. Special Requirements ~~f~~For Cable Routing ~~A~~and Installation

1. The majority of paging system wiring in this building will be installed above ceilings without conduit. All communications cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed.
2. Sealing of openings between floors, through rated fire and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the contractor. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.
3. Cabling routed underground, exterior of the building, through inaccessible ceilings or less than 10'-0" A.F.F. in the workroom shall be contained in conduit. Provide flush boxes within finished areas and factory boxes in unfinished areas. Provide 3/4" conduit risers with 90 degree bend and bushing for all wall mounted devices.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to ~~Contracting Officer through~~ 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.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

275116 - 14

USPS MPFS

Date: 10/1/2017~~8~~

~~IP INTEGRATED, PUBLIC ACCESS AND ZONE PAGING SYSTEMS~~



### 3.2 INSTALLATION

- A. ~~General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.~~ Install in accordance with manufacturer's instructions.
- B. ~~Furnish and install all material, devices, components and equipment for a complete operational system.~~ Verify that electrical connections are made correctly.
- C. Install exposed cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings so designed and installed to avoid damage to cables. Secure cable at intervals not exceeding ~~30 inches (76 cm)~~ and not more than ~~6 inches (15 cm)~~ from cabinets, boxes, or fittings.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Use lacing bars in cabinets.
- E. Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.
- F. Separation of Wires: Separate speaker-~~micro~~telephone, line-level, ~~speaker-level~~, and power wiring runs. Where exposed or in same enclosure, separate conductors at least ~~12 inches (30 cm)~~ for speaker microphones and adjacent parallel power and voice wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.
- G. ~~The Contractor shall provide necessary transient protection as recommended by the equipment supplier and referenced to earth ground.~~ Splices, Taps, and Terminations: ~~Make splices, taps, and terminations on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.~~
- H. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
- I. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables to identify media in coordination with system wiring diagrams.
- J. Conductor Sizing: Unless otherwise indicated, size speaker circuit conductors from racks to loudspeaker outlets not smaller than number 14 AWG and conductors from microphone receptacles to amplifiers not smaller than number 20 AWG.
- K. Weatherproof Equipment: Install units that are mounted outdoors, in damp locations, or where exposed to weather consistent with requirements of weatherproof rating. Provide surge protection where required.
- L. ~~Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.~~
- M. ~~Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.~~
- N. ~~Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.~~

### 3.3 FIELD QUALITY CONTROL

A. As specified in section 260500 – Common Work Results for Electrical.

B. Section 014000 – Quality Requirements: Field testing and inspection.

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

B.D. Inspection: Make observations to verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Operational Test: Perform tests that include originating program and page material at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and freedom from noise and distortion.

G.E. Testing: Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Contractor's expense. Verify, by the system test, that the total system meets the Specifications and complies with applicable standards. Signal-to-Noise Ratio Test: Measure the ratio of signal to noise of complete system at normal gain settings, using the following procedure:

1. Disconnect a microphone at the connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure the ratio of signal to noise.
2. Repeat test for each separately controlled zone of loudspeakers.
3. Minimum acceptance ratio is 50 dB.

D. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure the distortion in the paging and all call amplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.

E. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use a sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in the same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.

F. Power Output Test: Measure electrical power output of each power amplifier at normal gain setting at 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.

G. Signal Ground Test: Measure and report ground resistance at public address equipment signal ground. Comply with testing requirements specified in Division 26.

H. Retesting: Correct deficiencies, revising tap settings of speaker-line matching transformers where necessary to optimize volume and uniformity of sound levels, and retest. Prepare written record tests.

I. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

J. Schedule tests with at least seven days advance notice of test performance.

### 3.4 ADJUST AND CLEAN

A. Adjust equipment for proper operation.

B. Prior to final acceptance, this Contractor shall vacuum and clean all system components and protect them from damage and deterioration.

Formatted: Outline numbered + Level: 3 + Numbering  
Style: A, B, C, ... + Start at: 1 + Alignment: Left + Aligned at:  
0.2" + Tab after: 0.6" + Indent at: 0.6"

Formatted: Normal

275116 - 16

USPS MPFS

Date: 10/1/2017

IP INTEGRATED, PUBLIC ACCESS AND  
ZONE PAGING SYSTEMS

3.5 FINAL ACCEPTANCE TESTING~~PROTECTION~~

- A. The Final Acceptance Testing shall be provided to the Owner or the Owner's designated representative only. Final acceptance testing to any other trade or service provider for the project does not comply with the requirements of this section~~Protect finishes until substantial completion.~~
- B. The Contractor shall provide a Final Acceptance Test record document signed by both the Contractor and the Owner or designated Owner's Representative establishing the "In Warranty" date. The warranty period shall not commence until the Final Acceptance Test is completed.
- C. This Contractor shall be prepared to verify the performance of any portion of the installation by demonstration, listening and viewing test, and instrumented measurements. This Contractor shall make additional adjustments within the scope of work and which are deemed necessary by the Owner because of the acceptance test.

**Formatted:** Outline numbered + Level: 3 + Numbering Style: A, B, C, ... + Start at: 1 + Alignment: Left + Aligned at: 0.2" + Tab after: 0.6" + Indent at: 0.6", Don't allow hanging punctuation, Font Alignment: Baseline

**Formatted:** Outline numbered + Level: 3 + Numbering Style: A, B, C, ... + Start at: 1 + Alignment: Left + Aligned at: 0.2" + Tab after: 0.6" + Indent at: 0.6", Don't allow hanging punctuation, Font Alignment: Baseline

3.6 PROJECT SUBMITTALS PRIOR TO ACCEPTANCE~~DEMONSTRATION~~

- A. Installer Certificates: Signed by Contractor certifying that installers complied with requirements.~~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.~~
  - 3.1. Schedule training with Postal Service at least seven days in advance.
- B. Acceptance Documents (include record of final settings and measurements certified by Installer).
- C. Electronic documentation of method to load music, to create and edit zones, to adjust volume, etc.
- D. Maintenance Data: For equipment to be included in maintenance manuals.
  - 1. Record of Owner's equipment-programming option decisions.
  - 2. All instructions necessary for proper operation and manufacturer's instructions (three hard copies and one electronic copy).
  - 3. Manufacturer's maintenance information (document with updated and accurate web links).
  - 4. Electronic copies of software programs and system information on all programmable features of the installed platform.

3.7 IN-SERVICE TRAINING

- A. The facility shall provide a space for the training sessions. This Contractor shall provide everything else, including copies of instructional materials, trainer(s), etc.
- B. Provide videotaped training: one for maintenance session and one for each plant's staff training session. Submit to USPS's Project Manager.
- C. Maintenance Personnel: The Contractor shall provide on-site training for the Owner's maintenance personnel in the procedures involved in operating, troubleshooting, servicing, and preventative maintenance of the system. Over a 14 day period, the Contractor shall schedule, with facility maintenance personnel, two complete sessions to accommodate personnel's schedules. The two sessions are intended to accommodate facility staff being trained prior to system being actively used in the facility.
  - 1. In addition to the Training Materials provided, the Contractor shall furnish Operators Manuals and User's Guides at the time of this training via electronic or online media.

2. Schedule training with Owner (through the Owner or the Owner's Designated Representative) with at least seven days advance notice.

D. Facility Staff: This Contractor shall provide and implement a complete and comprehensive, on-site, facility staff training program. This mandatory training program shall provide facility staff a complete understanding of how to utilize and properly operate the system functions. The intent is to provide two sessions, one session would be provided upon production activation of the phone and paging system. The second session, timing as requested by the facility, shall be provided within six months of the first session. Additional training is outside the scope of this bid and would be procured separately.

1. The training program shall be implemented by a staff member/trainer employed by this Contractor. The trainer must be qualified to provide training on their product.

2. All staff development training is to be coordinated through the Owner's Designated Representative with at least seven days advance notice. The trainer shall provide the facility's staff a document listing all of the staff members who attended, received, and completed the training program.

### 3.8 AS-BUILT/RECORD DRAWINGS

A. Prior to final acceptance, provide three sets of drawings and one AutoCAD disc (Release 2014 or later) and a pdf file indicating all cable numbers and construction details in accordance with the actual system installation before final payment shall be issued. Revise all shop drawings to represent actual installation conditions. These Record Drawings shall be used during "Final Acceptance Testing."

### 3.9 WARRANTY

A. Provide a [1] [2] [3] year warranty on all of the Contractor-supplied equipment against defects in material and workmanship. This warranty shall cover all electronic equipment, as well as speakers. If any defects are found within the warranty period, this Contractor shall replace the defective equipment at no cost to the Owner (i.e., to include equipment and labor).

B. If the equipment cannot be repaired within 24 hours of service visit, the Contractor shall provide "loaner" equipment to the facility at no additional charge.

C. If requested, Contractor shall provide a quote for a service contract offering continuing factory authorized service of the system after the warranty period.

D. Any software updates, during the warranty period, shall be provided to the facility as part of this contract (i.e., no additional charge). This effort shall include travel to the site for installation and configuration of the updates.

### 3.10 EMERGENCY SERVICE

A. This Contractor shall maintain sales and service presence in the area of adequate size and quality to assure the Owner rapid response to emergency service requests. Rapid emergency service response shall mean arrival of service personnel at trouble site within four hours of notice during normal business hours (i.e., 8:00 AM to 6:00 PM) and within 24 hours of said notice during all other hours on a 7-day per week basis. Service personnel shall arrive on site within 48 hours of receiving a request for routine or non-emergency service.

END OF SECTION

275116 - 18

USPS MPFS

Date: 10/1/2017~~8~~

~~IP INTEGRATED, PUBLIC ACCESS AND ZONE PAGING SYSTEMS~~

USPS Mail Processing Facility Specification issued: 10/1/2017~~8~~  
Last revised: ~~9/9/2018~~9/5/2018

USPS MPFS

275116 - 19  
Date: 10/1/2017~~8~~

~~IP INTEGRATED, PUBLIC ACCESS AND~~  
~~ZONE PAGING SYSTEMS~~

SECTION 275117

VIDEO INTERCOM AND EXTERIOR GATE CONTROL SYSTEM

\*\*\*\*\*

\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

\*\*

PART 1 - GENERAL

1.1 SCOPE

- A. Provide an integrated audio and 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. Audio and video master control station.
  - 2. Central exchange unit.
  - 3. Video door stations.
  - 4. UPS unit.
- B. Related Sections:
  - 1. Section 260500 - Common Work Results for Electrical.
  - 2. Section 264128 - Surge Protective Devices (SPDs).
  - 3. Section 270500 - Common Work Results for Communications.
  - 4. Section 281304 - Enterprise Physical Access Control System.

← Formatted: 4

1.3 REFERENCES

- A. Electronic Industries Association (EIA):
  - 1. ANSI/TIA/EIA-568-A - Commercial Building Wiring Standard.
- B. National Fire Protection Association (NFPA):
  - 1. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

- A. Procedures for submittals.
  - 1. Product data: For each type of equipment.

275117 - 1

USPS MPFS

Date: 10/1/2017~~8~~

VIDEO INTERCOM AND EXTERIOR  
GATE CONTROL SYSTEM

- 2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection.
  - 3. Control equipment.
  - 4. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance. Include a single-line diagram showing cabling interconnection of components.
- 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.

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 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.

PART 2 - PRODUCTS

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.*  
 \*\*\*\*\*

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Aiphone Corp., Bellevue, WA (800) 692-0200.
  - 2. Atlas-Soundolier; Atapco Security & Communications Group.
  - 3. Bogen Communications, Incorporated.
  - 4. Dukane Corp.; Communications Systems Division.
  - 5. Executone Information Systems Incorporated.

- 6. Rauland-Borg Corporation.
- 7. Valcom, Incorporated, Roanoke, VA (540) 427-3900.

**NOTE TO SPECIFIER**

*Delete paragraph below if Postal Service will contract separately for this service.*

- B. 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 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.

**NOTE TO SPECIFIER**

*Large video intercom systems requiring multiple CEU's or fiber optic interface between masters and/or call stations shall utilize the Aiphone "IS" series. Revise paragraphs 2.3, 2.4 and 2.5 accordingly.*

**2.3 AUDIO VIDEO MASTER CONTROL STATION(S)**

- A. Master station(s) shall initiate and answer calls from up to (7) additional master units and up to (8) door substations. Master station(s) shall be expandable in increments of (16) channels, shall be wall or desk mounted and shall have the following features:
  - 1. 3.5 inch TFT color video monitor
  - 2. 8 master station channels
  - 3. 8 door / substation channels
  - 4. LED and call tone annunciation for programmable length or infinite call-in
  - 5. Hands-free VOX communication or Push-to-Talk
  - 6. All call to other master stations
  - 7. Selective calling to any station in the system
  - 8. Add-on selectors in increments of 16 channels for max. capacity of 120 door / sub stations (CEU capacity also required)
  - 9. Privacy prevents other masters from listening in
  - 10. Scan Monitor allows listening to door / sub stations in programmed time increments
  - 11. Door release button activates door strike or magnetic lock (selectable N/O or N/C contacts from CEU)
  - 12. 3.5mm speaker and mic jacks for computer-style headset or handset connection
  - 13. Tone and volume adjustments for open voice and headset communication
  - 14. Brightness and contrast adjustments for video.
  - ~~15. Option connector for video output, call extension, or footswitch operation of TALK function~~
- B. Operation: When a video door station calls, a tremolo tone rings and the 3.5 inch color monitor comes on, displaying the image from the door station location. To answer the call, simply press the TALK

**Formatted:** NotesToSpecifier

**Formatted:** Font: Bold

**Formatted:** NotesToSpecifier, Centered

**Formatted:** NotesToSpecifier



button once and speak hands-free, or Press and Hold the TALK button to use as push-to-talk, release-to-listen. If access control is included, simply press the "key" button and the associated electric strike or magnetic lock will be activated.

- C. Wiring: Each master station shall be connected via CAT-5e cable homerun to the Central Exchange Unit. Feature and operation variables are set with the system set-up software and uploaded to the CEU.
- D. Basis of Design: Aiphone #AX-8MV.

#### 2.4 CENTRAL EXCHANGE UNIT (CEU)

- A. The central exchange unit shall support a minimum of (8) master stations and up to (24) door / sub stations. Unit shall be expandable and shall have the following features:
  - 1. Wiring hub for system using CAT-5e cable
  - 2. Controls all functionality of AX system
  - 3. 8 Master station ports (RJ45)
  - 4. 24 Door / substation ports (RJ45)
  - 5. 2 24V DC power supply input terminals
  - 6. 24 Door release dry contacts (24V AC/DC 500mA)
  - 7. 2 BNC composite video outputs and video switching triggers
  - 8. Outputs for add-on exchanges to support the maximum capacity of 120 doors
  - 9. Programmable functionality via supplied software
  - 10. USB to serial adaptor and gender changer, software program and Installation and Operation Manual on CD, and QuikStart Guide.
- B. Operation: The CEU handles the calling and communication signals for the 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 CEU with the use of the supplied software. Power is applied directly to the CEU via two PS-2420UL power supplies. 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 surface mounted to a wall, desk mounted, or mounted in a standard 19 inch EIA rack.
- D. Wiring: The audio/video master units and door stations shall be connected to the CEU via homerun CAT-5e wiring and RJ45 jacks.
- E. Basis of Design: Aiphone #AX-~~20~~48C.
- F. Battery Backup: The CEU shall be provided with ~~30~~18 minute, UPS battery reserve power. Provide ~~10500 VA/900~~ Watt at 120\_Volt stand-alone UPS unit.
  - 1. UPS shall be line-interactive, rack mounted and rated 1000VA/900W with 18 minute battery reserve at 450 Watts; Tripp-Lite #SMART1000RML2U.

Formatted: 4

#### 2.5 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. Color video camera with audio intercom
  - 2. 2-way hands-free voice communication with master station
  - 3. Call button to initiate call to master(s)
  - 4. White LED illuminator for low light conditions
  - 5. RJ45 jack for CAT-5e connection

275117 - 4

USPS MPFS

Date: 10/1/2017~~8~~

VIDEO INTERCOM AND EXTERIOR  
GATE CONTROL SYSTEM

6. 980 ft. wiring distance from CEU using CAT-5e cable

- B. Operation: When the call button on the door station is pushed, the master station(s) ring and the video monitor comes on with the image from the door station's camera. The master station user then pushes the "TALK" button to initiate communication. The person at the door station speaks hands-free.
- C. Wiring: Each door station shall be connected to the CEU via CAT-5e cable. Door stations located more than 980 ft. from CEU shall be connected using fiber cabling.
- D. Basis of Design: Aiphone #AX-DV (surface mounted); Aiphone #AX-DVF (flush mounted).

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to ~~Contracting Officer through~~ 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.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

#### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Verify that electrical connections are made correctly.
- C. Install exposed conduits and cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings so designed and installed to avoid damage to cables. Secure cable at intervals not exceeding 30 inches (76 cm) and not more than 6 inches (15 cm) from cabinets, boxes, or fittings.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Use lacing bars in cabinets.
- E. Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.
- F. Identification of Conductors and Cables: Apply wire and cable marking tape to designate wires and cables to identify media in coordination with system wiring diagrams.
- G. 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.
- H. 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, power supplies, door contacts and magnetic locks. Refer to specification section 264128.

275117 - 5

USPS MPFS

Date: 10/1/2017~~8~~

VIDEO INTERCOM AND EXTERIOR  
GATE CONTROL SYSTEM

1. 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.

Formatted: Normal

- I. Provide independent wiring for the gate and door release functions. Each gate and door release shall be connected to the central exchange unit (CEU) utilizing (2) conductor #18 low voltage cable. This wiring shall be separate from the ePACS wiring. Loss or interruption of the ePACS shall not affect the operation of the gate or door release functions.

### 3.3 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. Operational Test: Verify proper routing and volume levels and freedom from noise and distortion.
- C. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
- D. Schedule tests with at least seven days advance notice of test performance.

### 3.4 ADJUST AND CLEAN

- A. Adjust equipment for proper operation.

### 3.5 PROTECTION

- A. Protect finishes until substantial completion.

### 3.6 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: 10/1/2018<sup>7</sup>  
Last revised: ~~7/28/2016~~ 6/2018

SECTION 275123  
CALL BELL SYSTEMS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Doorbell call system.
  - a. Employee personnel door.
  - b. Retail wicket door.
  - c. Entry into BMEU.
  - d. Food service entry.
2. Assistance buzzer system.
  - a. Full service counter.
  - b. BMEU workstation.

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

C. Related Sections:

1. Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

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

1.3 SUBMITTALS

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

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

1. Project Record Documents: Accurately record the following:
  - a. Location of devices and components.
  - b. Actual routing and sizes of conduit, boxes and conductors.

1.4 QUALITY ASSURANCE

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

- B. Qualifications:
  1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
  2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
  1. Conform to requirements of NFPA 70.
  2. Products: Listed and classified by Underwriter's Laboratories Incorporated as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Verify manufacturer information, Product numbers, and availability at time of preparation for Project.*  
 \*\*\*\*\*

2.1 MANUFACTURERS

- A. Subject to compliance with Project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  1. Broan – Nutone, LLC. Hartford WI (800) 558-1711
  2. Carlon/Thomas & Betts, Cleveland OH (216) 464-3400
  3. Edwards Signaling and Security Systems, Plainville, CT (800) 336-4206.
  4. EZ Tone, Hermatage TN (800) 366-7235
  5. Federal Signal Corp., University Park, IL (800) 548-7229.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 DOORBELL CALL SYSTEM

- A. Description: Commercial two tone chime type door bell, pushbuttons, power transformer, conduits, chimes, and wiring as required for complete system.
- B. Materials:
  1. System with pushbutton, power transformer, conduits, and wiring as required for complete system.
  2. Provide chimes with audibly different and distinct sound from sound made by assistance buzzer.
  3. Color/finishes of pushbutton and faceplate to match other electrical devices.
- C. Transformer: 12 volts AC rated.
- D. Location:
  1. Wicket door (set to two tone chime).
  2. Personnel door (set to single chime).
  3. BMEU.
  4. Exterior entry into food service.

2.3 ASSISTANCE BUZZER

- A. Description: Commercial buzzer type doorbell, pushbuttons, power transformer, conduits, buzzer, and wiring as required for complete system.
- B. Materials:
  - 1. System with pushbutton, power transformer, conduits, and wiring.
  - 2. Provide buzzer with audibly different and distinct sound from sound made by doorbell chimes.
  - 3. Color/finishes of pushbutton and faceplate to match other electrical devices.
- C. Transformer: 12 volts AC rated.
- D. Location:
  - 1. Full service counter.
  - 2. BMEU workstation.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 INSTALLATION

- A. The call bell system(s) shall be installed and wired completely as shown on the plans by the contractor, who shall make all necessary wiring connections to devices and equipment.
- B. Install system transformer at outlet box locate above within accessible ceiling.
- C. Install low voltage wiring in conduit.
- D. Flush mount wall outlets for buzzers at 6 inches below ceiling unless otherwise noted on Drawings.

#### 3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 – Common Work Results for Electrical.
- B. Perform operational testing on call bell system(s) to verify proper operation and field wiring connections.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018~~7~~  
Last revised: 5/1/2017

SECTION 275313

WIRELESS, SYNCHRONIZED, GPS CLOCK SYSTEM

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. General Requirements and Scope: Furnish and install a complete new wireless, synchronized, GPS clock system, including equipment, accessories and materials in accordance with these specifications and drawings.
- B. This section addresses the needs and requirements of the wireless clock system, It includes requirements for the wireless clock system components including, but not limited to, the following:
  - 1. Master Clock with Wireless Transceiver
  - 2. Wireless Repeater
  - 3. Secondary Wireless Analog Clock
- C. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- D. Related Sections:
  - 1. Section 260500 - Common Work Results for Electrical.

1.2 REFERENCES

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

1.3 SUBMITTALS

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. General: Submit the following in accordance with Conditions of Contract Sections:
  - 1. Submit equipment prints, full electronic wiring diagrams and specifications sheets for each item specified herein. Provide a tabulation of the specification clearly comparing the submitted item with the specified item, being able to refer to all written expressed functions and capabilities. Specification sheets shall be submitted on all items.
    - a. Shop drawings detailing wireless clock
  - 2. Wiring diagrams, detailing wiring for power, signal, and control.
  - 3. Submit wiring diagrams showing typical connections for all equipment.
  - 4. Submit a certificate of completion of installation and service training.

#### 1.4 QUALITY ASSURANCE

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. All items of equipment shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.
- C. The contractor shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least five (5) years. The contractor shall utilize a duly authorized distributor of the equipment supplied for this project location with full manufacturer's warranty privileges.
- D. The contractor shall show satisfactory evidence, upon request, that the supplier maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The supplier shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.
- E. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 "National Electrical Code" including, but not limited to:
  - 1. Article 250, Grounding.
  - 2. Article 300, Part A. Wiring Method.
  - 3. Article 310, Conductors for General Wiring.
  - 4. Article 725, Remote Control, Signaling Circuits.
  - 5. Article 800, Communication Systems.
- F. Installation and start up of all systems shall be under the direct supervision of a local agency regularly engaged in installation, repair, and maintenance of such systems. The supplier shall be accredited by the proposed equipment manufacturers.
- G. The agency providing equipment shall be responsible for providing all specified equipment and mentioned services for all equipment as specified herein. The agency must be a local authorized distributor of all specified equipment for single source of responsibility and shall provide documents proving such. The agency must provide written proof that the agency is adequately staffed with factory-trained technicians for all of the specified equipment. The agency must have established business for and currently be providing all services for the equipment.
- H. The contractor shall guarantee availability of local service by factory-trained personnel of all specified equipment from an authorized distributor of all equipment specified under this section. Maintenance shall be provided at no cost to the purchaser for a period of one (1) year (parts and labor) from date of acceptance unless damage or failure is caused by misuse, abuse, neglect, or accident. Additionally, all manufacturer supplied products must be covered by three (3) year (parts only) limited warranty from the date of acceptance. The warranty period shall begin on the date of purchase by the owner/engineer.
- I. The contractor shall, at the owner's request, make available a service contract offering continuing factory authorized service of the system after the initial warranty period.
- J. The contractor is responsible for all cost associated with proper installation, termination, configuration, programming, impedance and load matching of all system components.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in factory boxes. Store in clean, dry space in original boxes. Protect products from fumes and construction traffic. Handle carefully to avoid damage.



1.6 IN-SERVICE TRAINING

- A. The contractor shall provide training with this system. These sessions shall be broken into segments that will facilitate the training of individuals in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training.

PART 2 - PRODUCTS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.*

\*\*\*\*\*

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  1. Sapling, Inc., Huntingdon, PA (215) 322-6063.
  2. Primex Wireless, Inc., Lake Geneva, WI (800) 537-0464.
  3. Substitutions permitted with approval from ~~Contracting Officer through~~ the USPS Project Manager.

- B. The "Basis of Design" manufacturer shall be:

Sapling, Inc.  
 1633 Republic Road  
 Huntingdon Valley, PA 19006  
 Phone: 215.322.6063  
 Fax: 215.322.8498  
 Web: [www.Sapling-Inc.com](http://www.Sapling-Inc.com)

- C. The intent of this specification is to establish a standard of quality, function and features. It is the responsibility of the contractor to insure that the proposed product meets or exceeds every standard set forth in these specifications.
- D. The functions and features specified are vital to the operation of this facility, therefore, the acceptance of alternate manufacturers does not release the contractor from strict compliance with the requirements of this specification.
- E. The contractor shall be responsible for providing a complete functional system including all necessary components whether included in this specification or not.
- F. Any approval of an alternate system does not automatically exempt the supplier from the intent of these specifications. Failure to comply with the operational and functional intent of these specifications may result in the total removal of the alternate system at the expense of the contractor.

2.2 SYSTEM REQUIREMENTS

- A. Wireless analog and/or digital clock system with interface capability to GPS, network, internet and existing systems such as: 58 minute, 59 minute, National Time & Rauland sync-wire, once a day reset, 2-wire digital communication and RS485 communication.

## 2.3 SYSTEM

- A. The system shall function as a stand alone system or in conjunction with an existing wired system and the system shall have interface capability to GPS, network, Internet and existing systems such as: 58 minute, 59 minute, National Time & Rauland sync-wire, once a day reset, 2-wire digital communication and RS485 communication.
- B. The system shall be capable of working in 915-928 MHz frequency-hopping technology. The system shall be capable of automatic transmission of data along 51 alternating frequencies that allows for an enhanced signal, even if there is interference in one of the frequencies.
  - 1. Contractor shall obtain a federal assignment for the transmit frequency that is to be utilized by the clock system. Frequency clearance shall be requested through Raleigh IT Service Center.
- C. Each secondary clock in the system shall be capable of receiving and transmitting the wireless signal which allows it to be used as a repeater while boosting the data stream and sending along the system. With this dual capability there shall be no limit on the number of clocks that can be used in the installation. The clocks shall be designed to automatically work together without interference with each other. The system shall be capable of increasing the quality of the signal while increasing the quantity of the clocks.
- D. The secondary analog clocks shall have the following option:
  - 1. Two (2) D cell batteries; the clock receives and transmits time every two (2) or four (4) hours, as selected by the user.
- E. The analog secondary clocks shall include automatic digital calibration for time base to minimize deviation from each other.
- F. The analog secondary clocks shall have a built-in close-loop system that will allow the clock to detect the position of the hands and bring the clock to the correct time even if the clock were manually or forcefully altered.
- G. The analog secondary clocks shall have the capability for diagnostic function that will allow the user to view the quality of the signal, how long since the last time the clock received a signal, as well as functional tests of the electronics and the gears.
- H. The system shall operate in a license-free frequency range where no license is required.

## 2.4 FCC APPROVAL

- A. This equipment shall be tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment shall not cause harmful interference to radio or television communications.

## 2.5 PRODUCTS

- A. SMA 2000 Master Clock/Transceiver/Transmitter: The Master Clock / Transmitter shall be the Sapling SMA 2000 Series. The master clock shall have a LED display and two push switches. The transmitter shall be capable of transmitting data to the SAL wireless analog clock. The master clock shall be capable of receiving a signal from any SNTP time server via the Internet. The master clock shall have up to ten pre-programmed SNTP servers to use in case the clock does not receive time from one of the servers via a web interface. The transmitter will be capable of receiving signals from all Sapling Master Clocks via RS485, as well as 59 minute correction, 58 minute correction, National Time and Rauland, and Dukane. The transmitter shall have the capability of transferring a wired system into a wireless

system. The transmitter shall contain two clock circuits that have the capability to run synchronous wire systems such as 59 minute correction, 58 minute correction, National Time/Rauland or a once a day pulse for intercom systems. The transmitter shall be capable of acting as a repeater while receiving a signal wired or wirelessly from the main transmitter. The master clock shall be programmed via the two push switches on the front panel. The transmitter shall be capable of interfacing with the wired analog clocks via the Converter Box. The transmitter shall utilize 915–928 MHz frequency–hopping technology. The master clock shall be powered by 110VAC/60 Hz or 220VAC/50 Hz.

1. SMA 2000 options
  - a. GPS – The master clock shall have the option of having a GPS receiver built into the unit for synchronization from the satellites via UTC.
  - b. Web Interface – The master clock shall be able to be programmed completely from a web interface that can be accessed through any typical web browser such as Microsoft Internet Explorer or Mozilla FireFox. The interface shall allow the user to program all display features, IP settings of the master clock and any system setting that the master clock has.
  - c. SNTP Server – The master clock shall have the capability to act as a SNTP server that other devices can point to in order to receive the time through SNTP protocol.
- B. SMA 1000 Wireless Repeater: The repeater shall be a Sapling Wireless Repeater. The repeater shall wirelessly transmit and receive data. The repeater shall be capable of transmitting to the wireless analog clocks. The repeater shall work on 915–928 MHz frequency–hopping technology. The repeater shall wirelessly transmit and receive data. The repeater is to have a maximum antenna size of seven (7) inches. The repeater shall have an RF input sensitivity of –103 dbm. The repeater is to have a RF power output of 27 dbm. The voltage input for the repeater shall be 110 volts/60 Hz or 220 volts/50 Hz.
- C. Analog Secondary Clock: The secondary clock shall be Sapling SAL-2 Series, 12 or 15 inch diameter, wireless type. The clock will be capable of receiving a signal from multiple clocks. The clock shall receive and transmit with 915–928 MHz frequency–hopping technology. The clock is to be capable of transmitting the time simultaneously without interfering with each other. The clocks shall include automatic calibration, as well as a diagnostic function that allows the user to view the quality of the signal, the last time the clock received a correction signal, a gearbox test and a comprehensive analysis of the entire clock. The clock shall have a maximum correction time of five (5) minutes. The clock shall be capable of receiving a signal every 2 or 4 hours. It shall be designed to be used with the Sapling SMA Series Master Clock (with transmitter option) or the Sapling Repeater, which can be regulated via Sapling wireless communication protocol. Upon receipt of the wireless signal, the clock will immediately self–correct. The clock shall have a semi–flush smooth surface ABS case. The dial is to be made of durable polystyrene material. The crystal is to be shatterproof, side molded polycarbonate. Glass and visible molding marks are unacceptable. The clock shall have black hour and minute hands as well as a red second hand. The clock shall be FCC compliant, part 15 Section 15, 247.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the wireless clock system.
- C. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General:

1. Install system in accordance with applicable codes. Install equipment in accordance with manufacturer's written instructions.
2. Upon installation completion, a room-by-room test shall be conducted for every device in the system. A technician shall perform the test and repairs shall be performed as needed at no cost to the Owner to any devices, which do not function correctly, including cable. A written room-by-room report following testing and repairs shall be prepared and submitted to the Engineer.

### 3.3 FIELD QUALITY CONTROL

- A. As specified in Section 260500 - Common Work Results for Electrical.
- B. Provide services of a service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.
- C. Make observations to verify that units and controls are properly labeled.
- D. Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at the Contractor's expense. Verify by the system test that the total system meets the specifications and complies with applicable standards.

### 3.4 TRAINING

- A. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. Operators Manuals and Users Guides shall be provided at the time of this training.
- B. Schedule training with Owner through the Architect, with at least seven (7) days advance notice.

### 3.5 CLEANING AND PROTECTION

- A. Prior to final acceptance, clean system components and protect from damage and deterioration.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~  
Last revised: ~~8/24/2018~~9/2016

SECTION 275319

DISTRIBUTED ANTENNA SYSTEM (DAS)

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this section for Mail Processing Facilities (MPF).*

***\*\*THIS ENTIRE SECTION CONSISTS OF REQUIRED PARTS OR ARTICLES. DO NOT REVISE WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER AND RALEIGH IT SERVICE CENTER SUBJECT MATTER EXPERT FOR NEW CONSTRUCTION/BUILDING EXPANSIONS.***

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

A. This specification describes the technical and performance criteria for deploying a Neutral-Host Basic Distributed Antenna System (DAS) capable of supporting USPS Networks and subsequent enhancement to support Wireless Service Providers (WSP) for Cellular Telephones and/or Land Mobile Radio systems (LMR). The DAS components specified in this document include:

1. Donor Antennas
2. Coverage Antennas
3. Coax Cable
4. Coax Connectors
5. Splitters
6. Combiners
7. Couplers
8. Fiber-Optic: Cable, Connectors and Jumpers.
9. Bi-Directional Amplifiers (BDA)
10. Fiber-Optic: Master Unit and Remote Units.

B. Related Documents

1. The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section.
2. USPS LAN Infrastructure Best Practices, 01 October, 201~~8~~7.
3. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

C. Related Sections: Refer to the following sections for additional requirements for the Distributed Antenna System (DAS).

1. Section 078400 – Fire stopping
2. Section 260500 – Common Work Results for Electrical
3. Section 270500 – Common Work Results for Communications
4. Section 271100 – Communications Equipment Room Fittings
5. Section 271300 – Communications Backbone Cabling
6. Section 271500 – Communications Horizontal Cabling

1.2 SYSTEM DESCRIPTION

A. Services: Upon commissioning, the DAS shall provide coverage for the WSPs listed below on all frequencies currently being used by the designated WSPs and PSN in the given market.

1. AT&T Wireless
2. T-Mobile
3. Verizon

B. Expansion: Without replacing the Passive DAS Infrastructure, the DAS shall have expansion capabilities to support the following WSP frequencies deployed in a SISO antenna environment. Any additional Components required for system expansion shall comply with all specifications of this Section.

Technology	MS/UE TX Power	Maximum BTS received power	Minimum path loss	
GSM900	+33 dBm	-26 dBm/200 kHz	59 dB	Adj.-channel
	+5 dBm	-40 dBm/200 kHz		Co-channel
DCS1800	+36 dBm	-35 dBm/200 kHz	71 dB	Adj.-channel
	0 dBm	-40 dBm/200 kHz		Co-channel
3G850	+24 dBm	-52 dBm/3.84 MHz	76 dB	Adj.-channel
	-50 dBm	-73 dBm/3.84 MHz		Co-channel
3G2100	+24 dBm	-52 dBm/3.84 MHz	76 dB	Adj.-channel
	-50 dBm	-73 dBm/3.84 MHz		Co-channel
<b>3GPP LTE</b>	<b>+24 dBm</b>	<b>-52 dBm/3.84 MHz</b>	<b>76 dB</b>	<b>Adj.-channel</b>
	<b>-50 dBm</b>	<b>-73 dBm/3.84 MHz</b>		<b>Co-channel</b>

- C. The contractor shall propose and deploy a DAS system capable of receiving WSP approval for interconnection to the WSPs' macro networks.
- D. The contractor shall propose and deploy a DAS system capable of receiving approval of the USPS.
- E. Broadband Active Distribution: Single-mode fiber-optic cable will be used for Active distribution. In-line amplifiers are not allowed.
- F. Network Management:
  1. NMS: The DAS shall have a Network Management System (NMS) capable of alarm, monitor, configuration and control of all Active Components.
  2. SNMP Integration: The DAS NMS shall be capable of integration with 3rd party SNMP based NMS products for alarm purposes and provide alarming information.

### 1.3 ALTERNATIVES

- A. No alternative component(s) shall be accepted as equal to the components and manufacturers specified in this document unless the Contractor proves that the alternative component(s) are of equal or superior specifications and quality, and that they have been used in similar projects of size and complexity for no less than 3-years. The following information shall be required for each alternative component with submittal of the bid response:
  1. Passive Components:
    - a. Product samples

- b. Detailed product specifications
  - c. Independent test results verifying the product specifications
  - d. Written documentation from the manufacturer guaranteeing that the alternative component(s) shall remain available for new purchase for a period of 7-years from the date of system acceptance.
2. Active Components:
- a. Hardware and software manuals
  - b. Detailed product specifications
  - c. Mean Time Between Failure (MTBF) data for each Active Component
  - d. Independent test results verifying the product specifications
  - e. Written documentation from the manufacturer guaranteeing that the alternative component(s) shall be supported for a period of 7-years from the date of system acceptance.
  - f. For Active Components serving the WSPs, written documentation from the WSPs that the alternative component(s) are approved for use within the WSP's network and that interconnection of the DAS to the WSP's network will not be withheld due to the alternative component being used in the DAS.

#### 1.4 CODES, STANDARDS AND CERTIFICATIONS

- A. All work, including but not limited to: cabling, pathways, support structures, wiring, equipment, installation, workmanship, maintenance and testing shall comply with the latest editions of the National Electrical Code, National Electrical Safety Code, all applicable local rules and regulations, equipment manufacturer's instructions Standard of Installation. In case of discrepancy or disagreement between the documents noted above, the contractor shall satisfy the most stringent requirements.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Measured performance of installed DAS: In addition to the coverage, power and loss specifications above, a passive DAS shall meet the following performance requirements.
  - 1. Return loss
    - a. Return loss measured at any input port of the multi-network combiner (or any other device serving a similar function) be greater than 20 dB over the operating frequency bands.
    - b. The return loss of any feeder connected to the output ports of the multi-network combiner shall be greater than 16 dB over the operating frequency bands.
  - 2. Passive intermodulation
    - a. The passive intermodulation performance of each passive DAS segment connecting to a multi-network combiner (Measurement point 2 in Figure 5-1) shall be -140 dBc @ 2 x 43 dBm minimum.

### PART 2 - PRODUCTS

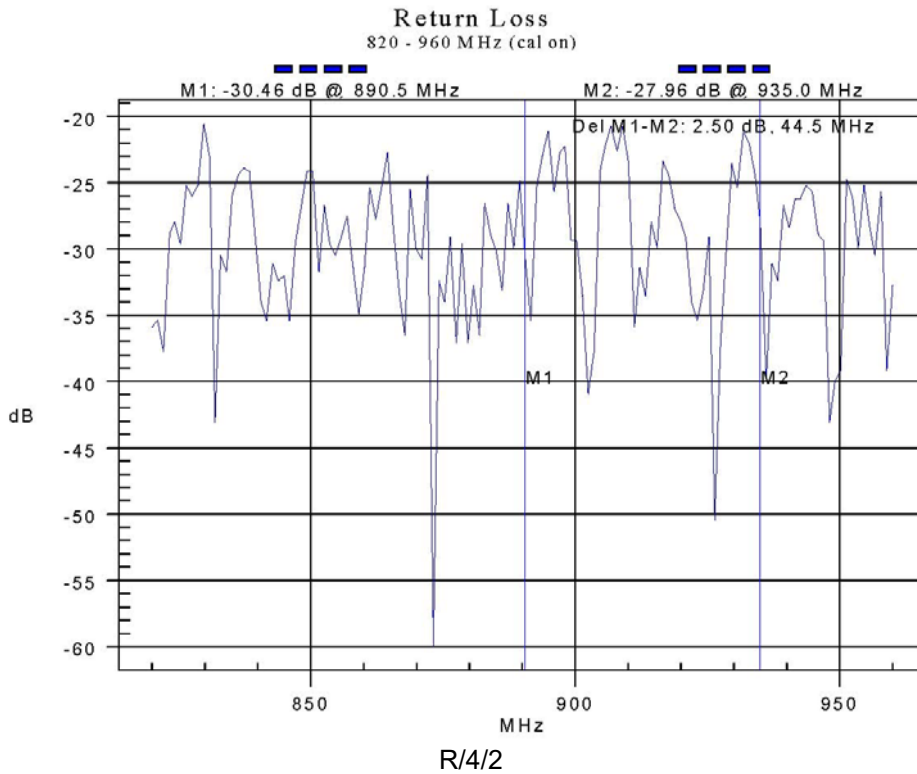
#### 2.1 Preferred Vendor List

- A. Specified in Section 270500 – Common Work Results for Communications.
- B. Specified in Section 271100 – Communications Equipment Room Fittings.
- C. Specified in Section 271300 – Communications Backbone Cabling.
- D. Specified in Section 271500 – Communications Horizontal Cabling.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Note that under no circumstances the following instructions to override Code of Federal Regulations (CFR). Where there is any conflict with the building codes, installation contractor must follow Code of Federal Regulations (CFR).
  - 1. Passive Backbone
    - a. Specified in Section 271300 – Communications Backbone Cabling.
  - 2. Active Backbone
    - a. Specified in Section 271300 – Communications Backbone Cabling.
  - 3. Floor Cabling
    - a. Specified in Section 271500 – Communications Horizontal Cabling.
  - 4. RF Sweeps
    - a. All RF sweeps are to be documented as per the diagram below with the cable number and also supplied in electronic format to the lead carrier for validation and acceptance.
    - b. All cables are to be swept across the 820 MHz to 960 MHz and 1710 to 2170 MHz bands.



3.2 DOCUMENTATION

- A. All documentation shall be securely bound in a durable cover and in a form that allows easy replacement and addition of individual sheets. The design contractor shall provide two sets of all documentation supplied to the lead mobile carrier and any other sharing carriers.
- B. In addition, soft copy of all drawings and documents supplied above are to be provided on a CD. The documents shall be provided in formats compatible with Microsoft Office 2003 applications.
- C. Drawings shall be in Acrobat .PDF format. (MS Visio or AutoCAD drawing format if requested.)



- D. All scanned drawings are to be stored in JPEG Bitmap format (\*.JPG) or Acrobat .PDF format.
- E. The design contractor shall provide two copies of the CD containing electronic copies of all documentation supplied.
- F. The design contractor shall provide Detailed Design Documentation and Turn-key Installation Documentation.
- G. Preliminary Design Documentation
  - 1. Specified in Section 270500 – Common Work Results for Communications.
- H. Detailed Design Documentation
  - 1. Specified in Section 270500 – Common Work Results for Communications.
- I. Installation Documentation
  - 1. Specified in Section 270500 – Common Work Results for Communications.
- J. Contractor/Builder initiated DAS
  - 1. Specified in Section 270500 – Common Work Results for Communications
- K. Insertion Loss
  - 1. The backbone distribution system must be checked for its insertion loss. A signal must be fed in at the base station end and the level out must be measured at the final splitting or coupling point to each floor. Where a splitter feeds more than 1 floor or there is more than 1 output from the same splitter to a floor only one output needs to be tested. The difference between the input level and the output level must be recorded as the insertion loss.
  - 2. All measurements for insertion loss must be tabulated as per the example below and supplied in electronic format to the lead carrier for validation and acceptance:

Test Point	Frequency	Input Point	Input Power	Output Power	Insertion Loss
Splitter S/3/1	860 MHz	BC/B2/1	+20 dBm	-3 dBm	23 dB
Splitter S/11/1	860 MHz	BC/B2/1	+20 dBm	-7 dBm	27 dB

- L. Passive Intermodulation Testing
  - 1. Passive intermodulation testing shall be carried out to determine the PIM performance of the installed DAS. The test configuration shall be in accordance with Set-up 1 of IEC 62037, using two +43 dBm test signals.
  - 2. Testing in one frequency band is acceptable (e.g. 900 MHz only).
  - 3. Test results shall be provided for reflected measurements at the following points:
  - 4. Each input of the multi-network combiner
  - 5. Each segment connected to multi-network combiner outputs (measured at the point which connects to the multi-network combiner, i.e. including cable tails).
- M. Dynamic testing
  - 1. Where specifications call for dynamic testing (of cable assemblies), the cable under test shall be bent through 90 degrees at its minimum bending radius, straightened, bent through 90 degrees and straightened. The worst PIM performance observed during this sequence shall be recorded.

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/201~~8~~  
 Last revised: ~~8/24/18~~10/1/2016

SECTION 281304  
ENTERPRISE PHYSICAL ACCESS CONTROL SYSTEM

**Style Definition:** 4: Indent: Left: 0.6", Tab stops: 1", Left + Not at 1.46"

\*\*\*\*\*  
\*  
**NOTE TO SPECIFIER**  
*Use this Specification section where an Enterprise Physical Access Control System (ePACS) is part of the Work. Verify ePACS requirements with USPS Contracting Officer and Inspection Services.*  
\*\*\*\*\*  
\*  
**NOTE TO SPECIFIER**  
**\*\*REQUIRED PARTS OR ARTICLES ARE INCLUDED IN THIS SECTION. DO NOT REVISE THIS SECTION WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.**  
\*\*\*\*\*  
\*

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 2018.
  
- C. Related Sections:
  - 1. Section 081100 – Metal Doors and Frames.
  - 2. Section 087100 – Door Hardware.
  - 3. Section 111415 – Turnstiles.
  - 4. Section 260500 – Common Work Results for Electrical.
  - 5. Section 264128 – Surge Protective Devices (SPDs).
  - 6. Section 270500 – Common Work Results for Communications.
  - 7. Section 275117 – Video Intercom and Exterior Gate Control System.
  - 8. Section 281600 – Intrusion Detection System.
  - 9. Section 282305 – Integrated Security and Investigative Platform (ISIP) CCTV System.
  - 10. Section 283100 – Fire ~~Emergency Voice/Detection and Alarm~~ Communication System (EVACS).

1.2 SYSTEM DESCRIPTION

- A. Enterprise Physical Access Control System:

281304 - 1

1. Access management system (System) shall monitor and control access to areas defined herein.
2. The system will utilize proximity cards as its primary access device, but will support ISO 14443 Contactless smartcard technology, such as Mifare, and (keypad) technology at each door. It shall also support alarm inputs and control out puts.
3. System shall consist of computers (servers/workstations), stand-alone microprocessor based controllers, card readers and/or Keypads and host software.
4. The microprocessor based controllers (FP) 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 down loading to the central computer. It will be able to store a minimum of 10,000 cardholders.
5. System shall be capable of operating in a distributed processing environment with or without host connectivity.
6. Specific types of devices and their functions shall be addressed in relevant sections.
7. The system shall support an integrated electronic photo identification (photo-ID) system.
8. System will utilize an ODBC compliant database, such that it can share or retrieve information from a local database.
9. System shall be 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.
10. System will share its database with the electronic photo-ID system to eliminate redundant input of data to the databases for common data fields.
11. The operating system shall be USPS Windows applicable version (ACE standard operating system).
12. The system shall support true multi-user, multi-tasking with a minimum of 3 workstations.
13. The system shall include capability for remote access for off-site support and/or management workstations. Systems that connect to the network must provide remote access via the Postal Service business partner VPN connectivity. Dial-up phone connectivity is not permitted when systems are connected to the network.
14. The system shall utilize standard GUI interface allowing day-to-day operations to be performed using a standard mouse. All graphics shall be dynamic color alarm graphic maps (user definable) created with graphic drawing programs, not vector files. All device names shall be user programmable (minimum of 32 characters, full English).
15. The complete operator instruction manual shall be imbedded in the on-line help and shall be readily accessible using standard "Index," "Help Topics," "Keyword" and "Search" requests.
16. The client shall have the ability to define events for viewing in any one of multiple event viewer screens or any combination of screens. Events shall also be designated for printing to selectable printers.
17. Provide multiple levels of password protected system access with encryption. All passwords will use one-way encryption.
18. Provide operator with configurable reporting of event history and cardholder activity by authorized request only.
19. Provide reports for: Inputs (all or in groups), outputs (all or in groups), alarm messages, instructions, event action, card transaction history, field devices and panel reports, alarm history, alarm suppression.
20. Report generation shall allow for reports to be filtered by time and date as well as by device name, event category and definition and by card holder categories or individual record(s).
21. It will monitor all emergency egress doors and interface the alarms from these doors with the CCTV system.

B. Description of work:

1. 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.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
 \*\*\*\*\*

281304 - 2

ENTERPRISE PHYSICAL ACCESS  
 ACCESS CONTROL SYSTEM

*Review the following lists with the Contracting Officer and Inspection Services. Note that coded keypads shall only be utilized upon approved exception by USPS. Modify Accordingly.*

- \*\*\*\*\*
2. Enterprise Physical Access Control System will manage access to the following [building] [and] [selected areas] using [encoded cards.] [and/or] [coded Keypads.]
    - a. employee entrances/exits
    - b. access to administrative space
    - c. Registry Cage
    - d. Stamp Depository
    - e. 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 Controller.
    - b. Reader Interface Modules.
    - c. Card reading sensors.
    - d. Cards: Not In Contract, provided by local USPS facility. Contact USPS via email at [pacs-support@usps.gov](mailto:pacs-support@usps.gov) for assistance in procuring cards.
    - e. ACE Standard Server/Workstations & software: Not In Contract, provided by USPS.
    - f. Photo-ID badge issuing software. Not In Contract, provided by local USPS facility. Contact USPS via email at [pacs-support@usps.gov](mailto:pacs-support@usps.gov) for installation of software.
    - g. Photo-ID badge printer. Not In Contract, provided by local USPS facility. Contact USPS via email at [pacs-support@usps.gov](mailto:pacs-support@usps.gov) for assistance in procuring printer.
    - h. Digital badge camera, backdrop, consumables and peripherals. Not In Contract, provided by local USPS facility. Contact USPS via email at [pacs-support@usps.gov](mailto:pacs-support@usps.gov) for assistance in purchase.
    - 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.
- 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.

281304 - 3

#### 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: FP, proximity card reading sensors, keypads, power supplies, switches and ancillary equipment, ~~photo-ID equipment including but not limited to card printer, digital camera, backdrop and light~~. Submit separate layout drawings of each 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.
- 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 Contracting Officer~~ 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.
- 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 Contracting Officer representative~~. Use the following email for assistance in obtaining this clearance: [pacs-support@usps.gov](mailto: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 Contracting Officer~~.
    - 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.

281304 - 4

USPS MPFS

Date: 10/1/2017~~8~~

ENTERPRISE PHYSICAL ACCESS  
ACCESS CONTROL SYSTEM

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. Operator Training for using and programming the system for up to six (6) operators and two (2) shift supervisors, provide in two (2) sessions of eight (8) hours each. Provide two (2) additional eight (8) hour training sessions three (3) months after acceptance. Provide separate training for photo-ID badge production operators.
  - e. Submitting procedures for installing system on USPS networks and performing cut-over and acceptance testing on the system. Coordinate procedures with USPS Information Technology to ensure no interference with USPS network or systems.
  - f. Provide two (2) eight (8) hour maintenance training sessions.

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/Contracting Officer.

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.

PART 2 - PRODUCTS

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project. Review and confirm system requirements with USPS Inspection Services. Modify following paragraphs accordingly. Vanderbilt Industries has been selected by the USPS as the sole source provider for the system controller. Revisions to or substitutions for the controller are not permitted. All other ePACS peripheral components can be provided by any of the manufacturers listed below.*

281304 - 5

USPS MPFS

Date: 10/1/2017~~8~~

ENTERPRISE PHYSICAL ACCESS  
ACCESS CONTROL SYSTEM

\*\*\*\*\*  
\*

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](mailto: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. GE Security (800)428-2733.
    - b. HID Corporation (800) 721-7336.
    - c. Hirsch Electronics Corporation, Irvine, CA (714) 250-8888.
    - d. Honeywell Security (800)323-4576.
    - e. Vanderbilt Industries: contact G. Patrick Shadood; Office - (973) 316-3910; Mobile – (908) 432-8806.
    - f. Lenel Systems International (716) 248-9720.
    - g. Software House (800)550-6660.
    - h. 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 a microprocessor based controller by Vanderbilt Industries #VRCNX-AM.
  - 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 metal enclosure for wall mounting and include integrated battery backup.
- B. Field Panel: provide complete hardware to operate with the following features:
  - 1. The field panel shall support a minimum of sixteen (16) card reading sensors and shall be capable of supporting additional input and output modules, [Vanderbilt Industries #VSRC-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 field panel, 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 field panel 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 field panel 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 field panel shall operate on 12 - 24VDC, powered from an external, regulated power supply with battery backup. The field panel shall provide necessary power to all card readers and expansion modules.
  - b. Memory Retention: The field panel shall maintain configuration and card holder information for up to seventy-two (72) hours when operating power is disconnected from the field panel.

C. 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 (CR) to be provided at:
  - a. High-speed rollup doors.
  - b. Automatic impact doors.
  - c. Inbound Truck Maneuvering Area Gates (a reader on top due to mirror on high vehicles and a reader mounted low for cars).
  - d. Employee parking area gates.
  - e. These readers are exempt from the requirements of FIPS201.
- 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 (CR):
    - 1) At high-speed rollup and automatic impact 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 field panel.
  - 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-#1822 AWG minimum). Size cable gauge to meet distance requirements from the field panel.
- 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.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
 \*\*\*\*\*

*Note that coded keypads shall only be utilized upon approved exception by USPS.*  
 \*\*\*\*\*

- D. Keypad:
  - 1. General:
    - a. The Keypad shall operate in conjunction with CR for an increased level of user authentication.
    - b. Where required, the keypad shall be integral to the CR and provided as a single card reader/keypad combination unit.
    - c. The system shall have the means to utilize a numeric keypad for entry of a Personal Identification Number (PIN).
  - 2. Capacities:
    - a. Keypad only reader shall provide a standard 10 digit numeric entry organized in the standard telephone pad layout.
    - b. The user shall be able to enter a 4-digit Personal Identification Number (PIN).
- E. 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 field panel, 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 field panel, card reader, expansion module, and electric lock operation for at least four (4) hours in event of power failure.

281304 - 8

2. Capacities: The Power supply shall provide:
  - a. 12 volt DC output to the field panel; 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.
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 field panel 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.

F. 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.

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.

281304 - 9

- 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 ~~Contracting Officer~~ 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 [Design Build Entity] [or] [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.

### 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.
- J. Use sheet metal channel to bridge studs above and below cabinets recessed in hollow partitions.

### 3.3 INSTALLATION – TERMINAL CABINETS

- A. Terminal cabinets shall be provided to house long range reader power supplies, interface modules and other access control system components. Enclosures shall be hinged and lockable with panelboard construction and plywood backboards.
- B. Terminal cabinets shall be wall or pedestal mounted 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.
- C. Terminal cabinets shall be sized to accommodate all components without overheating and forced air exhaust fans shall be provided, as deemed necessary by the manufacturer. Cabinets shall be equipped with copper ground busses and those requiring 120 Volt power shall be provided with a 20 Amp, 125 Volt quadruplex receptacle and a (6) outlet, 120 Volt power strip complete with surge protection (Tripp-Lite, APC or equal). Receptacle and power strip shall be securely mounted within the cabinet.
- D. Exterior terminal cabinets mounted near or adjacent to vehicular traffic shall be protected using 6 inch dia. x 4 ft. high concrete bollards.

### 3.4 EQUIPMENT INSTALLATION AND DOCUMENTATION

- A. Installation:
  - 1. The Enterprise Physical Access Control System shall be installed and wired completely on the USPS structured wiring system as shown on the plans by factory trained and authorized employees of the Systems Integrator.
  - 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](mailto: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 ~~Contracting Officer~~ [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 field panel shall be wall mounted in a secure area.
    - b. The power supplies shall be installed in a secure area adjacent to the field panel.
  - 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 structured cabling system provider to insure transmission pathway through the structured wiring system.

2. Telecommunications outlets and cabling for equipment as shown on the plans will be provided under Section 270500.

3. Refer to "ePACS Standard System Configuration – revised March 2017" and "Access Control (ePACS) SOP – revised October 2018 for database configuration and local facility responsibilities."

Formatted: 4

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 field panel 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~~Contracting Officer).
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 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.

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:

281304 - 12

USPS MPFS

Date: 10/1/2017~~8~~

ENTERPRISE PHYSICAL ACCESS  
ACCESS CONTROL SYSTEM

- 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 Contracting Officer** 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 Contracting Officer**.
  5. The Systems Integrator shall guarantee all material and workmanship involving the system for twelve (12) months after startup.
- B. Training (in addition to the requirements of Section 1.5, B, 5):
1. After system startup, the Systems Integrator shall instruct USPS personnel in how to program the system and demonstrate a typical operating program for each type of access controlled area.
  2. Enterprise Physical Access Control System training sessions shall be arranged with the USPS at least one week prior to the training date. Training manuals shall be delivered for each trainee with one additional copy delivered for archiving on the project site.
  3. Training manuals shall consist of an agenda, defined objectives for each lesson, a detailed description of the subject matter of each lesson, and the manufacturer's written operation and system manuals. At a minimum, training agenda shall consist of the following.
    - a. An overview of the system components and features.
    - b. A detailed description of how the equipment will operate to meet the performance requirements of the Enterprise Physical Access Control System.
    - c. A description of the operating system and application software.
    - d. Start up and orderly shutdown procedures for the system.
    - e. Hands on training on all Enterprise Physical Access Control System software and hardware features.
    - f. Basic troubleshooting guide intended to identify the source of system problems.
    - g. System configuration and data back-up and restoration procedures.
- C. 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

USPS Mail Processing Facility Specification issued: 10/1/2017<sup>9</sup>  
Last revised: 9/4/2017<sup>9</sup>5/2018

281304 - 13

USPS MPFS

Date: 10/1/2017<sup>8</sup>

ENTERPRISE PHYSICAL ACCESS  
ACCESS CONTROL SYSTEM

SECTION 281600

INTRUSION DETECTION SYSTEM

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

\*\*\*\*\*

**NOTE TO SPECIFIER**

**\*\*REQUIRED PARTS OR ARTICLES ARE INCLUDED IN THIS SECTION. DO NOT REVISE THIS SECTION WITHOUT AN APPROVED DEVIATION FROM USPS HEADQUARTERS, FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.**

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Intrusion detection devices.
2. Alarm control panel.
3. Signaling devices.

B. Related Sections:

1. Section 282305 – Integrated Security and Investigative Platform (ISIP) CCTV System.
2. Section 260500 – Common Work Results for Electrical: Supporting devices and electrical identification.
3. Section 260533 – Raceway and Boxes for Electrical Systems. Conduit for system wiring.

1.2 REFERENCES

A. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code.

B. Underwriters Laboratories Incorporated (UL):

1. UL 609 - Local Burglar Alarm Units.
2. UL 634 - Connectors and Switches for Use with Burglar-Alarm Systems.
3. UL 639 - Intrusion Detection Devices.
4. UL 681 - Installation and Classification of Mercantile and Bank Burglar-Alarm Systems.
5. UL 1023 - Household Burglar-Alarm Systems.
6. UL 1076 - Proprietary Burglar Alarm Units and Systems.
7. UL 1449 - Transient Voltage Surge Suppressors.

1.3 DEFINITIONS

- A. Hard-Wired System: Alarm, supervisory, and detection devices directly connected, through individual dedicated conductors, to central control panel.
- B. Multiplex System: Communications link using signaling method characterized by simultaneous or sequential transmission, or both, and reception of multiple signals in a communication channel, including means for positively identifying each signal.
- C. Zone: A single initiating device or combination of devices connected to a single point/zone on the Intrusion Detection Device panel. Circuit showing the display of alarms point/zone.
- D. Dial-Up System: Communication link utilizing PSTN 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. When alarm signal is unable to be sent by telephone; a local 110 decibel horn is to sound for 5 minutes after the last sensor activation. The horn is to be located in the workroom.

#### 1.5 SUBMITTALS

- A. 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 pre-test and acceptance test reports directly to ~~Contracting Officer~~ [USPS Project Manager](#) from Manufacturer's Quality Control Inspector with, with copy to Contractor.
  - 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 ~~Contracting Officer~~ [USPS Project Manager](#) from Manufacturer's Quality Control Inspector, with copy to Contractor.
- B. Procedures for closeout submittals.
1. Operation and Maintenance Data: Include data for each type product, including features and operating sequences, both automatic and manual. Include user's software data and recommendations for spare parts to be stocked at the site. Provide names, addresses, and telephone numbers of service organizations that stock repair parts for the system.
  2. Project Record Documents: Record actual locations of equipment and devices, and routing of alarm wiring.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firms experienced in manufacturing equipment of the types and capacities indicated that have record of successful in-service performance with minimum 5 years documented experience. Prime system manufacturer and manufacturers of major system components required to qualify separately.
1. Service Center: Prime system manufacturer maintains a service center capable of providing training, parts, and emergency maintenance and repairs for overall system at Project site within 8 hour maximum response time.
- B. Installer Qualifications: Experience with systems of the type and scope indicated and certified as authorized service representative of the prime system manufacturer with minimum 5 years documented experience.
1. System shall be installed by a single contractor that assumes responsibility for system components and their compatibility.
  2. Only manufacturer's certified installer shall be utilized.
  3. Installer shall be NFBA/SIA technical level #1 certified.
  4. Installer shall be licensed where required by state or county.
  5. Installer shall require a security clearance if the installation is accomplished after the facility starts processing the mail.
- C. Regulatory Requirements:
1. Coordination and verification of standards and requirements with Postal Inspection Service through ~~Contracting Officer~~ [USPS Project Manager](#) is required throughout planning, design, construction phases, and final approval of alarm security system.
  2. Postal Inspection Service has sole responsibility for evaluating the need for any security related equipment.
- D. Comply with requirements of NFPA 70.
- E. Comply with UL Standard 609, 1023, and 1076.
- F. FM Compliance: Provide FM-approved intrusion detection systems and components.

## 1.7 OWNER'S INSTRUCTION

- A. Installer will provide training to end user.
- B. Postal Inspection Service will provide final programming.

## 1.8 MAINTENANCE

- A. Extra Materials: Furnish extra materials described below that match products installed, packaged with protective covering for storage and identified with labels clearly describing contents.
  - 1. Intrusion Detection Devices: Furnish quantity equal to 5 percent of the number of units of each type installed, but not less than 1 of each type.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified Products which may be incorporated in the Work include the following:
  - 1. Bosch Security, Fairport, NY (800) 289-0096(alarm & keypad).
  - 2. Visonic, Inc., Bloomfield, CT (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 Contracting Officer with supporting documentation. Include written justification, designs, manufacturer's specifications, cost benefits, and any special circumstances dictated by local conditions. Documentation package shall be submitted in sufficient time to minimize any adverse effects of the proposed changes to the project construction schedule. Postal Inspection Service through Contracting Officer reserves the right to reject substitute and other systems.
  - 2. Substitutions are not permitted for control panel, expansion boards, and control stations.
- C. Specified Products:
  - 1. Door Switches: Sentrol Magnetic Contacts, #1078CW with 1K ohm resistor.
  - 2. Dual-Technology Devices, Passive Infrared and Microwave:
    - a. Wall Mounted
      - 1) Bosch #ISC-CDLI-W15G
      - 2) Visonic DUO 220AM
    - b. Ceiling Mounted
      - 1) Bosch DS9360
      - 2) Visonic DUO 240
  - 3. Control Panel: Bosch: # G7412GV4-USA Control/Communicator.
  - 4. Expansion Boards: Bosch: #D8128D OctoPOPIT.
  - 5. Control Stations (Keypad): Bosch: #D1255 Command Center.

### 2.2 INTRUSION DETECTION EQUIPMENT

- A. Surge Protection: Comply with minimum requirements of UL Standard 1449 for each component using solid-state devices and having line voltage power source connection or exterior underground signal connection.

- B. Interference Resistance: Systems and equipment and their operation not affected by radiated radio frequency interference and electrical induction of 15 V/m over frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25 V rms injected into power supply lines at 10 to 10,000 MHz.

### 2.3 INTRUSION DETECTION DEVICES

- A. Types, features, accessories, and mounting conditions of individual devices are as indicated.
- B. Alarm Contact Arrangement: Contact-making intrusion detection devices are single-pole, double-throw type.

### 2.4 DOOR SWITCHES

- A. Comply with UL Standard 634.
- B. All door contacts will have 1 K resistors added or 1 K resistor built in.
- C. Balanced magnetic type. Magnet part designed for installation in door; magnetically operated switch installed in door frame. Unit uses bias magnet and sensitive read switch to resist compromise by introduction of foreign magnetic fields.
  - 1. Flush-Mounted Units: Flush with surface of door frame and door.

### 2.5 SPACE INTRUSION DETECTION DEVICES

- A. Comply with UL Standard 639 and the following general requirements:
  - 1. Configuration: Devices consist of single component or two or more separately mounted components as indicated or as required to perform functions. Single-component devices may not be used where multiple-component devices are indicated.
  - 2. Power Source Characteristics: Devices are supplied by one or more dedicated 120 V 60 Hz supply circuits from alarm control panel.
  - 3. Detection Indicator: LED in unit housing, latching-type where indicated.
  - 4. Sensitivity: Units detect presence of an intruder within their specified detection patterns and are insensitive to influences outside the pattern.
  - 5. Self-Testing Capability: Devices indicated to have this feature automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Test failure is signaled to control panel by a trouble signal.
  - 6. Anti-Masking Capability: Devices indicated to have this feature automatically check operation continuously or at intervals of a minute or less and use signal-processing logic to detect blocking, masking, jamming, tampering, or other operational dysfunction. Such detection is signaled to the control panel as an alarm signal.
  - 7. Addressability: Indicated devices include communication transmitter and receiver with unique identification and status-reporting capability to system control panel.
  - 8. Remote Controllability: Indicated devices are individually monitored at system control panel for calibration, sensitivity, and alarm condition and are individually adjustable for sensitivity from panel.
- B. Passive Infrared (PIR) Devices: Detects intrusion by monitoring infrared energy emitted within protected zone. Units are sensitive to infrared wavelengths emitted by human body and are insensitive to general area thermal variations.
  - 1. Wall-Mounted Units: Maximum detection range for individual units exceeds scheduled distance by 25 percent, but is not less than 50 feet (15-m).
  - 2. Ceiling-Mounted Units: Full 360 degree conical spot-detection pattern. With device mounted at 8 feet (2500-mm) above floor the pattern at floor level is minimum diameter of 7 feet (2000-mm).

With device mounted at 25 feet (7600mm) above floor the pattern at floor level is minimum diameter of 18 feet (5500mm).

- C. Dual-Technology Devices, Passive Infrared and Microwave: Combine the two detection methods described above in a single housing.
  - 1. Detection by either or both methods results in an alarm signal. A control in device selects operating mode.

## 2.6 CONTROL PANEL

- A. Comply with UL Standard 1076.
- B. Cabinet: Lockable steel enclosure. Arrange panel so operations required for testing or for normal operation and maintenance are performed from front of enclosure. If more than single unit is required to form complete control panel, provide exact matching, keyed alike panels. Accommodate components and allow ample gutter space for interconnection of panels and field wiring. Identify each enclosure by engraved, laminated, phenolic resin nameplate. Lettering on enclosure nameplate shall not be less than 1 inch (25 mm) high. Identify individual components and modules within cabinets with permanent labels.
- C. Systems: Alarm and supervisory systems are separate and independent in control panel. Alarm-initiating zone boards in panel consist of plug-in cards. Arrangement requiring removal of field wiring for module replacement not permitted. Use Bosch D7412GV4-C-USA (complete) package containing the G7412GV4-USA control panel. The manufacturer has verified that the control panel will be produced for U.S. Postal Service Projects. THE CONTRACTOR IS REQUIRED TO INFORM THE MANUFACTURER THAT THE CONTROL PANEL IS FOR A U.S. POSTAL SERVICE PROJECT.
- D. Control Modules: Types and capacities as required to perform functions of system. Visible and audible signals in control panel indicate alarm, supervisory, and trouble conditions for each zone. Each type of audible alarm has distinct sound.
- E. Expansion Boards: Provide and install as many expansion boards (D8128D OCTOPOPITS) as necessary to connect all door contacts and motion sensors. All expansion boards shall be installed in the control panel cabinet or in a like cabinet immediately adjacent to the control panel cabinet. All unused points shall have EOL resistors installed. Popits are not allowed.
- F. Zones: Quantity of alarm and supervisory zones as indicated with capacity for expanding number of zones by minimum of 25 percent.
- G. Power Supply Circuits: Panel provides power for remote power-consuming detection devices. Provide adequate circuit capacity for at least a 25 percent increase in load. Transformer near the panel, minimum 18AWG copper wire. Earth ground, use 14-16AWG solid copper wire.
- H. Command center (keypad): Individual annunciation for each zone. Blue fluorescent vacuum alphanumeric display for each control panel section/area display devices on the keypad. Manual toggle test-switches or push test-buttons do not require key to operate. Alarm and supervisory signals 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.
- I. Resetting: Controls permit silencing audible signals for individual zones but prevent the resetting of alarm, supervisory, or trouble signals while condition still exists.
- J. Alphanumeric Display and System Controls: Arrange for basic interface between human operator at control panel and system components, including annunciation and supervision. A display with minimum

of 18 characters displays alarm, supervisory, and component status messages. Arrange keypad to enter and execute control commands.

## 2.7 SECURE-ACCESS CONTROL STATIONS

- A. Keypad and display module is arranged for entering and executing commands for system-status changes and for displaying system status and command-related data.

## 2.8 HORN

- A. 110 decibel horn powered by control panel with battery backup.

## 2.9 WIRE AND CABLE

- A. Stranded copper. Size conductors as indicated but not less than recommended by system manufacturer.
- B. Cable for Low-Voltage Control and Signal Circuits: All sensors and keypads will have wiring concealed inside walls or above ceiling in conduit. All sensors and keypad will be dedicated homerun wires to the D7412GV4-USA panel. Wire will be category2, unshielded, four-pair twisted 22 AWG stranded wire (conductors), except where manufacturer recommends shielded cable. Use wire colors red, green, black, orange, yellow, blue, brown, and white.

## 2.10 SPECIAL REQUIREMENTS FOR CABLE ROUTING AND INSTALLATION

- A. The majority of IDS wiring in this building will be installed above ceilings without conduit. All communications cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 725. All cabling shall bare CMP and/or appropriate markings for the environment in which they are installed.
- B. Sealing of openings between floors, through fire rated and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the contractor. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.
- C. Cabling routed exterior of the building, underground, through inaccessible ceilings or less than 10'-0" A.F.F. in the workroom shall be contained in conduit. Provide flush boxes within finished areas and factory boxes in unfinished areas. Provide 3/4" conduit risers with 90 degree bend and bushing for all wall mounted devices.

## 2.11 POWER REQUIREMENTS

- A. Normal System Power Supply: 120 V 60 Hz from locked disconnect device. System components are supplied with power through system control panel.
- B. Power Source Transfer: When normal power is interrupted, system is automatically switched to backup supply without degradation of critical system function or loss of signals or status data.
  - 1. Backup Source: Batteries in power supplies of individual system components. Such batteries are an integral part of power supplies of components. When system is in "Alarm" mode, power

- source shall provide a minimum of 4 hours of battery backup, with 8 to 12 hours in "Normal" mode.
2. Annunciation: Switching of system or any system component to backup power is indicated on system control panel as a change in system condition.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Execution Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to ~~Contracting Officer~~[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 Control Center (NLECC), Tel: 1-877-MYNLECC or 1-877-696-5322, Fax: 1-651-306-6700. Postal Management must complete Burglary Alarm Information Form (BAIF) and send to NLECC. This needs to be done at least one week prior to the installer requesting programming. Leave all installation and operating instruction books inside cabinet.
  1. Questions regarding alarm monitoring at USPS sites should be directed to the following specialist:
    - a. Leonardo V. Martinez, Sr. Physical Security Specialist, Technical Services Division – NLECC, Dulles, Virginia, [LVMartinez@uspis.gov](mailto:LVMartinez@uspis.gov)
- D. Connection and Programming Protocol:
  1. The Contractor shall connect the panel to a telephone line using a RJ31x wired for line seizure.
  2. The Contractor shall call 877-696-5322 Mon – Fri between 8am and 8pm (Eastern Time) and request to speak with a USPIA Alarm Technician.
  3. The Contractor shall provide descriptive text for each point (zone) covered, and the point it was landed to on the Alarm Panel.
  4. The Contractor shall advise USPIA which points need a delay for Entry/Exit.
  5. The Contractor shall have all keypads addressed individually. (USPIA can provide support for this).
  6. The Contractor shall advise USPIA if any special code is needed to dial out on the Alarm Panel's phone line (9, 8, etc).
  7. The Contractor shall provide USPIA with all system information necessary for the completion of the programming template by USPIA. Upon completion of the template, USPIA will transmit program to the panel for final testing.

8. Contractor will adjust the sensitivity of all sensors, adjust and mask if necessary to prevent false activations.
  9. Sensors will not be mounted in close proximity to air handling vents, as this will cause false activations.
  10. No panic, smoke, sprinkler flow control or fire alarm monitoring will be supervised at the intrusion panel. Panic system device interface will not be permitted without advance special approval by HQ Security Group.
- E. Wiring Within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Provide and use lacing bars and distribution spools.
  - F. Number of Conductors: As recommended by system manufacturer for functions indicated.
  - G. Tighten connections to comply with tightening torques specified in UL Standard 486A.
  - H. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so media are identified and coordinated with system wiring diagrams as specified in Section 260500.
  - I. Install power supplies and other auxiliary components for detection devices at alarm control panel or at a data-gathering panel except as otherwise indicated. Do not install such items in vicinity of devices they serve.
  - J. Install panel and keypad at locations indicated on Drawings and verified by Postal Inspection Service through [Contracting Officer/USPS Project Manager](#).
  - K. Grounding: Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common mode returns, noise pickup, cross talk, and other impairments.
  - L. All IDS system wiring shall be homerun from each individual device back to IDS control panel.
  - M. At IDS control panel consolidate individual cable runs at a junction box located above ceiling near the IDS control panel with a single conduit down to the IDS control panel. Splicing within any cable run is not acceptable.

### 3.3 CONSTRUCTION

- A. Interface with Other Work: Interface installation of intrusion detection system with closed circuit television system.

### 3.4 FIELD QUALITY CONTROL

- A. 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 [Contracting Officer/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.

### 3.5 ADJUSTING

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

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018  
Last revised: 9/5/2018



SECTION 282305

INTEGRATED SECURITY AND INVESTIGATIVE PLATFORM (ISIP) CCTV SYSTEM

**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities and Customer Service Facilities larger than 60,000 sq. ft. with more than 200 employees. This specification section must be utilized for CCTV projects requiring more than (16) cameras and shall not be used for any project requiring (16) cameras or less.*

***\*\*THIS ENTIRE SECTION CONSISTS OF REQUIRED PARTS OR ARTICLES. DO NOT REVISE WITHOUT AN APPROVED WRITTEN DEVIATION FROM USPS HEADQUARTERS FACILITIES PROGRAM MANAGEMENT, THROUGH THE USPS PROJECT MANAGER.***

*This is a Direct Vendor supplied system used by the Postal Inspection Service for Security, Criminal Investigative, Burglary, and Robbery Countermeasure purposes in Postal facilities.*

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Direct Vendor:

1. All equipment including the servers, monitors, network switch, etc. are to be procured directly from the Direct Vendor (Securitas Electronic Security) utilizing the pass through pricing process.
2. The cameras, servers, monitors and associated equipment shall be supplied and installed by Securitas Electronic Security, Inc the sole approved USPS CCTV Direct Vendor. The Direct Vendor is to provide a Bill of Materials, pricing, and installation costs. The General Contractor is responsible for power, conduit, cable tray, cable and cable pulling. For assistance contact the Direct Vendor at:

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

3. Contract to Securitas should be addressed to:

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

4. NEW SES Installation Number: 844-SES-6100 (844-737-6100)

- For SES Installation inquiries.
- Project installation and scheduling.
- ~~Please Note: You can also use SecureStat@ (<https://securestat.securitas.com>) to easily check installation project status and dates online.~~

5. SES Account Management & Sales Number: 855-331-0359
  - For SES Account Management & Sales.
  - The current number will remain the same.
  - For add-ons, upgrades, new systems, new services, new locations and other account management related items.

C. General Contractor:

1. Responsible for providing power, conduit, cable tray, cable, and cable pulling and NEMA Enclosures to be used as part of the installation.
2. Provide AutoCAD electronic copies of the final camera placement drawings and camera schedules (from the project issued for construction drawings produced and provided by the design A/E) to the Direct Vendor and any requested documentation. This will include head end and remote node locations and any monitors requested.
3. Verify customer location has 56 network available for installation of system via USPS site project manager or USPS IT.

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

1. System Installation Manuals (provided by the Direct Vendor) shall be left on-site during the final acceptance. Manuals will not be provided prior to installation completion.
2. USPS Security Standards Booklet ([prepared by Securitas](#)) – [08/31/201804/27/2017](#).

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.
- ~~3. Section 270500 – Common Work Results for Communications.~~
- ~~4. Section 281600 – Intrusion Detection.~~
- [5.3](#) Section 281304 – Enterprise Physical Access Control System.

## 1.2 REFERENCES

A. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code.
2. ANSI / TIA / EIA 568-C Commercial Building Telecommunications Cabling Standard (2009).
3. ANSI / TIA / EIA 569-B Commercial Building Standard for Telecommunications Pathways.

## 1.3 SYSTEM DESCRIPTION

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

## 1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures:

1. Product Data: Manufacturer's specification sheets for each component shall not be required for all products provided as part of this Direct Vendor agreement.

282305 - 2

USPS MPFS

Date: 10/1/2018

ISIP CCTV SYSTEM

2. Due to USPS security requirements, submittals will be limited to one electronic copy of the block diagram and one copy of the shop drawings to be provided to the General Contractor.
  3. Final As-Built Drawings, Operation and Installations Manual, will be supplied directly to USPS and stored within the rack per USPS Project Manager.
- B. Shop Drawings:
1. The Direct Vendor will provide a Standard Drawing Package that shall be utilized for the installation of the CCTV system. This package shall include:
    - a. Block Diagram: System block diagrams noting major system components and interrelationships of each component.
    - b. Console and Equipment Racks: Rack elevation drawings showing console/equipment arrangement.
    - c. The shop drawings shall include camera placement (camera placements shall be provided by the project specific design entity).
- C. Sequence and Scheduling Plan: Direct Vendor shall provide installation scheduling plan for review and approval. Coordinate scheduling of software and revisions with the USPS.
- D. Section 017704 - Closeout Procedures and Training:
1. Operation and Maintenance Data: Include data for each type of product, including features and operating sequences, both automatic and manual. This information shall be supplied directly to the USPS by the Direct Vendor.
  2. Product Quick Reference cards for the operation of all key system components.
  3. Project Record Documents: Direct vendor shall provide field-accurate drawings that reflect actual locations of cameras and, indicating cable identifiers, layout, location and numbering of system devices to reflect as-built conditions. The General Contractor shall provide routing of cabling information.
  4. Provide a final materials list of equipment installed and spare parts on hand. Materials list shall include model number, serial number, and date installed.
  5. Project Completion Certification: Document signed by the direct vendor and a Postal Service representative indicating that the project is fully complete with all punch-listed items resolved. IN NEW CONSTRUCTION, THE GENERAL CONTRACTOR WILL SIGN THE PROJECT COMPLETION CERTIFICATION.
  6. OPERATING INSTRUCTION
    - a. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance that is required to ensure normal operation. Authorized USPS (USPIS & USPS OIG) Representatives will receive this training.
    - b. Provide one complete set of equipment operating and installation manuals that will be stored in the rack per USPS Project Manager.
- 1.5 DELIVERY, STORAGE AND HANDLING
- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
  - B. Keep devices and equipment in manufacturer's packaging in a secured location until system is ready for installation.
  - C. Comply with Direct Vendor requirements. Coordinate storage location with the Postal Service.
  - D. The equipment delivered must be insured at the contractor's expense through acceptance.
- 1.6 DIRECT VENDOR WARRANTY/SERVICE/TECHNICAL SUPPORT PLAN
- A. Warranty:

1. Direct Vendor to include manufacturer warranty for three (3) years after facility acceptance and project completion certification for materials and labor.
  - a. Service plan shall include all parts and labor, the cost of utilizing a lift truck (if required) and shall include return shipping. Failed equipment shall be repaired or replaced at no charge to the Postal Service during the Direct Vendor warranty period.
  - b. USPS shall not be required to process any paperwork in order to be entitled to service plan coverage. It is the Direct Vendor's sole responsibility to monitor and comply with warranty eligibility.
  - c. Where operational performance is substantially affected, all software and firmware shall be upgraded to the latest version supported by the purchased hardware platform throughout the service plan period and be provided at no cost to USPS. Such upgrades shall be covered under the warranty/service plan and are at the discretion of ~~the Contracting Officers through~~ the USPS Project Manager.
  - d. Any software bugs identified by the USPS and mutually agreed upon as "level one" bugs (impacting operation with no work-around) shall be rectified within two (2) weeks of their being reported.
  - e. Any software bugs identified by the USPS and mutually agreed upon as "level two" bugs (impacting operation but with a work-around) shall be rectified within 90 days of their being reported.
  - f. Turnaround time for all repairs (warranty and out-of-warranty) shall not exceed 72 hours.
  - g. The semi-annual "PM" service performed by the Direct Vendor shall include testing and exercising of the PTZ cameras make advance replacement units available in cases where USPS operational issues require immediate replacement of a unit while minimizing down time. Direct Vendor shall provide semi-annual service test results to USPIS/OIG.

B. Technical Support:

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

1.7 Maintenance Stock Submittals:

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

1. Indoor/Outdoor fixed camera: Two cameras.
2. Indoor/Outdoor PTZ camera: Two cameras.
3. Video encode: One encoder.
4. Video decoder: One decoder.
5. 22" monitor: One monitor.
6. Fiber optic transmitter/receiver: Two of each type.
7. Camera power supply transformer: Two power supplies
8. Ethernet cable extender: Two midspans.

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

Formatted: 3

## 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](mailto:michael.tracey@Securitates.com)

#### B. Section 016000 - Product Requirements:

1. Product options and substitutions are not permitted without a written and USPS approved deviation.
2. All equipment to be supplied under this specification shall be new and the current model of the Direct Vendor listed above.
3. Systems and components shall have been thoroughly tested and proven in actual use.

### 2.2 VIDEO SERVER AND STORAGE

#### A. Based on the Construction Documents, the General Contractor shall purchase all equipment from the Direct Vendor.

#### B. Server:

1. Server/Storage Requirements: Server storage, processor, and RAM requirements will be based off a mathematical formula from the information obtained during the site survey process. Once the number, type and classification of cameras are approved by all parties, it will calculate the required server(s) fit for the site. These servers are all HP Servers that contain USPS IT ACE images. These are approved CLINS and Assets by USPS.
  - a. Storage for 30 Days of Video with 30% Expansion Capability. Depending on size of system storage may be either internal to the server or external iSCSI attached NAS device.
  - b. Dual Network Interface Cards on board and 4 additional GB NIC ports via PCIe card per USPS requirements. The system also contains HP's integrated Lights Out management cards. This requires 1 connection on the USPS network per server. Thus each server will have (at minimum) 2 USPS 56 Network connections.
  - c. UPS Power Supplies for Server and Storage.
  - d. Input Power: 120VAC, 60Hz (a power adaptor may be used to provide this voltage).
  - e. Operating Temperature: Range shall be equal to or greater than 10 to 40 degrees Celsius.
  - f. Humidity: Withstand a minimum of 10% to 80% humidity.
  - g. Current Build of IP Configure Network Video Recording Software.
  - h. Laptop computer.
  - i. All items rack mounted.

### 2.3 IP VIDEO SWITCH

#### A. CISCO Network Switch (IP Video):

1. Based on the Construction Documents, the CISCO Switch is to be procured by the General Contractor from the Direct Vendor.

282305 - 5

USPS MPFS

Date: 10/1/2018

ISIP CCTV SYSTEM

## 2.4 VIDEO ENCODER

- A. Direct Vendor shall provide video encoders.
- B. The video encoder blade shall be equipped with six (6) analog video inputs and shall be able to provide simultaneous Motion JPEG and MPEG-4 video streams. Furthermore, the blade shall, for each video channel, support resolutions up to 704x576 (PAL) / 704x480 (NTSC) pixels in full frame rate (25/30fps). The Encoder Shall meet or Exceed the following requirements:
1. Be equipped with 6 analog composite video inputs with PAL/NTSC auto sensing.
  2. Provide resolutions up to 704x576 (PAL) / 704x480 (NTSC) pixels at 25/30 frames per second for each video channel.
  3. Support simultaneous Motion JPEG, MPEG-4 and H264 individually configurable for each video channel.
  4. Support both unicast and multicast MPEG-4, individually configurable for each video channel.
  5. Provide the ability to control PTZ devices from third party manufacturer.
  6. Support both IPv4 and IPv6.
  7. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
  8. Be equipped with 4 alarm inputs and 4 alarm outputs.
  9. Include embedded event functionality, which may be triggered by alarm input, video loss or by video motion detection.
  10. Be supported by an open and published API.
  11. Be equipped with a 1000BaseT Gigabit Ethernet interface.
- C. The desktop Video Encoder shall be equipped with one analog video input and one channel of audio, provide simultaneous Motion JPEG and MPEG-4 video streams and shall support resolutions up to 704x576 (PAL) / 704x480 (NTSC) pixels in full frame rate (25/30fps). The Encoder shall meet or exceed the following requirements:
1. Be equipped with a 10BaseT/100BaseTX Ethernet interface.
  2. Be equipped with 1 analog video input, supporting composite and Y/C signals.
  3. Provide resolutions up to 704x576 (PAL) / 704x480 (NTSC) pixels at 25/30 frames per second.
  4. Support simultaneous Motion JPEG, MPEG-4 and H264.
  5. Support both unicast and multicast MPEG-4.
  6. Provide full duplex audio and be equipped with Line In and Line Out.
  7. Provide the ability to control PTZ devices from third party manufacturer.
  8. Support both IPv4 and IPv6.
  9. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
  10. Be equipped with 4 alarm inputs and 4 alarm outputs.
  11. Include embedded event functionality, which may be triggered by alarm input, video loss or by video motion or audio detection.
  12. Be supported by an open and published API.
- D. The Video Encoder Blade and Video Encoder shall be available as rack mountable or desk-top versions.

## 2.5 VIDEO DECODERS

- A. Video Decoders will support up to (2) remote monitors with full screen camera views; (49) camera views per monitor.
- B. Camera displays approved only by OIG and IS.
1. Video Output - HDMI.
  2. Video Decoding - H.265, H.264 and MPEG-4 Unicast and Multicast.
  3. Security – Password protected user access HTTPS encryption.

C. Basis of Design: Costar #CV12MV2.

## 2.6 VIDEO CAMERAS

A. Direct Vendor shall provide cameras.

B. IP Color cameras for video surveillance and monitoring of specific areas as shown on the drawings and confirmed with Postal Inspection Service and ~~Contracting Officer through USPS Project Manager with the following minimum capacities.~~

C. Fixed ~~H.264~~, 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 ~~proof~~-resistant, ~~indoor/outdoor~~ casing with smoked transparent cover where required.
3. Equipped with pixel counter.
4. Image sensor: Progressive scan RGB CMOS 1/3 inch (effective).
5. Lens: ~~Varifocal, 6MM; 2-53.0 – 10.52mmMM, F1.4; 92+05 degree – 3449 degree horizontal/50 degree – 20 degree verticalview, F1.2-DC-IRIS.~~
6. Minimum illumination:
  - a. Color: 0.15 LUX, F1.42.
  - b. B/W: 0.032 LUX, F1.42.
7. Shutter time: 1/~~6629~~,500 to ~~12~~ seconds; 60 Hz.
8. Pan/Tilt/Zoom: Digital PTZ, preset positions, guard tour.
9. Angle Adjustment: Pan ~~+18360~~ degrees, tilt ~~-5 to -85170~~ degrees, rotation ~~+95340~~ degrees.
10. Resolution: ~~19280x108960 (24 MP) to 160x90.~~
11. Support simultaneous Motion JPEG, MPEG-4 and H264.
12. Frame Rate:
  - a. H.264; 30 fps in all resolutions; 60 Hz.
  - b. Motion JPEG; 30 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 indoor camera module with encapsulated electronics (1.84 lbs).~~
21. Processor and Memory: ~~ARTPEC-3, 25126 Mb RAM, 42568 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~~; ~~-4032~~ – 122 degrees F; 10 – ~~10085~~ percent RH.
24. Accessories: ~~Indoor; M-mounting platebracket, smoked transparent cover. Provide ceiling, or pendant or wall bracket mounting and connector kits.~~
25. Basis of Design: Indoor/~~Outdoor~~, Axis #P3225-VE-MKII364.

D. Indoor/~~Outdoor~~ PTZ camera shall be a network dome camera and shall incorporate 23x optical zoom, day/night functionality, and simultaneous Motion JPEG and MPEG-4 video streams. Camera Shall meet or exceed the following requirements:

1. Be equipped with a 10BaseT/100BaseTX Ethernet interface.

282305 - 7

2. Include a vandal ~~proof~~ resistant, indoor/outdoor casing with smoked transparent cover.
3. Feature a progressive scan CMOS sensor with Wide Dynamic Range (WDR), electronic image stabilizer and day/night functionality.
4. Be equipped with 23x optical zoom.
5. Image Sensor: ~~4/2.8"~~ Progressive scan CMOS 1/2.8".
6. Lens: F1.6 – F4.2, 4.3 – 98.9 mm, angle of view: Horizontal – 57.9 to 2.9 degrees, vertical – 33.9 to 1.6 degrees.
7. Minimum Illumination: 0.2 LUX @ 30IRE F1.6.
8. Shutter Time: 1/45,500s to 2s.
9. PTZ:
  - a. E-Flip, 100 preset positions.
  - b. 23x optical zoom and 12x digital zoom, total 276x zoom.
  - c. Pan: 360 degrees, 0.1 – 350 degrees/s.
  - d. Tilt: 180 degrees, 0.1 – 350 degrees/s.
10. Video Compression: H264 (MPEG – 4 part 10/AVC) baseline, main and high profiles motion J-PEG.
11. Resolution: 1280 x 720 (1 MPHDTV) to 320x180.
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: 512 MB RAM, 256 MB Flash.
22. Connectors: RJ45 10 BASE – T/100BASE-TX PoE push-pull connector for (2) alarm input and (2) alarm output.
23. Operating Conditions: -22 – 131 degrees F; 10 – 100 percent RH.
24. Security: Password protection, IP address filtering, HTTPS encryption, IEEE 802.1x network access control.
25. Power: 24 to 34 VDC max 20W; power over Ethernet IEEE 802.3at.
26. Accessories: ~~Indoor~~ Mounting plate, smoke transparent cover. Provide ceiling, wall or pendant or wall bracket mounting and connector kits.
27. Basis of Design: Indoor, Axis #P5624-EMK11.

**NOTE TO SPECIFIER**

*The choice of exterior gate-fixed cameras shall be based on the viewing distance, and the size of the area to be monitored and the climate in which the camera is to be mounted. In general, utilize the AXIS #3225364-VE-MK11 fixed dome type camera for exterior non-blue sky, wall mounted applications and for blue sky applications requiring shorter viewing distances. Applications requiring longer viewing distances and those facilities located in extremely cold climates may require the #P1365-EMK11 (50 or 80 mm lens) box camera with environmental enclosure. Specifier shall include to select the appropriate paragraph 2.6 E-F for those applications.*

- F. Gate camera shall be fixed (1) mega-pixel, outdoor, non-blue sky dome type camera shall be a network camera with WDR, light finder, remote focus and zoom, shall be equipped with full duplex audio 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 proof resistant casing smoked transparent cover.
  3. Equipped with pixel counter.
  4. Image sensor: Progressive scan RGB CMOS 1/3-inch (effective).

Formatted: Font: (Default) Times New Roman, 11 pt

Formatted: Font: 11 pt

Formatted: 3, Indent: Left: 0", First line: 0"



5. ~~Lens: 2.5 –12MM, 105 degree –49 degree view, F1.2 P-IRIS.~~
6. ~~Day and Night: Automatically removable infrared-cut filter.~~
7. ~~Minimum illumination:~~
  - a. ~~Color: 0.15 LUX, F1.4.~~
  - b. ~~B/W: 0.03 LUX, F1.4.~~
8. ~~Shutter time: 1/29500 to 2 seconds; 60 Hz.~~
9. ~~Pan/Tilt/Zoom: Digital PTZ, preset positions, guard tour.~~
10. ~~Angle Adjustment: Pan 360 degrees, tilt 170 degrees, rotation 340 degrees.~~
11. ~~Resolution: 1280x960 (1 MP) 160x90.~~
12. ~~Support simultaneous Motion JPEG, MPEG-4 and H264.~~
13. ~~Frame Rate: H264; 30 fps in all resolutions; 60 Hz.~~
14. ~~Support both unicast and multicast MPEG-4.~~
15. ~~Support Power over Ethernet according to IEEE802.3af.~~
16. ~~Support both IPv4 and IPv6.~~
17. ~~Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.~~
18. ~~Be equipped with 1 alarm input and 1 alarm output.~~
19. ~~Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.~~
20. ~~Be supported by an open and published API.~~
21. ~~Casing: Outdoor; IP66 and NEMA 4X, IK10 impact resistant aluminum with integrated dehumidifying membrane. Provide integral thermostatically controlled heater and blower with defrost capabilities.~~
22. ~~Processor and Memory: 256 MB RAM, 128 MB Flash.~~
23. ~~Connectors: RJ45 10 BASE –T/100BASE-TX PoE terminal block for (1) alarm input and (1) alarm output.~~
24. ~~Operating Conditions: Outdoor; –40 –131 degrees F; 10 –100 percent RH.~~
25. ~~Accessories: Outdoor; Weather shield, cable shield, 16 ft. network cable with pre-mounted gasket. Provide pendant wall or pole attachment.~~
26. ~~Basis of Design: Outdoor, Axis #P3364-VE.~~

E. Exterior fixed Gate camera shall be fixed (35) mega pixel, outdoor, network type with WDR, light finder, remote focus and zoom and shall incorporate Power over Ethernet (PoE). The camera shall meet or exceed the following requirements:

1. Be equipped with a 10BaseT/100BaseTX Ethernet interface.
2. Include a vandal proof resistant casing with fan and heater.
3. Equipped with pixel counter.
4. Image Sensor: 1/3-2.8" progressive scan RGB CMOS.
5. Lens: F1.32 varifocal, 2.8 to 8 mm, P- iris.
6. Day and Night: Automatic IR filter removal in low light conditions.
7. Angle of view: 80 to 32 degrees horizontal.
8. Minimum Illumination: 0.2 lux at F1.2.
  - a. Color (HDTV): 0.22 LUX @ F1.3.
  - b. BW (HDTV): 0.02 LUX @ F1.3.
9. Shutter time: 1/66,000s to 2s.
- 9-10. Video compression: H264 (MPEG-4 part 10/AVC) baseline, and-main and high profiles. motion J-PEG.
- 10-11. Resolutions: 1920x2592x1080x944 (35 MP) to 160x90.
- 11-12. Frame rate: Up to 60 5-MP @ 12-fps in all resolutions.
- 12-13. Video Streaming: Multiple motion J-PEG and H264 controllable frame rate and band width, VBR/CBR H264.
- 13-14. Support Power over Ethernet according to IEEE802.3af.
- 14-15. Support both IPv4 and IPv6.
- 15-16. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
- 16-17. Be equipped with 1 alarm input and 1 alarm output.
- 17-18. Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.

282305 - 9

~~18-19.~~ Be supported by an open and published API.

~~19-20.~~ Casing: Outdoor; IP66 and NEMA 4X, IK10 impact resistant aluminum with integrated humidifying membrane.

~~20-21.~~ Processor and Memory: 512 MbB RAM, 42568 MbB Flash.

~~22.~~ Connectors: RJ45 10 BASE – T/100BASE-TX PoE terminal block for (1) alarm input and (1) alarm output.

~~21-23.~~ ~~Shutter time – 1/24,000s to 2s~~Power: Camera ~~and with~~ built in fan ~~and heater~~, 24\_- 34VDC, max 125.95 Watts, PoE (IEEE802.3af) class 2.

~~22-24.~~ Operating Conditions: ~~-4022~~ to 122 F, Humidity 10-100 percent RH (non-condensating).

~~23-25.~~ Accessories: Outdoor, weather shield, cable shield, 16 ft. network cable with pre-mounted gasket. Provide pole attachment.

~~24-26.~~ Basis of Design: ~~Outdoor- Axis #P13657-EMKIL- with Pelco #EH3515/BK3512-1 blower, Pelco #HD3515-1 heater, Pelco #SS3515 sun-shroud~~

F. ~~Fixed (1) Mega-pixel, outdoor, non-blue sky dome type camera shall be a network camera with WDR, light finder, remote focus and zoom, shall be equipped with full duplex audio 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 proof resistant casing smoked transparent cover.~~

~~3. Equipped with pixel counter.~~

~~4. Image sensor: Progressive scan RGB CMOS 1/3-inch (effective).~~

~~5. Lens: 2.5 –12MM, 105 degree – 49 degree view, F1.2 P-IRIS.~~

~~6. Day and Night: Automatically removable infrared-cut filter.~~

~~7. Minimum illumination:~~

~~a. Color: 0.15 LUX, F1.4.~~

~~b. B/W: 0.03 LUX, F1.4.~~

~~8. Shutter time: 1/29500 to 2 seconds; 60 Hz.~~

~~9. Pan/Tilt/Zoom: Digital PTZ, preset positions, guard tour.~~

~~10. Angle Adjustment: Pan 360 degrees, tilt 170 degrees, rotation 340 degrees.~~

~~11. Resolution: 1280x960 (1 MP) 160x90.~~

~~12. Support simultaneous Motion JPEG, MPEG-4 and H264.~~

~~13. Frame Rate: H264; 30 fps in all resolutions; 60 Hz.~~

~~14. Support both unicast and multicast MPEG-4.~~

~~15. Support Power over Ethernet according to IEEE802.3af.~~

~~16. Support both IPv4 and IPv6.~~

~~17. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.~~

~~18. Be equipped with 1 alarm input and 1 alarm output.~~

~~19. Include embedded event functionality, which may be triggered by alarm input or by video motion or audio detection.~~

~~20. Be supported by an open and published API.~~

~~21. Casing: Outdoor; IP66 and NEMA 4X, IK10 impact resistant aluminum with integrated dehumidifying membrane. Provide integral thermostatically controlled heater and blower with defrost capabilities.~~

~~22. Processor and Memory: 256 MB RAM, 128 MB Flash.~~

~~23. Connectors: RJ45 10 BASE – T/100BASE-TX PoE terminal block for (1) alarm input and (1) alarm output.~~

~~24. Operating Conditions: Outdoor; -40 –131 degrees F; 10 –100 percent RH.~~

~~25. Accessories: Outdoor; Weather shield, cable shield, 16 ft. network cable with pre-mounted gasket. Provide pendant wall or pole attachment.~~

~~26. Basis of Design: Outdoor, Axis #P3364-VE.~~

G. ~~Exterior PTZ camera shall be a network dome camera and shall incorporate 36x optical zoom, day/night functionality, and simultaneous Motion JPEG and MPEG-4 video streams. Camera shall meet or exceed the following requirements:~~

~~1. Be equipped with a 10BASET/100BASETX Ethernet interface.~~

~~2. Include a vandal-proof resistant casing with smoked transparent cover.~~

3. Feature a progressive scan CCD sensor with Wide Dynamic Range, Electronic Image Stabilizer and day/night functionality.
4. Be equipped with 36x optical zoom.
5. Image Sensor — 1/2.8" Progressive scan CMOS.
6. Lens — 3.3 — 119mm, F1.4 — 4.2, angle of view: Horizontal — 47.0 to 1.5 degrees, Vertical — 35.5 to 1.1 degrees.
7. Minimum Illumination:
  - a. Color: 0.15 LUX at 30 IRE F1.4.
  - b. Color: 0.25 LUX at 50 IRE F1.4.
8. Shutter Time — 1/30,000s to 1.0s.
9. PTZ
  - a. E-Flip, 256 preset positions.
  - b. 36x optical zoom and 12x digital zoom, total 432x zoom.
  - c. Pan; 360 degrees endless, 0.05 — 450 degrees/s.
  - d. Tilt; 220 degrees, 0.05 — 450 degrees/s.
10. Video Compression, H.264 (MPEG-4 part 10/AVC) baseline, main and high profiles motion JPEG.
11. Resolutions — Extended D1-720x480 to 176x120.
12. Frame Rate — Up to 60 fps in all resolutions.
13. Support simultaneous motion JPEG, MPEG-4 and H264.
14. Support both unicast and multicast MPEG-4.
15. Support Power over Ethernet according to IEEE802.3af.
16. Support both IPv4 and IPv6.
17. Provide multiple user passwords, support for HTTPS and SSL/TLS and incorporate IEEE802.1X authentication.
18. Be equipped with full memory card for alarm triggers.
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:
  - a. Outdoor; IP66 and NEMA 4X, IK10 impact resistant aluminum with integrated dehumidifying membrane and sun shield. Provide integral thermostatically controlled heater and blower with defrost capabilities.
22. Processor and Memory: 512 MB RAM, 256 MB Flash.
23. Connectors: RJ45 10 BASE — T/100BASE-TX PoE terminal block for (2) alarm input and (2) alarm output.
24. Operating Conditions:
  - a. Outdoor; -58 to 122 degrees F; 20 — 80 percent RH.
25. Security — Password protection, IP address filtering, HTTPS encryption, IEEE 802.1x network access control.
26. Power — 24 to 34 VDC max; 60W outdoor; power over Ethernet IEEE 802.3 af class 1.
27. Accessories:
  - a. Outdoor; required mounting bracket, weather shield, cable shield, 16 ft. network cable with pre-mounted gasket. Provide pendant mounting kits and pole attachment.
28. Basis of Design:
  - a. Outdoor; Axis #Q6052-E.

H.F. Products shall utilize internal or external surge protection such that a normally occurring power surge shall not void any manufacturer's warranty.

H.G. Product model numbers indicated with the cameras are for convenience only. Errors or obsolescence shall not relieve the furnishing of cameras, which meet the technical description given in specifications noted or required by function designated.

## 2.7 VIDEO MONITORS

- A. Provide 21.5-inch LCD flat-panel color monitors with the following minimum capabilities.
1. Product Requirements:
    - a. Video Interface Connections: BNC Video – 12 in, BNC Video – 1 out, HDMI – 1 in, VGA – 1 in, Audio – 1 in, Audio – 1 out.
      - 1) Switching between inputs shall be performed using a front panel control.
      - 2) VGA resolution shall be equal to the native resolution of the installed Digital Video Recorder, if applicable.
    - b. Input Power: 120VAC, 60Hz (a power adaptor may be used to provide this voltage).
    - c. Mounting: Each monitor shall be wall or desktop mounted. VESA mounting holes shall be provided and a series of optional VESA compliant mounts shall be made available at extra cost.
    - d. Operating Temperature: Range shall be equal to or greater than 0 to 40 degrees Celsius.
    - e. Humidity: Withstand a minimum of 20% to 80% humidity.
    - f. Resolution: 1920 x 1080 SXGA.
    - g. Pixel Pitch: 0.2482 x 0.2482 mm.
    - h. Brightness: 250 cd/m<sup>2</sup>.
    - i. Contrast Ratio: 1000:1.
    - j. Backlight Type: LED BLU.
    - k. Panel Aspect Ratio: 16:9.
    - l. Warranty: 3 years – parts/labor.
    - m. Adjustments: Must support on-screen display for setup and adjustment of monitor parameters.
    - n. Colors: Must support a minimum of 16.7 million colors.
    - o. Basis of Design: Orion #22RCE.

~~B. Provide 32-inch LCD flat-panel color monitors with the following minimum capabilities.~~

- ~~1. Product Requirements:~~
  - ~~a. Video Interface Connections: CVBS (BNC) Video – 2 in, CVBS (BNC) Video – 1 out, HDMI – 1 in, VGA – 1 in, Audio – 1 in, Audio – 1 out.
    - ~~1) Switching between inputs shall be performed using a front panel control.~~
    - ~~2) VGA resolution shall be equal to the native resolution of the installed Digital Video Recorder, if applicable.~~~~
  - ~~b. Input Power: 120VAC, 60Hz (a power adaptor may be used to provide this voltage).~~
  - ~~c. Mounting: Each monitor shall be desktop mounted. VESA mounting holes shall be provided and a series of optional VESA compliant mounts shall be made available at extra cost.~~
  - ~~d. Operating Temperature: Range shall be equal to or greater than 0 to 40 degrees Celsius.~~
  - ~~e. Humidity: Withstand a minimum of 20% to 80% humidity.~~
  - ~~f. Resolution: 1920 x 1080.~~
  - ~~g. Pixel Pitch: 0.364 x 0.364 mm.~~
  - ~~h. Brightness: 300 cd/m<sup>2</sup>.~~
  - ~~i. Contrast Ratio: 5000:1.~~
  - ~~j. Backlight Type: LED BLU.~~
  - ~~k. Panel Aspect Ratio: 16:9.~~
  - ~~l. Warranty: 2 years – parts/labor.~~
  - ~~m. Adjustments: Must support on-screen display for setup and adjustment of monitor parameters.~~
  - ~~n. Colors: Must support a minimum of 1.07 billion colors.~~
  - ~~o. Basis of Design: Orion #32RCE.~~

~~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 #SMART1000RXML2U and #2POSRMKITWM wall bracket.~~

Formatted: 4

282305 - 12

2.8 CAMERA POWER SUPPLIES:

- A. Based on the Construction Documents, the Direct Vendor will identify camera power source. When required the Direct Vendor will provide power supplies for camera.
- B. Interior Fixed Cameras: Camera shall be powered by PoE from network switch. Maximum total cable length (including horizontal and vertical distances) from switch to camera is 300 ft. Provide fiber cabling for cable runs exceeding 300 ft.
  - 1. Network switch shall be equipped with UPS power supply.
- C. Interior and Exterior PTZ Cameras (non "Blue Sky"): Camera shall be powered by PoE from network switch. Maximum total cable length (including horizontal and vertical distances) from switch to camera is 300 ft. Provide 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. ~~Camera and enclosure shall be powered by PoE from network switch shall be equipped with UPS power supply. Maximum cable distance from switch to camera is 300 ft. Provide fiber cabling for cable runs exceeding 300 ft.~~
  - 2. ~~Wall mounted Environmental Camera Enclosures power supplies (where necessary) shall be equipped with integral heaters and defoggers located in a suitably protected area near the camera. Provide individually fused power supplies.~~
  - 3. ~~All exterior building wall mounted cameras are to be considered as "non blue-sky" type Pole mounted Environmental Enclosure power supplies shall be located within a NEMA 4 enclosure at the pole. Provide individually fused power supplies.~~
- E. Exterior PTZ Fixed Cameras ("Blue Sky"): Exterior cameras mounted remote from the building exterior wall are considered "blue sky" type.
  - 1. Wall mounted environmental enclosure power supplies shall be located in a suitably protected area near the camera. Provide individually fused power supplies. ~~PTZ Exterior Cameras shall be powered from individually fused power supplies located within a NEMA 4 enclosure at the pole. Other options for powering these cameras are available based on site design.~~
  - 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.
- F. Fixed and PTZ 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.
  - 1. Power supplies shall be rated to support 200 percent of the actual (nominal) power loading.
  - 2. Each power supply shall be fed from a dedicated 120 Volt circuit.
  - 3. Adjacent cameras shall be fed from different power supplies.
  - 4. Multiple camera power supplies are available in the correct application.
- H. Power supplies utilized shall be as recommended by the camera manufacturer and equipped with ESD protection for data and video feeds.
- I. Enclosures housing camera power supplies, media converters and 120 Volt receptacles shall contain interior back planes for mounting of all components and shall be provided by the General Contractor.

## 2.9 VIDEO CAMERA HOUSINGS AND MOUNTS

- A. Direct Vendor shall provide ~~indoor~~ housings and mounts as required for all camera types with the following minimum capabilities:
1. Interior Cameras:
    - a. All cameras shall be in a housing that is coordinated with adjacent finishes with the appropriate mounting hardware. Selection of housings and mounts, including incremental changes to paint colors, dome materials, and cosmetic finishes shall be approved by the USPS or their authorized agent.
    - b. All housings shall be sufficiently dust and moisture resistant to withstand normal environmental conditions in their chosen installation location.
    - c. Hardware shall be provided to ensure tamper-resistant mounting in public access areas after normal business hours without modification to the integrity of the housing.
    - d. Where used, pendant mounts shall be suitable for use as wall, ceiling and column mounts. Pendant mounts shall attach to the appropriate camera housing using Direct Dealer provided standard threaded schedule 40 rigid iron pipes. Pipe lengths are to be a minimum of 1-1/2 inch in diameter. Exterior pipe shall be galvanized.
    - e. All mounts shall incorporate installer provided safety chain or cable of sufficient endurance to support 2 times the weight of the equipment.
    - f. The General Contractor shall terminate the Ethernet, camera power and fiber optic cabling to the patch panels provided by the Direct Vendor and located in the upright racks.
  2. Exterior Cameras:
    - a. Environmental: Thermostatically controlled heaters and blowers with defrosting capabilities.
    - b. Moisture: Rainproof seals and gaskets.
    - c. Wind Resistance: Rated for 80mph sustained winds, minimum.
    - d. Ambient Temperature Rating: -22 to 131 degrees F.
    - e. Areas with more demanding environmental conditions will be granted a deviation from this specification.

## 2.10 FIBER OPTIC MEDIA CONVERTER MODULES

- A. Direct Vendor shall provide fiber optic media converters.
- B. Fiber optic transmission equipment shall be used when one or more of the following conditions are met:
1. Camera cable run 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).
  3. Building wall mounted cameras and C cameras protected by canopies or other architectural elements that shield them from direct view of the overhead sky are excluded from this requirement.
  4. Cabling from the remote node cabinets to the CCTV headend.
  5. The cable path is within 20 feet of a TIME or MIMS aerial.
- C. Modules located at field devices shall be low profile "miniaturized" type, and shall be mounted in the power supply/PoE Injector housing for both fixed and PTZ cameras.
1. Fiber optic transmit modules shall derive power from the camera power supply, eliminating the need for an additional power supply. AC power is required for PoE injector and media converter.
- D. Modules located at head-end locations shall be standalone modular units unless four (4) or more modules are required, in which case they shall be enclosed in a fiber-optic rack mount.
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 RJ-45 Ethernet port, SC Fiber Port.
  2. ~~50/125 LOMF, OM3, 10 Gb Multi-mode fiber~~ or 62.5/125, OM1, tight-buffered, multi-mode 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 Compliant.
  
- F. Remote Node Cabinet
  1. Remote Node Cabinet will house an IP video system network switch, patch panel, UPS and camera power supply.
    - a. The GC shall ~~install the provide dedicated 110volt power, hang~~ remote node cabinet, and terminate fiber optic and CAT-6 cables.
    - b. Direct Vendor will supply 1.0kVA/900W, line-interactive, rack mounted UPS with 18 minute battery reserve at 450 Watts; Tripp-Lite #SMART1000RML2U.
    - c. The GC shall provide a dedicated 20 Amp, 120 Volt circuit for each remote node cabinet.
  
- G. Patch Cables
  1. Direct Vendor will provide CAT-6 and fiber optic patch cables for connections, CAT-6, fiber optic patch pushed to devices.

Formatted: 5

## 2.11 ETHERNET CABLE EXTENDERS

- A. Direct Vender shall provide Ethernet Cable Extenders as required.
  
- B. Cable Extenders, or fiber optics, shall be used at the discretion of the design engineer or when one or more of the following conditions are met:
  1. Camera cable runs exceeding 300 ft. shall be fiber optic.
  2. When adding or replacing cameras to an existing CCTV system, camera total cable lengths (including horizontal and vertical distances) runs in excess of 300 ft. and no more than 800 ft. may be equipped with midspan Ethernet cable extenders.
  
- C. Modules located at the field devices shall be located in the camera enclosure or junction box close to the device field device module derives power from the head end module and does require local power.
  
- D. Modules located at the head-end are standalone modules mounted in the equipment rack.

## 2.12 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, multi-mode, indoor/~~outdoor, aluminum interlocked armor,~~ plenum rated fiber cable; utilize plenum rated where required.
  3. Exterior cable runs, ~~contained in conduit and~~ routed to remotely located "blue sky" cameras shall be (2) count, 62.5/125, OM1, multi-mode, indoor/outdoor rated fiber cable. Where multiple fiber cables are routed within a common conduit provide innerduct separation of each cable.
  4. Interior cable runs from remote node cabinets to the CCTV headend rack(s) shall be (6) count, ~~62.5/125, OM13, multimode LOMF, 10 Gb,~~ indoor/~~outdoor, aluminum interlocked armor, plenum rated~~ fiber cable; utilize plenum rated where required.
  5. All exterior cable runs shall be contained in conduit.
  
- B. Camera Ethernet Data Cabling:

Formatted: 4

282305 - 15

1. 4-Pair Category 6 Unshielded Twisted Pair Cable shall be provided and installed by the General Contractor.
  2. The General Contractor shall provide and install the RJ-45 jack as shown on the drawings. The General Contractor shall terminate and test the CAT-6 cable and RJ 45 jacks.
  3. Complies with individual characteristics established in ANSI/TIA/EIA-568-B terminated to T568A and all addendums for Category 6 cable performance specification.
  4. Cabling and wire ways shall be installed in accordance with sections ~~260533 and 0500~~.
- 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. ~~50/125 LOMF, 10-Gb, aluminum interlocked, armored multimode, indoor/outdoor, plenum rated fiber.~~
  - 2.1. 62.5/125, OM1, ~~aluminum interlocked, armored~~ multi-mode, indoor/outdoor, ~~plenum~~ rated fiber.
  - 3.2. 62.5/125, OM1, multi-mode, indoor/outdoor rated fiber.
  - 4.3. "SC" type connectors shall be used on all cable terminations, including junction boxes and break-out trays.
  - 5.4. Performance characteristics (including optical attenuation) shall be such that the fiber optic modules specified in Section 2.10 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. Fiber cabling not routed within conduit shall be encased within appropriately sized inner ducts; utilize plenum rated where required.
  7. The general contractor shall terminate and test the fiber optic cable and connectors.

Formatted: 4

Cable Type	Signal	Use
(2) Count, 62.5/125, OM1, multi-mode, indoor/outdoor, <del>aluminum interlocked armor, plenum riser</del> rated fiber optic ( <u>General Cable #CL0021PNRO-C-C-#DX002KWLS90P16</u> or Approved Equal)	Camera Data	Interior ( <del>non-plenum</del> ) camera cable runs exceeding 300 feet. See Sections <u>2.10 and 2.14</u>
(2) Count, 62.5/125, OM1, multimode, indoor plenum rated fiber cable ( <u>General Cable #CL0021PNU or Approved Equal</u> )	<u>Camera Data</u>	<u>Interior (plenum) camera cable runs exceeding 300 feet. See Sections 2.10 and 2.14</u>
(6) Count, <del>62.50</del> /125, OM1 <del>3</del> , LOMF, <del>10-Gb multimode, indoor/outdoor, aluminum interlocked armor, plenum riser</del> rated fiber optic ( <u>General Cable #CL0061PNRO-C-C-#DX006KALT9QP16</u> or Approved Equal)	Data	Interior ( <del>non-plenum</del> ) cable runs – node cabinets to headend. See Sections <u>2.10 and 2.14</u>
(6) Count, 62.5/125, OM1, multimode, indoor plenum rated fiber cable ( <u>General Cable #CL0061PNU or Approved Equal</u> )	<u>Data</u>	<u>Interior (plenum) cable runs – node cabinets to headend. See Sections 2.10 and 2.14</u>



(2) Count, 62.5/125, OM1, <del>multi-mode multimode</del> , indoor/outdoor rated fiber optic contained in conduit (General Cable #CL002ANR.BKQ.C.C. #DX002KWLS90R or Approved Equal)	Camera Data	Exterior cable runs to "blue sky" cameras. See Sections 2.10 and 2.14
CAT-6 riser rated cable <del>Plenum</del> with footage markings (purple) (General Cable 7131763809 or Approved Equal)	Camera Data	Interior (non-plenum) camera cable runs less than 300 feet. See Sections 2.8 and 2.13
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 Sections 2.8 and 2.13

### 2.13 CATEGORY 6 CABLING

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

1. Belden
2. Berk-Tek
3. CommScope Uniprise
4. General Cable - Preferred
5. Leviton
6. Ortronics (Legrand)
7. Panduit
8. Product options and substitutions. Substitutions: Permitted if approved by Direct Vendor and Manufacturer.

B. Conductors: 4 twisted pair, minimum 24 AWG, solid copper.

1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire area where cable is installed is not considered a return air plenum according to any applicable codes.
2. Complies with individual characteristics established in TIA-568-C, and all addendums for Category 6 cable performance specification.
3. Nominal Impedance: 100 ohms plus or minus 15 percent.
4. Certified and capable of performing to a minimum of 250 MHz.

### 2.14 OM1 FIBER CABLING

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

1. Belden
2. Berk-Tek
3. CommScope Uniprise
4. Corning Cable Systems
5. General Cable - Preferred
6. Leviton
7. Optical Cable Corp.
8. Ortronics (Legrand)
9. Superior Essex
10. Product options and substitutions. Substitutions: Permitted if approved by Direct Vendor and Manufacturer.

B. Conductors: 2 / 6 strand

1. Provide multi-strand, 62.5/125 micron, tight-buffered, multimode, OM1 fiber cabling rated as follows:
  - a. 1 Gb/s < 150m @ 850 nm.
  - b. 1 Gb/s < 1000m @ 1300 nm.
2. The fiber cabling shall meet the following specifications:
  - a. EIA/TIA-492AAAA-A-1997, "Detail Specification for 62.5 micron Core Diameter/125 micron Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers."
  - b. IEC 60793-2-10, "Product specifications – Sectional specification for category A1 multimode fibers", Type A1b 62.5/125 micron graded index fiber.
3. Terminate fiber strands onto "SC" ports.
4. Provide individually insulated plenum rated strands under common plenum rated sheath, unless entire area where cable is installed is not considered a return air plenum according to any applicable codes.
5. Fiber cabling shall comply with individual characteristics established in TIA-568-C including all addendums for fiber optic cable performance specification.
6. Interior fiber cabling shall be indoor rated.
7. All exterior or underground fiber cable shall be indoor/outdoor rated.

Formatted: 5

2-132.15 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.
- B. The headend equipment rack~~All Servers and workstations~~ shall utilize a standalone UPS sized for a minimum of 120 minutes of battery run-time. The UPS shall be provided by the Direct Vendor. General contractor will provide dedicated 30 Amp, 120VAC power ~~determined by the Direct Vendor based on the construction documents.~~
  1. The UPS shall be line-interactive, rack mounted and rated 3kVA/2.88kW with a 10 minute battery reserve at 1440 Watts; Tripp-Lite #SMART3000RMXL2U.
- C. Upright Racks: The Direct Vender 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" 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, camera power and fiber optic cabling to the patch panels provided by the Direct Vender and located in the upright racks.

Formatted: 4

Formatted: 4

PART 3 - EXECUTION

3.1 EXAMINATION

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

282305 - 18

- C. Report in writing to the ~~Contracting Officer through~~ 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 break-outs shall be at 90-degree angles from the harness or chase, and all chases shall be parallel to or at 90-degree angles from the rack frame.
  5. Cables are to be secured to the rack frames at sufficient intervals to ensure that the weight of the cable will not contribute to fatigue or early failure of that cable or the device and connector to which it is attached.
  6. Sufficient excess cable shall be provided in "service loop locations" to ensure that the cable may be re-connected without requiring the addition of extension pieces.
  7. All permanent cabling shall be mechanically numbered in a manner consistent with Direct Vendor's written system documentation.
  8. Wiring for all equipment shall be tie-wrapped (except as indicated below) so that all connectors in a bundle can be removed and re-installed without the possibility of cross connecting.
  9. CAT-6 and Fiber Optic cables shall utilize Velcro fasteners in place of tie wraps to eliminate the risk of over-tightening cable bundles and affecting the strength or rated performance of the cable.
  10. Where wiring is routed through sheet metal or over frame members, the metal edges shall be covered with flexible grommeting or edge dressing (such as automobile door edge trim).
  11. Double-sided foam tape shall not be used to secure any equipment, terminal blocks, or accessory devices. All device mounting shall be of a permanent nature.
  12. All excess length AC cords are to be tie-wrapped out of the way. Where possible, they shall be routed in a separate bundle a minimum of 6 inches away from any signal or control cable.
  13. Exposed wires run to wall mounted cameras shall be fed through tubing or the body of the mount to present a professional appearance.
    - a. Any accessible cables that can be reached by an individual standing on the floor, a stool, or a small stepladder shall be encased in protective tubing or armored sheathing to prevent tampering or cutting with common hand tools.

14. Care shall be exercised at all times to protect Postal Service property. For example, ladders shall not be placed against wallpapered or finished surfaces, equipment or furnishings; desks or countertops shall not be used in lieu of ladders.
15. On pendant mounted cameras, label each camera on all four sides with three-inch numbers supplied by the Direct Vendor. Numbers shall be stenciled or laminated vinyl in a contrasting color to the camera housing. Camera number shall match and correspond to the Last Octet of camera IP Address and/or printed map provided by the Direct Vendor. Numbers shall not be placed on lower dome or any area that would obstruct camera viewing.
16. Ensure that pendant mounted cameras are hung from stable, vibration free mounting platforms, using guy-wires or other support mechanisms to ensure stability where required. Mount cameras below any suspended lighting to avoid glare or reflection on camera dome and/or lens.
17. Perform complete programming of the system, in coordination with the ~~Contracting Officer and~~ Postal Inspector, ~~through 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.
18. Provide the Direct Vendor redlined drawings with job condition changes required to provide accurate close-out documentation.
- ~~19. When installing armored fiber cabling, proper grounding techniques to ground the metallic member of the armored cable must be maintained. Armored fiber cabling shall be grounded/bonded on the headend or node cabinet end only.~~

B. Power requirements shall be determined by actual equipment used.

C. Ensure that:

1. All applicable statutes, ordinances, regulations, license requirements and codes are fully complied with.
2. All required permits are obtained.
3. All required inspections are conducted.
4. All necessary certificates are issued, obtained, and delivered to the Postal Service.
5. All equipment installations and mounting are in strict accordance with requirements for applicable seismic classification.

D. Arrange all components to be mounted in the console(s)/rack(s) in accordance with Direct Vendor and/or Postal Service provided System Elevation drawings. Design shall provide a neat appearance and accessibility for servicing equipment.

E. Provide required power outlets, interconnecting cables, hardware and equipment for a complete and operable system.

1. Power, 120VAC: As required by codes and standards for the facility.
2. Where conduit is used, a minimum of 40% excess capacity shall be provided for future use.

F. Install cameras as shown on the drawings and in accordance with the USPS specifications.

1. Provide 84-inch minimum headroom below cameras and their mountings. Where necessary modify mounting type to maintain clearance, ~~except as noted on drawings (behind counter) and along slat wall.~~

G. All CAT-6 cable connections must be made to 8 pin modular jacks or plugs at the device and to 8 pin modular patch panel at the head end to the T568A standard. Patch panel shall be terminated per direct vendors documentation/drawings by the General Contractor.

H. When not installed in cable trays, cable (CAT-6, fiber optic, and low voltage power) shall be supported with wide base cable hangers rated for proper support of CAT-6, fiber optic, and inner-duct cables (compliant with UL and NEC requirements for structured cabling).

1. Cable hangers shall be installed every 3 to 6 feet and shall be rated to support the weight of the cable multiplied by a factor of three (3).

282305 - 20

2. Cable tray for camera wiring shall not include any low voltage AC wiring.

### 3.3 CAT-6 COPPER AND FIBER OPTIC CABLE TESTING

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

##### B. Testing and Certification Overview:

1. The Contractor shall provide Fluke Copper/Fiber equipment and materials for the testing of all installed copper and fiber camera cabling. For Category 6 copper, the supplier shall employ Level III compliant test equipment. The contractor shall provide camera cabling test results to the USPS.
  - a. The test reports shall be typewritten and shall provide complete listings of all tested parameters. Testing instruments shall be annually tested and calibrated.
  - b. The Contractor shall provide all equipment and services necessary to test the cabling.
  - c. The Contractor shall re-terminate and retest any cable found to be defective.
  - d. Cable testing shall be performed prior to installation of any cameras or node cabinets.

##### C. Copper Cable Testing:

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

Formatted: 5

##### D. Fiber Optic Testing: 62.5/125 micron, OM1, multimode fiber optic cable testing.

1. The installer shall perform Tier 1 Testing with Optical Loss Test Set (OLTS) that includes testing for length.
2. The installer shall perform Tier 2 testing with OTDR to show all splices.
3. The supplier shall perform bi-directional testing on all installed fiber optic cabling. Supplier test equipment shall perform testing of fiber in accordance with the fiber type being tested, TIA-526-14-A, Method B for Multimode Fiber (One Jumper/Two Adapters).
4. The fiber testers and test heads shall have passed calibration within one year of actual test date.
5. Multimode fiber optic cable shall be tested bi-directionally at wavelengths of 850nm and 1300nm.

Formatted: 3, Left, None, No bullets or numbering, Hyphenate

Formatted: 4, Left, None, Indent: Left: 0", Hyphenate

### 3.3.4 CONSTRUCTION COORDINATION

- A. The Direct Vendor shall interface with Other Work: Interface installation of CCTV System with the Physical Access Control System specified in Section 281304.
  1. Interface shall be a contact closure provided by the Physical Access Control System vendor.
  2. The interface shall be done at a central location.
  3. The quantity of inputs shall be provided by the Physical Access Control System vendor.

### 3.4.5 FIELD QUALITY CONTROL

282305 - 21

- A. Section 014000 - Quality Requirements: Inspection and testing procedures.
- B. Inspection:
  - 1. The Direct Vendor shall inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
  - 2. The Direct Vendor shall verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.
- C. Testing:
  - 1. The Direct Vendor shall perform tests and provide test equipment, tools, and personnel required to conduct system tests and inspections. These tests shall include video quality and PTZ operation (where applicable) for all cameras.
  - 2. The Direct Vendor shall provide an actual demonstration of each system function.
  - 3. The Direct Vendor shall conduct system acceptance test upon completion of installation using pre-approved procedures. Test shall consist of system, subsystem, and device level acceptance tests, including software.
  - 4. The Direct Vendor shall use accepted Checklist for system testing.
  - 5. The Direct Vendor shall ensure that test procedures confirm each specification statement and manufacturer requirement has been met or exceeded. An actual demonstration of each system function and a simulation of each system failure shall be provided.
  - 6. An acceptance test period of thirty days shall begin at the start of the acceptance test. Any system failure during the acceptance test period will suspend the acceptance test. The thirty-day test period will restart when the required repairs have been made and certified.
  - 7. Perform all tests in the presence of the Postal Service Project Manager. The Postal Service reserves the right to accept any portion or activate any phase prior to acceptance of entire system.

#### 3-53.6 CLEANING AND ADJUSTING

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

END OF SECTION

USPS Mail Processing Facility Specification issued: 10/1/2018~~7~~  
Last revised: ~~9/4/2017~~9/5/2018

*[This page intentionally left blank.]*

282305 - 23

Date: 10/1/2018

USPS MPFS

ISIP CCTV SYSTEM

SECTION 283100

FIRE EMERGENCY VOICE/DETECTION AND ALARM COMMUNICATION SYSTEM (EVACS)

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Use this Outline Specification Section for Mail Processing Facilities only. This Specification defines "level of quality" for Mail Processing Facility construction. For Design/Build projects, it is to be modified (by the A/E preparing the Solicitation) to suit the project and included in the Solicitation Package. For Design/Bid/Build projects, it is intended as a guide to the Architect/Engineer preparing the Construction Documents. In neither case is it to be used as a construction specification. Text in [brackets] indicates a choice must be made. Brackets with [\_\_\_\_\_] indicates information may be inserted at that location.*

\*\*\*\*\*

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification provides the minimum requirements for the Fire Emergency Voice/Alarm CommunicationLife Safety System. The system shall include, but not limited to all equipment, materials, labor, documentation and services necessary to furnish and install a complete, operational system to include but not limited to the following functions:
  1. Protected premises fire alarm systems.
  2. Initiating devices.
  3. Notification appliances.
  4. Inspection and testing.
  5. Auxiliary fire alarm equipment.
- B. Related Sections:
  1. Section 281304 – Physical Access Control System.
  2. Section 210000 - Fire Suppression.
  3. Section 260500 - Common Work Results for Electrical.
  4. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
  5. Section 260533 – Raceway & Boxes for Electrical Systems.
  6. Section 260800 – Commissioning of Electrical Systems.

Formatted: Font color: Blue

1.2 REFERENCES

- A. All work and materials shall conform to all applicable federal, state and local codes and regulations governing the installation. If there is a conflict between the referenced standards, federal, state or local codes, and this specification, it is the bidder's responsibility to immediately bring the conflict to the attention of the engineer for resolution. National standards shall prevail unless local codes are more stringent. The equipment and installation shall comply with the current provisions of the following codes and standards.
- B. American National Standards Institute (ANSI):
  1. ANSI S3.411, Audible Emergency Evacuation Signals.
  2. ANSI/UL 1971, Standard for Safety Signaling devices for Hearing Impaired.
- C. National Fire Protection Association (NFPA):
  1. NFPA 13, Installation of Sprinkler Systems.
  2. NFPA 20, Installation of Centrifugal Fire Pumps.
  3. NFPA 70, National Electrical Code.



4. NFPA 72, National Fire Alarm Code.
5. NFPA 101, Life Safety Code.
6. [\[NFPA 720, Installation of Carbon Monoxide \(CO\) detection and Warning Equipment.\]](#)

- D. Underwriters Laboratories, Inc.(UL):
1. UL 864 - Control Units for Fire Protective Signaling Systems.
  2. UL 268 - Smoke Detectors for Fire Protective Signaling Systems.
  3. UL 268A - Smoke Detectors for Duct Applications.
  4. UL 217 - Single and Multiple Station Smoke Alarms.
  5. UL 521 - Heat Detectors for Fire Protective Signaling Systems.
  6. UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.
  7. UL 464 - Audible Signaling Appliances.
  8. UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems.
  9. UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.
  10. UL 1711 - Amplifiers for Fire Protective Signaling Systems.
  11. UL 1638 - Visual Signaling Appliances.
  12. UL 1971 - Signaling Devices for the Hearing-Impaired.
  13. UL 1481 - Power Supplies for Fire Protective Signaling Systems.
  14. [UL 1635 - Digital Alarm Communicator System Units.](#)

Formatted: Font color: Blue

NOTE: Control equipment shall be listed to comply with both UL864 and UL2572 standards.

- E. Federal Codes and Regulations
1. Americans with Disabilities Act (ADA)
- F. International Standards Organization (ISO)
1. ISO-9000
  2. ISO-9001
- G. Factory Mutual (FM)
1. Provide factory mutual approval.
- H. ASME 17.1 – Elevator Code
- I. International Code Council
1. International Building Code
  2. International Fire Code
  3. International Mechanical Code

### 1.3 DEFINITIONS:

- A. Authority Having Jurisdiction (AHJ): See Public Authorities.
- B. Engineer of Record: A Professional Engineer Registered in the State where the project is located who undertakes design of the fire protection system.
- C. Owner: Building/facility owner, landlord/lessor, tenant/lessee, Insurance Carrier or any designated representative of these entities.
- D. Public Authorities: Local, State or Federal government body having jurisdiction over any portion of the project. This includes, but is not limited to: Fire Departments, Fire Marshal Offices, Aviation Authorities, Insurance Regulatory Boards, etc.
- E. Approved: Unless otherwise stated, materials, equipment or submittals approved by the Authority or AHJ.

- F. Circuit: Wire path from a group of devices or appliances to a control panel or transponder.
- G. ~~CCS: Central Control Station:~~ A remote supervising station (facility) that is listed for central station remote monitoring in accordance with NFPA 72. The central station serves as the constantly attended location that receives alarm, supervisory or trouble signals from the protected premises fire alarm system.
- H. CPU: The central computer of a multiplex fire alarm or voice command control system.
- ~~I. EVACS: Dedicated in building "Emergency Voice/Alarm Communication System" utilized for originating and distributing voice instructions and evacuation signals pertaining to a fire emergency to the occupants of a building.~~
- ~~I-J. FAAP: Fire Alarm Annunciator Panel.~~
- ~~J-K. FACP: Fire Alarm Control Panel.~~
- ~~K. FCC: Fire Command Center.~~
- L. FM: FM Global (Factory Mutual).
- ~~M. GCW: Graphical Command Workstation.~~
- ~~N-M. MPSA: Medium Power Speaker Array.~~
- ~~O-N. IDC: Initiating Device Circuit.~~
- ~~P-O. LCD: Liquid Crystal Display.~~
- ~~Q-P. NAC: Notification Appliance Circuit.~~
- ~~R-Q. NICET: National Institute for Certification in Engineering Technologies.~~
- ~~S-R. NRTL: Nationally Recognized Testing Laboratory.~~
- ~~T-S. SLC: Signaling Line Circuit.~~
- ~~U-T. Style 1: As defined by NFPA 72, Class B.~~
- ~~V-U. Style 4: As defined by NFPA 72, Class B.~~
- ~~W-V. Style 6: As defined by NFPA 72, Class A.~~
- ~~X-W. Style 7: As defined by NFPA 72, Class A.~~
- ~~Y-X. Style B: As defined in NFPA 72, Class B.~~
- ~~Z-Y. Style D: As defined in NFPA 72, Class A.~~
- ~~AA-Z. Style Y: As defined in NFPA 72, Class B.~~
- ~~BB-AA. UL Listed: Materials or equipment listed and included in the most recent edition of the UL Fire Protection Equipment Directory.~~
- ~~CC-BB. Zone: Combination of one or more circuits or devices in a defined building area.~~

1.4 SYSTEM DESCRIPTION

A. Summary:

1. Provide all permits, labor, equipment, materials and services to furnish and install a fully tested functional, UL Listed, code compliant, intelligent addressable networked, fire emergency voice/ alarm control communication system (EVACS) including but not limited to all initiation and notification appliances, all raceways and wiring, and connection to a central station monitoring station company.
2. The fire alarm system supplied under this specification shall utilize modular low voltage design with direct wired, node to node, peer-to-peer network communications. The system shall utilize independently addressed, fire detection devices, input/output control modules, audio amplifiers, and notification appliances as described in this specification. Network panels shall contain the required user interfaces for all functions.
3. The system shall be designed for interior building audibility of 15 dBA-fast over ambient condition and intelligibility. Intelligibility shall be designed to ensure
4. All equipment shall be new and the current products of a single manufacturer, actively engaged in the manufacturing and sale of digital fire detection devices for over ten years.
5. Also included are system wiring, fiber optic cable, raceways, pull boxes, terminal cabinets, mounting boxes, and any accessories and miscellaneous items required for a code compliant system.
6. The system drawings show the intended coverage and suggested device locations. Final device quantity, location, and AHJ approval are the responsibility of the contractor.
7. The final system shall be complete, tested, and ready for operation as described elsewhere in this specification, before owner acceptance.
8. Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed, is compatible with other systems, and will accommodate the future requirements and operations of the building owner. All specified operational features must be met without exception.
9. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional protected premises fire alarm system (System). The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.
10. Certification that the entire system(s) has/have been inspected and tested, is/are installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and ULI listings, and is/are in proper working order. Contractor shall use "Fire Alarm System Certification and Description" as required by NFPA 72.

B. Related Work:

1. Work and/or equipment provided in other sections and related to the fire alarm system shall include, but not be limited to:
  - a. [Sprinkler water flow, high and low pressure switches and supervisory switches shall be wired and connected by the fire alarm system contractor. Sprinkler devices necessary to accommodate monitoring by the fire alarm system shall be the responsibility of the fire sprinkler system contractor.]
  - b. Duct smoke detectors shall be furnished, wired and connected by the electrical contractor.
  - c. Elevator recall control circuits are to be provided in compliance with ANSI A17.1.
  - d. Fire pumps status monitoring.
    - 1) Pump failure (fail to start) indication
    - 2) Pump running indication
    - 3) Phase reversal indication
  - e. [Emergency generator status monitoring.
    - 1) Running indication
    - 2) Fail to start indication]
    - f. IP network interface:
      - 1) Coordinate with the owner's IT department for interconnection between the owners' TCP/IP network and the TCP/IP network equipment supplied under this contract.

Formatted: Font color: Blue

Formatted: Font color: Blue

C. General:

283100 - 4

USPS MPFS

FIRE EMERGENCY VOICE/ALARM  
Date: 10/1/2017 FIRE DETECTION AND ALARM COMMUNICATION SYSTEM (EVACS)

1. Furnish and install a complete UL list/certified, modular, non-coded, independently point addressable, intelligent Fire Alarm System as described herein and as shown on the plans. System shall be dedicated to fire service.
2. The system shall be fully field programmable such that virtually any combination of system output functions may be correlated to any type of input event(s). Inputs may be combined using Boolean logic, be time dependent or under manual control, as defined by required system operation. Each FACP shall have an operator interface to allow for loading or editing special instructions and system operating sequences as required. The system shall be capable of on-site programming to accommodate and facilitate expansion, building parameter changes and changes as required by local codes. All software operations are to be stored in a non-volatile programmable memory within each of the FACP's. Loss of primary and secondary power shall not erase the system programs stored in memory. There shall be no limit, other than maximum system capacity, as to the number of addressable devices which may be in alarm simultaneously.
3. [The fire network shall utilize token ring, peer-to-peer communications. The network shall consist of one main and one secondary FACP. To enhance survivability, each FACP shall be an equal, active functional member of the network, capable of making all local decisions and initiating network tasks for other panels. In the event of an FACP failure or communications failure between units, FACP's shall be capable of forming sub-networks and remain operational between communicating units. Master/slave system configurations shall not be considered as equal.]
4. The FACP's shall allow the operator to set detector sensitivity ratings for each device, within code allowed parameters. To accommodate and facilitate job site changes, initiation circuits shall be individually configurable on site to provide either alarm/trouble operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non-latching circuit or an alarm verification circuit. All control equipment shall have transient protection devices to comply with UL864 requirements. Addressable smoke detector sensitivity settings for both pre-alarm and alarm activation shall be automatically individually configurable for both daytime and nighttime operation. Addressable smoke detectors shall be UL listed for automatic sensitivity testing.
5. Each FACP unit shall accept addressable analog detectors and addressable monitor modules for dry contact devices.
6. Bypass switches shall be included for system testing to prevent audible/visual signal operation, sprinkler system flow, high and low pressure switch operation, HVAC control activation and remote fire department notification. Bypass switches for fire alarm system testing shall be located in each of the FACP's. Activation of bypass switches shall cause system trouble alarm.
7. Ease of maintenance shall be facilitated by the use of panel based and PC based system diagnostics.
  - a. The system shall automatically test smoke detector sensitivity, eliminating the need for manual sensitivity testing.
  - b. Ground fault detection and annunciation shall be by individual module address for supervised input and output devices.
  - c. System test operation shall be configurable by individual addressable devices, and not disable entire circuits.
  - d. The system shall be capable of generating a graphical map of connected all addressable devices to aide in circuit troubleshooting.
  - e. Placement supervision of addressable devices shall couple a device's location (not its address) to the programmed system response.
8. The system shall provide a one-way multi-channel emergency communication sub-system for the distribution of emergency messages to facility occupants.

D. System Components:

1. Provide and install a new fire detection and alarm system that shall consist of:
  - a. Fire Alarm Control Panel.
  - b. LCD remote annunciator(s).
  - c. A system printer.
  - d. Manual pull stations.
  - e. Area smoke detectors.
  - f. Area heat detectors.
  - g. Duct smoke detectors.

- h. Sprinkler system waterflow(s) and valve supervisory switch(s).
- i. [Interface with suppression, smoke control and ancillary shutdown system(s)].
- j. Audible notification appliances.
- k. Synchronized visual notification appliances.
- l. Magnetic door holders.
- m. Communications.
- n. Addressable interface devices.
- o. [Digital alarm communicator transmitter.]
- p. Control system integration.
- q. [Provide elevator recall functions for primary and alternate floors and elevator power shunt trip activation.]

Formatted: Font color: Blue

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Remote central station monitoring is required for MPF's not occupied 24/7 or those equipped with FACP's that are not "constantly attended". Include paragraph 1.4.D.r. below for these MPF's.*  
 \*\*\*\*\*

Formatted: NotesToSpecifier

Formatted: Font: Bold

Formatted: NotesToSpecifier, Centered

Formatted: NotesToSpecifier

- r. [Connection to a central station monitoring company. Provide digital alarm communicator transmitter, 3<sup>rd</sup> party digital cellular communicator and remote antenna. The owner-USPS shall arrange for two dedicated phone lines to be terminated as directed by the installing contractor monitoring service contract with a U.L. listed monitoring company. Refer to paragraph 3.6 B.]

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue, Superscript

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Don't keep with next

1.5 SEQUENCE OF OPERATIONS

A. General

- 1. The alarm activation of any area smoke detector, heat detector, manual pull station, sprinkler waterflow, the following functions shall automatically occur:
  - a. The internal audible device shall sound at the control panel and remote annunciator.
  - b. The LCD display shall indicate all applicable information associated with the alarm condition including; device type, device location and time/date.
  - c. All system activity/events shall be documented in system history and on the system printer.
  - d. Any remote or local annunciator LCD/LED's associated with the alarm shall be illuminated.
  - e. Activate notification audible appliances throughout the building.
  - f. Activate visual strobes notification appliances throughout the building. The visual strobe shall continue to flash until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.
  - g. [Transmit an "Contact ID - Point Address" alarm signals to the central station.]
  - h. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
  - i. All exit doors shall unlock throughout the building.
  - j. All self-closing fire/smoke doors held open shall be released.
  - k. Recall elevators to primary or alternate recall floors.
  - l. Upon water flow, the designated mail processing equipment shall immediately shutdown as indicated on the drawings.

Formatted: Font color: Blue

B. Duct Smoke Operation

- 1. The Alarm activation of any duct smoke detector, the following functions shall automatically occur:
  - a. The internal audible device shall sound at the control panel and remote annunciator.
  - b. The LCD display shall indicate all applicable information associated with the alarm condition including; device type, device location and time/date.
  - c. All system activity/events shall be recorded on the system printer and system history file.
  - d. Any remote or local annunciator LED's associated with the alarm shall be illuminated.
  - e. [Transmit an "Contact ID - Point Address" alarm signals to the central station.]
  - f. Shutdown the local air handling unit.

Formatted: Font color: Blue

- g. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.

C. Elevator Control

- 1. Upon activation of elevator lobby, hoist-way or machine room smoke detector, phase 1 & 2 elevator recall shall be initiated.
- 2. Upon activation of designated heat detector(s) in elevator hoist-way or machine room, power to the elevator(s) shall be disconnected prior to the application of water. Phase I recall shall meet all requirements of ASME A17.1, 211 3b (5).

D. Supervisory Operation

- 1. Upon supervisory activation of any sprinkler valve supervisory switch, the following functions shall automatically occur:
  - a. The internal audible device shall sound at the control panel and remote annunciator.
  - b. The LCD display shall indicate all applicable information associated with the supervisory condition including; device type, device location and time/date.
  - c. All system activity/events shall be documented on the system printer and system history file.
  - d. Any remote or local annunciator LCD/LED's associated with the supervisory activation shall be illuminated.
  - e. [Transmit a "Contact ID – Point Address" supervisory signals to the central station.]

Formatted: Font color: Blue

E. Trouble Operation

- 1. Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:
  - a. The internal audible device shall sound at the control panel and remote annunciator.
  - b. The LCD display shall indicate all applicable information associated with the trouble condition including; device type, device location and time/date.
  - c. All system activity/events shall be documented on the system printer and system history file.
  - d. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
  - e. [Transmit a "Contact ID – Point Address" trouble signal to the central station.]

Formatted: Font color: Blue

1.6 SYSTEM CONFIGURATION

A. General

- 1. All Life Safety System equipment shall be arranged and programmed to provide a system for the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department (when required), the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building occupants.
- 2. The System shall utilize independently addressed, smoke detectors, heat detectors and input/output modules as described elsewhere in this specification.

B. Power Supply

- 1. The power supply shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. The automatic battery charger shall have low battery discharge protection. The power supply shall provide internal power and 24 Vdc at 4.5A continuous for notification appliance circuits. All outputs shall be power limited. The battery shall be sized to support the system for 60 hours of supervisory and trouble signal current plus general alarm for 5 minutes.
- 2. Auxiliary power supplies shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. The automatic battery charger shall have low battery discharge protection. The power supply shall provide internal

power and 24 Vdc at 6.4 continuous for notification appliance circuits. The power supply shall be capable of providing 8A to output circuits for a maximum period of 100 ms. All outputs shall be power limited. The battery shall be sized to support the system for 60 hours of supervisory and trouble signal current plus general alarm for 5 minutes. All supervision of the auxiliary supply shall be transmitted via addressable analog loop without additional equipment.

- C. Display
  - 1. The display module shall be of membrane style construction with a 16 line by 40 character Liquid Crystal Display. The LCD shall use super-twist technology and backlighting for high contrast visual clarity. In the normal mode display the time, the total number of active events and the total number of disable points. In the alarm mode display the total number of events and the type of event on display. Reserve 40 characters of display space for user custom messages. The module shall have visual indicators for the following common control functions; AC Power, alarm, supervisory, monitor, trouble, disable, ground fault, CPU fail, and test. There shall be common control keys and visual indicators for; reset, alarm silence, trouble silence, drill, and one custom programmable key/indicator. Provide four pairs of display control keys for selection of event display by type (alarm, supervisory, monitor and trouble) and forward / backward scrolling through event listings. The operation of these keys shall be integrated with the related common control indicator that lights when an event of its type is active. Allow the first event of the highest priority to capture the LCD for display so that arriving fire fighters can view the first alarm event "hands free". Provide system function keys; status, reports, enable, disable, activate, restore, program, and test. The module shall have a numeric keypad, zero through nine with delete and enter keys.
    - a. Basis of Design: Edwards model 3-LCDXL
- D. Initiating Device Circuits
  - 1. The Initiating device circuits (IDC) used to monitor manual fire alarm stations, smoke and heat detectors, waterflow switches, valve supervisory switches, fire pump functions, and air pressure supervisory switches shall be Class B.
- E. 24 VDC Notification Appliance Circuits
  - 1. 24 VDC Notification appliance circuits (NAC) shall be Class B. All notification appliance circuits shall have a minimum circuit output rating of 2 amp @ 24 vdc. The notification circuits shall be power limited. Non-power limited circuits are not acceptable.
- F. Audio Notification Appliance Circuits
  - 1. One-way audio notification appliance circuits (NAC) shall be Class B. All notification appliance circuits shall have a minimum circuit output rating of 35W @70Vrms. The notification circuits shall be power limited. Non-power limited circuits are not acceptable.
- G. Signaling Line Circuits (SLC-Data Circuits)
  - 1. The signaling line circuit shall communicate from a panel/node to analog/addressable detectors, input modules, output modules, isolation modules and notification appliance circuits.
  - 2. Each signaling circuit connected to addressable/analog devices shall provide a minimum of 20 spare addresses.
  - 3. [When a signaling line circuit covers more than one fire/smoke compartments, a wire-to-wire short shall not affect the operation of the circuit from the other fire/smoke compartments.]
  - 4. The signaling line circuit (SLC) connecting all components Class B (style 4).

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Remote central station monitoring is required for MPF's not occupied 24/7 or those equipped with FACP's that are not "constantly attended". Include paragraph 1.6H. below for these MPF's.*  
 \*\*\*\*\*

- H. DACT
  - 1. The panel shall contain a dialer (alarm communicator transmitter (DACT)) module to transmit all "Contact ID – Point Address" alarm, supervisory and trouble signals to a remote central station monitoring station (CMS) company. The DACT shall support digital 3<sup>rd</sup> party, cellular dual

- Formatted: NotesToSpecifier
- Formatted: Font: Bold
- Formatted: NotesToSpecifier, Centered
- Formatted: NotesToSpecifier
- Formatted: Font color: Blue
- Formatted: Font color: Blue
- Formatted: Font color: Blue
- Formatted: Font color: Blue, Superscript
- Formatted: Font color: Blue

~~telephones lines, 20 PPS 4/2 communications, and configured for dual tone multi-frequency (DTMF) or pulse modes. It shall be possible to delay AC power failure reports, auto test call, and site program using a touch-tone phone and password.]~~

## 1.7 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
1. Product Data: For each type of Product required.
  2. It shall be the contractor's responsibility to inspect the job site and become familiar with the conditions under which the work will be performed. These conditions should be used to adjust the submittals.
  3. Shop Drawings: Include plans, elevations, sections, details, and attachments necessary:
    - a. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
    - b. Include voltage drop calculations for notification appliance circuits.
    - c. Include 25 percent spare capacity on each signal circuit so that additional devices can be added.
    - d. Include substantiating emergency (battery) and normal power supply calculations for supervisory and alarm power requirements and calculations of notification device circuit loading (end of circuit voltage drop) to ensure proper operation of all devices.
    - e. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
    - f. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits. Drawing scale shall match engineers design drawings.
    - g. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
    - h. Include complete schematic circuit diagrams for system, including all equipment. Wiring diagram shall show point to point connections between all system components
    - i. Include descriptions of system operation, annunciator schedule showing titles for each zone, and manufacturer's literature marked to show model and catalog number for all equipment.
    - j. Include complete riser diagrams for system indicating wiring sequence of all alarm devices and control equipment shall be included with submittal data.
    - k. Include requirements of the Integrated Automation, Security, and Clean-Agent System and data sharing details.
- B. General Submittal Requirements:
1. Submit for approval ~~four~~ **six (46)** sets of shop drawings and submittal documentation to the consulting engineer for review and comment. Drawing and submittal documentation sets shall be bound. Additional copies may be required at no additional cost to the project.
  2. Contained in the title block of each drawing shall be symbol legends with device counts, wire tag legends, circuit schedules for all addressable and notification appliance circuits, the project name/address, and a drawing description which corresponds to that indicated in the drawing index on the coversheet drawing. A section of each drawing title block shall be reserved for revision numbers and notes.
  3. Shop Drawings shall be prepared by persons with the following qualifications:
    - a. Trained and certified by manufacturer in fire-alarm system design.
    - b. NICET-certified fire-alarm technician, Level III minimum.
- C. Construction Drawings:
1. The System's Contractor shall prepare fire alarm system installation drawings for permitting in accordance with Florida Administrative Code Rule 61G15. Drawings shall incorporate all required information per Rule 61G15 and be signed and sealed by a registered professional



engineer meeting the requirements of Rule 61G15. The System's Contractor furnishing and installing the fire alarm system is responsible for preparation of these drawings and getting drawings approved by the Authority Having Jurisdiction (AHJ).

- D. Systems Contractor Qualifications:
1. The contractor directly responsible for this work shall be a systems contractor, who is and who has been regularly engaged in the furnishing and installation of commercial and industrial fire alarm systems of this type and size for at least the immediate past 5 years. All equipment shall be installed by a technician with experience installing the manufactured system or a recognized training school or course for the installations of this type system. The contractor shall, if requested by the engineer; show proof of a specific individual's training. The system's contractor shall directly employ a suitable number of skilled systems installers whose normal work is systems installation and who shall install and make the wire and cable connections thereto.
  2. As part of the project submittal, it shall be demonstrated to the satisfaction of the engineer that the systems contractor has adequate plant and equipment to do the work properly and expeditiously, adequate staff and technical experience.
- E. Test Reports: Submit the following reports directly to ~~Contracting Officer~~ USPS Project Manager from Manufacturer's Quality Control Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
1. Pre-test.
  2. Acceptance test.
- F. Certificates: Manufacturer's certificate certifying that components and Products meet or exceed specified requirements.
- G. Qualification Documentation:
1. Submit documentation of manufacturer and installer experience indicating compliance with specified qualification requirements. Include lists of completed projects with project names and addresses, and names of Engineers and Owners.
  2. Fire alarm contractor license issued by State or local authority having jurisdiction.
- H. Manufacturer's Field Reports: Submit the following reports directly to ~~Contracting Officer~~ USPS Project Manager from Manufacturer's Quality Control Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.
1. Preparatory inspection.
  2. Initial inspection.
  3. Follow-up inspection.
  4. Final inspection.
- I. A copy of the installing technician's NICET certification shall be provided.
- J. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
1. Operation and Maintenance Data: Project specific operating manuals covering the installed Life Safety System. A generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement. Include user's software data and recommendations for spare parts to be stocked at the site. Provide names, addresses, and telephone numbers of service organizations that stock repair parts for the system.
  2. Operations and maintenance data for fire-alarm system and components shall include the following:
    - a. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
    - b. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
    - c. Record copy of site-specific software.
    - d. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:

- 1) Frequency of testing of installed components.
- 2) Frequency of inspection of installed components.
- 3) Requirements and recommendations related to results of maintenance.
- 4) Manufacturer's user training manuals.
- e. Manufacturer's required maintenance related to system warranty requirements.
- f. Abbreviated operating instructions for mounting at fire-alarm control unit.
- g. Copy of NFPA 25.
3. Software and Firmware Operational Documentation:
  - a. Software operating and upgrade manuals.
  - b. Program Software Backup: On magnetic media or compact disk, complete with data files. Provide all required passwords and access to allow independent, factory trained technician working for an authorized partner/dealer to utilize the backup database files.
  - c. Device address list.
  - d. Printout of software application and graphic screens.
4. Project Record Documents: As-Built drawings consisting of: a scaled plan of each building showing the placement of each individual item of the Life Safety System equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway. All drawings must reflect point to point wiring, device address and programmed characteristics. All drawings shall be provided in AutoCAD format. A hard copy plot of each sheet shall also be provided. Provide the application program listing for the system (to the facility) as installed at the time of acceptance (disk, hard copy printout, and all required passwords).
  - a. The Contractor shall provide three bound copies of the following, to be forwarded to the Owner at completion of project:
    - 1) As-built wiring and conduit layout diagrams showing all fire alarm devices on floor plans, including wire color code and terminal numbers, and showing all interconnections in the system.
    - 2) Electronic circuit diagrams of all FACP modules, power supplies, annunciator, data gathering panels, addressable interface modules, etc.
    - 3) Technical literature on all major parts of the system, including control panels, smoke detectors, batteries, manual stations, alarm notification appliances, power supplies, and remote alarm transmission means.
5. Record of Completion: Figure 4.5.2.1 NFPA 72.

K. Maintenance Material Submittals:

1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - a. Smoke Detectors, Fire Detectors: Quantity equal to 10 percent of amount of each type installed, but no less than 3 units of each type.
  - b. Detector Bases: Quantity equal to 10 percent of amount of each type installed, but no less than 5 units of each type.
  - c. Keys and Tools: Four extra sets for access to lock and tamper proofed components.
  - d. Audible and Visual Notification Appliances: Five of each type installed.
  - e. Manual Pull Stations: Five of each type installed.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm experienced in manufacturing equipment of the types and capacities indicated that have record of successful in-service performance with minimum 10 years documented experience. Prime system manufacturer and manufacturers of major system components required to qualify separately.

1. Service Center: The System Supplier shall maintain a service organization with adequate spare parts stock within 75 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor.
2. System equipment shall be from a single manufacturer and shall be supported by a manufacturer authorized, established service organization that shall stock parts for the equipment supplied.

Formatted: Font color: Blue

3. Equipment shall be manufactured by a firm that has been actively manufacturing fire alarm systems for a minimum of 7 years and that offers a 3 year warranty on all control equipment.
  4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  5. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.
- B. Installer Qualifications: Experience with systems of the type and scope indicated and certified as authorized service representative of the prime system manufacturer with minimum 5 years documented experience.
1. System shall be installed by a single contractor that assumes responsibility for system components and their compatibility.
  2. Only manufacturer's certified installers with NICET Level III or higher shall be utilized.
  3. The addressable fire alarm system shall be connected, programmed, and tested only by the manufacturer or by an authorized distributor who stocks a full complement of spare parts for the system. Technicians performing this service shall be trained and individually certified by the manufacturer for the model of system being installed and NICET Level II or greater. Copies of their certifications must be included with the contractor's submittal to the engineer, prior to installation. The submittal cannot be approved without this information.
- C. Regulatory Requirements:
1. Calculations, Product Data, Shop Drawings: Provide stamp of approval from Public Authorities.
  2. Comply with requirements of Public Authorities for submittals, approvals, materials, installation, inspections, and testing.
  3. Comply with requirements of ~~Contracting Officer~~ USPS Project Manager and Owner's insurance underwriter for submittals, approvals, materials, installation, inspections, and testing.
  4. Provide certificate of compliance from Public Authorities indicating approval of field acceptance tests.
  5. Conform to applicable code for submission of design and calculations, reviewed shop and erection drawings and as required for acquiring permits.
  6. Cooperate with regulatory agency or authority and provide data as requested.
- D. Pre-Installation Meetings:
1. Convene a pre-installation meeting one week prior to commencing Work of this Section. Final device and equipment locations shall be coordinated with the Plant and Engineer during this meeting.
  2. Require attendance of parties directly affecting Work of this Section.
  3. Review conditions of operations, procedures and coordination with related Work.
  4. Agenda:
    - a. Tour, inspect, and discuss conditions of building and building structure.
    - b. Review system design and requirements.
    - c. Review required submittals, both completed and yet to be completed.
    - d. Review system Drawings and data.
    - e. Review and finalize construction schedule related to system and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
    - f. Review required inspections, testing, certifying, and material usage accounting procedures.

#### 1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall be responsible for all receiving, handling, and storage of his materials at the job site.
- B. Overnight storage of materials is limited to the assigned storage area. Materials brought to the work area shall be installed the same day, or returned to the assigned storage area unless previously approved by the Owner. Store equipment in a clean, dry space and protect from dirt, fumes, water, construction debris, and physical damage.

- C. The Contractor shall remove rubbish and debris resulting from his work on a daily basis. Rubbish not removed by the Contractor will be removed by the Owner and back-charged to the Contractor.
- D. Handle equipment to prevent internal components damage, breakage, denting, and scoring enclosure and finish.
- E. Do not install damaged equipment.
- F. Do not install or connect any smoke detectors (spot or duct) before areas where detectors are installed are cleaned and ready for occupants as indicated in NFPA-72. If detectors are installed before areas are cleaned, and found to be contaminated at time of final commission or soon after. The installing contractor shall replace detectors with new at no cost to the owner.
- G. After installation, protect from damage by work of other trades.

1.10 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning with Substantial Completion, provide software support for three years.
- C. Upgrade Service:
  1. Update software to latest version at Project completion. Install and program software upgrades that become available within three years from date of Substantial Completion. Upgrading software shall include operating system of the FACP's.
  2. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.11 COORDINATION

- A. Coordinate locations of panels, annunciators and equipment with existing field conditions and Plant Staff.
- B. Coordinate conduit and cable runs with other contractors. Include fire proofing and fire stopping at penetrations.
- C. Coordinate locations of devices with reflected ceiling plans and wall elevations.
- D. Pre-installation Conference: Conduct conference at Project site. Conference should discuss all necessary coordination and outline specific interface details to be coordinated with the existing mail processing equipment and access control systems.

1.12 POSITIVE ALARM SEQUENCE

- A. Positive Alarm Sequence: If permitted by the public authority, the fire alarm system shall be equipped with positive alarm sequence feature (per NFPA 72, 9.6.3.4) that allows initial fire alarm signals to be received at the constantly attended control panel location and for which human action is subsequently required to delay the general alarm by 180 seconds after the start of the alarm processing. The transmission of the alarm signal to the central station shall activate upon the initial alarm signal.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approval agency for use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.
- B. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Edwards, (800) 655-4497
  2. Siemens, (800) 262-7976.
  3. Honeywell/Notifier, (800) 289-3473/973-455-2000.
  4. Simplex/Grinnell, (978) 731-2500
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted subject to approval of Contracting Officer/USPS Project Manager.
1. Conflicts, deviations, or change requests shall be submitted in writing to Contracting Officer/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. Contracting Officer/USPS Project Manager reserves the right to reject substitute and other systems.

### 2.2 PANEL COMPONENTS AND FUNCTIONS

- A. General
1. The control panel(s) shall be a multi-processor-based system designed specifically for fire and releasing system applications. The control panel shall be listed and approved for the application standard(s) as listed under the General section.
  2. The control panel(s) shall include all required hardware, software and system programming to provide a complete and operational system. The control panel(s) shall assure that life safety takes precedence among all panel activities.
  3. The control panel(s) shall include the following capacities:
    - a. Support up to 2500 analog/addressable points per panel with capacity of networking up to 64 nodes.
    - b. Support up to 5 fully supervised network remote annunciators.
    - c. Support a DACT (dialer) for off premise cellular notification.-]
    - d. Support up to 576 chronological events in history.
  4. The control panel(s) shall include the following features:
    - a. Provide auto-programming and electronic addressing and mapping of analog/addressable devices.
    - b. Provide an operator interface display that shall include functions required for annunciation, command and control system functions.
    - c. Provide a discreet system control switch provided for reset, alarm silence, local silence, drill switch, up/down switches, status switch, program switch, enable and disable switches, activate and restore switches, reports switch and test switch.
    - d. Provide system reports that provide sensitivity and history details.
    - e. Provide an authorized operator with the ability to operate or modify system functions like system time, date, passwords; and auto-program, enable mapping, restart the system and clear control panel event history file.
    - f. Provide an authorized operator to perform test functions within the installed system.

Formatted: Font color: Blue

5. Supervision of system components, wiring, initiating devices and software shall be provided by the control panel(s). Failure or fault of system component or wiring shall be indicated by type and location on the LCD display. Software and processor operation shall be independently monitored for failure. Control Panel:
6. Basis of Design: Control Panel - Edwards, EST3 Series.

B. Annunciation

1. The system shall be designed and equipped to receive, monitor, and annunciate signals from devices and circuits installed throughout the building. Manufacturer's standard control switches shall be acceptable if they provide the required operation, including performance, supervision and position indication. If the manufacturers' standard switches do not comply with these requirements, fabrication of custom manual controls acceptable to the ~~contracting officer~~ USPS Project Manager is required.
2. Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciator panel.
3. The control panel(s) and remote annunciator(s) shall contain the following system status indicators:
  - a. 80 character Backlit Liquid Crystal Display.
  - b. System Power Indicator - green LED.
  - c. System Common Alarm - red LED.
  - d. System Common Trouble - yellow LED.
  - e. System Common Supervisory - yellow LED.
  - f. System Common Monitor - yellow LED.
  - g. System Ground Fault - yellow LED.
  - h. System CPU Fault - yellow LED.
  - i. System Disabled - yellow LED.
  - j. System Test Point(s) - yellow LED.
  - k. System Reset Switch with Integral yellow LED.
  - l. System Alarm Silence Switch with Integral yellow LED.
  - m. System Local Silence Switch with Integral yellow LED.
  - n. System Drill Switch with Integral yellow LED.
  - o. System Message Queue Scroll Switches.
  - p. Additional buttons as required to provide system control and operator functions.
4. Basis of Design: Edwards EST3 series.

C. Power Supply

1. Each system power supply shall be a minimum of 6 amps @ 24 vdc.
2. Upon failure of normal (AC) power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any alarm, trouble or operator acknowledgment signals.
3. Each system power supply shall be individually annunciated and shall identify the inoperable power supply in the event of a trouble condition.
4. All standby batteries shall be continuously monitored by the system. Low battery and disconnection of battery power supply conditions shall immediately annunciate as a trouble signal, identifying the deficient batteries.
5. All system power supplies shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, in 48 hours maximum.
6. All AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of Section 4.4.1.4 of NFPA 72. The AC power circuit shall be installed in conduit raceway. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside each control panel.
7. Basis of Design: Edwards model 3-PPS/M2.

D. Display

1. System Message Processing and Display Operations:
  - a. The system shall allow message routing to be configured to any or all annunciators.

283100 - 15

- b. All system printer port(s) shall be configurable to output any combination of alarm, supervisory, trouble, or monitor, event messages.
  - c. Each LCD display on each annunciator shall be configurable to display the status of any combination of alarm, supervisory, trouble, or monitor, event messages.
  - d. Clear distinction shall be provided between alarm, supervisory, trouble, and monitor status messages.
2. The system shall provide the ability to retrieve data from the analog/addressable detectors to a PC while the system is on-line and operational in the protected premises. The uploaded data may then be analyzed in a diagnostic program supplied by the system manufacturer.
  3. A standby power supply shall automatically supply electrical energy to the system upon primary power supply failure.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Remote central station monitoring is required for MPF's not occupied 24/7 or those equipped with FACP's that are not "constantly attended". Include paragraph 2.2E. for these MPF's.*  
 \*\*\*\*\*

- Formatted: NotesToSpecifier
- Formatted: Font: Bold
- Formatted: NotesToSpecifier, Centered
- Formatted: NotesToSpecifier
- Formatted: Font color: Blue
- Formatted: Font color: Blue
- Formatted: Font color: Blue
- Formatted: Font color: Blue
- Formatted: Font color: Blue, Superscript
- Formatted: Font color: Blue
- Formatted: 5

- E. Dialer -- DACT
1. The system shall provide an off premise digital alarm communications transmitter (DACT) capable of transmitting system "Contact ID -- Point Address" alarm, trouble and supervisory events to a central station monitoring station (CMS) company. The DACT shall support digital, 3<sup>rd</sup> party, U.L. listed, cellular dual telephone lines, 20 PPS 4/2 communications, and configured for dual tone multi-frequency (DTMF) or pulse modes. It shall be possible to delay AC power failure reports, auto test call, and site program the DACT using a touch tone phone and password.
  2. Basis of Design:
    - a. Edwards model 3-MODCOM (DACT).
    - b. Honeywell, Telguard, Bosch, DSC (cellular communicator and antenna).]

- F. One-Way Emergency Audio Communications
1. A supervised one-way (8)-channel emergency communications system shall be provided in the main control panel located within the maintenance operation's office. The main one-way audio controller shall provide a push-to-talk microphone with coiled cord, and switches that allow the emergency user to page to the evacuation channel, page to the alert channel or quickly place evacuation or alert tones on the selected channels. Switches shall also be provided to permit paging on the evacuation or alert channel using the firefighters telephone system as the paging source.
  2. Each channel shall have the capability to output a different tone or prerecorded message independent of each other. Each supervised branch audio circuit shall provide a connect/disconnect switch and indicators for active circuit selection and circuit trouble.
  3. Basis of Design: One-way emergency audio communications module. Edwards model 3-ASU.

- G. One-Way Emergency Audio Amplifiers
1. The One-Way amplifiers shall be high-efficiency switch-mode audio amplifiers. Each amplifier must support dual channel audio. The audio output shall be configurable as 25VRMS or 70VRMS in Class B wiring, rated at 20,40 or 95 watts. The amplifiers shall support speakers connected directly to the output of the amplifier or the amplifier output shall be capable of being run as an audio riser to switching modules where speaker zone selection is made.
  2. Each amplifier shall have a built in back up 1kHz tone generator that automatically activates with loss of input signal. Each amplifier cabinet shall include a backup redundant amplifier. It shall be possible to default to back up tone or standby amplifier in the event of the loss of input signals. System remote amplifiers must communicate their status directly to the main control panel. External monitoring is not acceptable. Onboard status LEDs shall be provided for quick visual indication of amplifier status
  3. Basis of Design: Edwards model 3-ZA20, 3-ZA40, 3-ZA95.

H. System Printer

1. The event and status printer shall be a 9-pin, impact, dot matrix printer with a minimum print speed of 232 characters per second. The printer shall be capable of serial communications protocol. The printer shall list the time, date, type and user defined message for each event printed.
  2. Basis of Design: Edwards model PT-1S.
- I. Reports
1. The system shall provide the operator with system reports that give detailed chronological description of the last 576 system events. The system shall provide a report that gives a listing of the sensitivity and environmental compensation usage of all of the detectors on the system, or specified analog/addressable circuit.
  2. The system report shall also include facility name, compiled date, compiler revision, project revision and report date. The system shall output these reports via the main LCD, and reports shall be capable of being printed on the system printer.

\*\*\*\*\*

**NOTE TO SPECIFIER**

*Larger Mail Processing Facilities will require multiple FACP's interfaced with a common central graphic fire command workstation. Include Section 2.3 below when in those applications.*

\*\*\*\*\*

2.3 GRAPHIC FIRE COMMAND SERVERS AND WORKSTATIONS

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue

Formatted: Font color: Blue

- A. General: The graphic fire command workstation shall Edwards EST FireWorks and be an integral part of the Central fire command station (CCS), and shall function as the common center point for operational and administration functions required for the fire alarm system/emergency communication system(s) provided in this specification.
- B. The graphic fire command workstation shall provide multiple points of view of a system event to deliver the user the maximum amount of information with minimum intervention. Complete control of connected FACP's shall be provided.
- C. The graphic fire command workstation shall consist of a primary server (FW-ULS). The graphic command network shall have the capability of supporting a minimum of 15 remote WebClients, and 125 individual EST3 networks with each EST3 network supporting 64 EST3 nodes (ACU/FACP's). The graphic fire command workstation shall support a digital alarm communications receiver (DACR) unit to monitor third-party fire systems using Contact ID format via cellular communications phone lines or Ethernet. The workstation shall be UL listed to command and control all FACP networks and equipment supplied under this contract.
- D. The workstation shall be an industrial grade computer listed for UL Standards 864 (Control Units for Fire-Protective Signaling Systems) under categories UOJZ, APOU, and UUKL; UL 1076, (Proprietary Burglar Alarm Units and Systems) under category APOU as applicable. The workstation shall be capable of annunciation and control of all fire detection control points.
- E. The computer shall be a minimum of an Industrial Grade i7 4770S processor 3.9 GHZ, 32 GB RAM, 8 MB Chace, QPI speed of 5 GT/S, 4 core, multi-threaded to 8, RAID solid State Drives, and 2 NICs. .
- F. The computer operating system shall be Windows® 10 Pro 64, Service Pack 1.
- G. There shall be a 22" LCD touch screen main monitor installed as shown on drawing.
- H. Graphic fire command workstation shall be provided with an uninterruptable power source system sized for 4 hours of operation. At a minimum, the system shall provide annunciation and controls for:
  1. Activate prerecorded audio messages to any combination of local or remote FACP's.
  2. Initiating live page messages to any combination of local or remote FACP's.



3. Controlling/Monitoring local and/or remote building functions as detailed on the functional matrix.
  - a. Fire detection.
  - b. Fire pump status
  - c. Standby generator.
4. Workstation functions shall include but not be limited to:
  - a. Display events in response to an alarm or off normal point. The workstation shall simultaneously display
    - An "Event List Viewport" to display the alarm or off normal point with type and description and time of the event in a prioritized color-coded event list.
    - An "Event Action Viewport" to provide common control capability for Alarm Silence, Panel Silence, Drill and Reset as well as the Event Acknowledge button, the Computer Silence button, and the Event Log.
    - A "Map Viewport" to display a graphical representation of the area/location in which the alarm or off-normal device is located. Device Icons shall be surrounded by a color coded boarder that indicates the status of each device.
    - A "Browser Viewport" to automatically access web based emergency information sites,
    - An "Image Viewport" to display a stored image of items relevant to the event highlighted in the event list area. Examples include Hardware identification, Equipment diagrams, etc.
  - b. Highlighting any event in the event list viewport shall automatically cause the viewports to display information relating to the highlighted event. Systems requiring multiple screens to display this information shall not be considered as equal.
  - c. Receipt of incoming events shall transmit event details to web clients.
  - d. Receipt of incoming events shall email event details to responsible parties.
5. Workstation shall be capable of:
  - a. Acknowledging, silencing, and resetting all fire alarm functions.
  - b. Manually activating, deactivating, enabling, and disabling individual fire alarm points.
  - c. Generating status, maintenance and sensitivity reports for all fire alarm components.
  - d. Operating the smoke control system.
6. Workstation shall log all events and operator actions to history for future review.
7. Workstation shall be capable of logging the operator's comments for each event to history with time and date.
8. Workstation shall transmit system status to all connected web clients. ]

## 2.4 FIELD-MOUNTED SYSTEM COMPONENTS

- A. Smoke Detectors and Accessories
  1. Analog Addressable Smoke General
    - a. Each analog addressable smoke detector's sensitivity shall be capable of being programmed individually as: most sensitive, more sensitive, normal, less sensitive or least sensitive.
    - b. An alternate alarm sensitivity level shall be provided for each detector, which can be set to any of the five (5) sensitivity settings manually or automatically using a time of day event.
    - c. The detector's sensing element reference point shall automatically adjust, compensating for background environmental conditions such as dust, temperature, and pressure. Periodically, the sensing element real-time analog value shall be compared against its reference value. The detector shall provide a maintenance alert signal that 80% to 99% compensation has been used. The detector shall provide a dirty fault signal that 100% compensation has been used.
    - d. The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced. System shall display an off-normal condition until the proper detector type has been installed or change in the application program profile has been made.

2. Smoke Detector - Multi-Sensor Photo Thermal (Ceiling Mounted)
  - a. Provide analog/addressable multisensor combination photoelectric, thermal smoke detectors for all ceiling mounted locations. Alarm condition shall be based upon the combined input from the photoelectric and thermal detection elements. Separately mounted photoelectric detectors and heat detectors in the same location, clustered at the manufacturer's listed spacing is not an acceptable alternative. The system shall have the ability to set the sensitivity and alarm verification of each individual detector on the circuit. It shall be possible to automatically set the sensitivity of individual analog/addressable detectors for the day and night periods.
  - b. Each smoke detector shall be capable of transmitting alarm signals as well as normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds approximately six times an hour. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 80% and 100% of the allowable environmental compensation value.
  - c. Basis of Design: Edwards model SIGA-PHD.
3. Smoke Detector - Photoelectric (Duct Mounted)
  - a. Provide analog/addressable photoelectric smoke detectors at all duct applications. The system shall have the ability to set the sensitivity and alarm verification of each of the individual detectors on the circuit. It shall be possible to automatically change the sensitivity of individual analog/addressable detectors for the day and night periods. Each smoke detector shall be capable of transmitting alarm signals as well as normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds approximately six times an hour. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 80% and 100% of the allowable environmental compensation value.
  - b. Provide key operated "normal-reset-test" switch at each duct smoke detector.
  - c. Basis of Design: Edwards model SIGA-PD.
4. Duct Detector Housing
  - a. Provide smoke detector duct housing assemblies to mount an analog/addressable detector along with a standard, relay or isolator detector mounting base. The housing shall also protect the measuring chamber from damage and insects. The housing shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. Drilling templates and gaskets to facilitate locating and mounting the housing shall also be provided. The housing shall be finished in baked red enamel. Remote alarm LED indicators and remote test stations shall be provided.
  - b. Basis of Design: Edwards model SIGA-DH.

**B. Heat Detectors**

1. Fixed Temperature Heat Detector (Equipment Rooms)
  - a. Provide analog/addressable fixed temperature heat detectors within all equipment rooms. The heat detector shall have a nominal fixed temperature alarm point rating of 135°F (57°C). The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.
  - b. Basis of Design: Edwards model SIGA-HFD.
2. Fixed Temperature-ROR Heat Detector (Ceiling Mounted)
  - a. Provide analog/addressable combination fixed temperature / rate-of-rise detectors for all ceiling mounted locations. The heat detector shall have a nominal fixed temperature alarm point rating of 135°F (57°C) and a rate of rise alarm point of 15°F (9°C) per minute. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.
  - b. Basis of Design: Edwards model SIGA-HRD.

- c. Equipment rooms containing permanently installed fuel burning appliances and equipment shall be equipped with analog/addressable, combination, fixed temperature heat and carbon monoxide sensors. Sensors shall be equipped with a sounder base and temporal pattern generator for early detection.
  - 1) Basis of Design: Edwards model SIGA-PHCD with SIGA-AB4GT and SIGA-TCDR.

C. Detector Bases

- 1. Detector Base - Standard
  - a. Provide detector mounting base suitable for mounting on single gang, 3½ or 4 inch octagon box or 4 inch square box. The base shall, contain no electronics and support all series detector types.
  - b. Basis of Design: Edwards model SIGA-SB4.
- 2. Detector Base - Relay
  - a. Provide relay detector mounting base suitable for mounting on single gang, 3½ or 4 inch octagon box and 4 inch square box. The relay base shall support all detector types and have the following minimal requirements.
    - 1) The position of the contact shall be supervised.
    - 2) The relay shall automatically de-energize when a detector is removed.
    - 3) The operation of the relay base shall be controlled by its respective detector processor. Detectors operating standalone mode shall operate the relay upon changing to alarm state. Relay bases not controlled by the detector microprocessor shall not be acceptable.
    - 4) Form "C" Relay contacts shall have a minimum rating of 1 amp @ 30 Vdc and be listed for pilot duty.
    - 5) Removal of the respective detector shall not affect communications with other detectors.
  - b. The relay shall be a bi-stable type and selectable for normally open or normally closed operation.
    - 1) The position of the contact shall be supervised.
    - 2) The relay shall automatically de-energize when a detector is removed.
    - 3) The operation of the relay base shall be controlled by its respective detector processor. Detectors operating standalone mode shall operate the relay upon changing to alarm state. Relay bases not controlled by the detector microprocessor shall not be acceptable.
    - 4) Form "C" Relay contacts shall have a minimum rating of 1 amp @ 30 Vdc and be listed for pilot duty.
    - 5) Removal of the respective detector shall not affect communications with other detectors.
- c. Basis of Design: Edwards model SIGA-RB.

D. Manual Stations

- 1. Manual Station - Double Action Single Stage
  - a. Provide analog/addressable double action, single stage fire alarm stations at the locations shown on the drawings. The fire alarm station shall be of polycarbonate construction and incorporate an internal toggle switch. A locked test feature shall be provided. The station shall be finished in red with silver "PULL IN CASE OF FIRE" lettering. The manual station shall be suitable for mounting on 2 ½ (64mm) deep single gang boxes and 1 ½ (38mm) deep 4 square boxes with single gang covers.
  - b. Provide factory manufactured boxes for all surface mounted applications.
  - c. Basis of Design: Edwards model SIGA-278.

E. Notification Appliances

- 1. General
  - a. All appliances which are supplied for the requirements of this specification shall be UL Listed for Fire Protective Service, and shall be capable of providing the "equivalent facilitation" which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA(AG)), and shall be UL 1971 Listed.
  - b. All appliances shall be of the same manufacturer as the fire alarm control panel specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturer's instructions.
  - c. All notification appliances shall be [red][white] unless noted otherwise on the drawings.
- 2. Heavy Duty Horns (Exterior Locations)
  - a. Provide heavy duty electronic horns for exterior locations. Horns shall be selectable for high or low dBA output and steady or temporal output. At the high output setting, the horn shall provide a 85 dBA continuous sound output or a 82 dBA temporal sound output, when

- measured in reverberation room per UL-464. In and out screw terminals shall be provided for wiring. Weatherproof wall boxes shall be provided for outdoor applications.
- b. Basis of Design: Edwards Integrity series.
3. Low Profile Speaker (Interior Locations)
    - a. Provide low profile wall mount speakers within interior locations. The low profile speaker shall not extend more than 1" (2.5cm) past the finished wall surface, and provide a switch selectable audible output of 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464.
    - b. Wattage setting shall be visible with the cover installed. When the cover is installed, no mounting hardware shall be visible. In and out screw terminals shall be provided for all wiring. The low profile speaker shall mount in a 4" x 2 1/8" square electrical box, without trims or extension rings.
    - c. Provide factory manufactured boxes for all surface mounted applications.
    - d. Basis of Design: Edwards Genesis G4 series.
  4. Speaker-Ceiling Mount-8in
    - a. Provide 8" ceiling mounted speakers at the locations shown on the drawings. In and out screw terminals shall be provided for wiring. Speaker baffles shall be round <square> steel with white finish as required. Provide square surface mount boxes with matching finish where required. Speakers shall provide 1/2W, 1W, 2W, and 4W power taps for use with 25V or 70V systems. At the 4 watt setting, the speaker shall provide a 94 dBA sound output a frequency of 1000 Hz. when measured in an anechoic chamber at 10 ft.
    - b. Basis of Design: Edwards Integrity series.
  5. Low Profile Speaker-Strobe
    - a. Provide low profile wall mount speaker/strobes at the locations shown on the drawings. The low profile speaker/strobe shall not extend more than 1" (2.5cm) past the finished wall surface, and provide a switch selectable audible output of 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464.
    - b. Strobes shall provide synchronized flash output that shall be switch selectable for output values of 15cd, 30cd, 75cd & 110cd. Wattage and candela settings shall be visible with the cover installed. When the cover is installed, no mounting hardware shall be visible. In and out screw terminals shall be provided for all wiring. The low profile speaker/strobes shall mount in a 4" x 2 1/8" square electrical box, without trims or extension rings.
    - c. Provide factory manufactured boxes for all surface mounted applications.
    - d. Basis of Design: Edwards Genesis G4 series.
  6. Speaker-Strobe Ceiling Mount-8in
    - a. Provide 8" ceiling mounted speaker/strobes at the locations shown on the drawings. In and out screw terminals shall be provided for wiring. Speaker baffles shall be round or square, steel with white finish as required. Provide square surface mount boxes with matching white finish as required. Speakers shall provide 1/2w, 1w, 2w, and 4W power taps for use with 25V or 70V systems. At the 4 watt setting, the speaker shall provide a 94 dBA sound output a frequency of 1000 Hz. when measured in an anechoic chamber at 10 ft. Strobes shall provide synchronized flash outputs. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 75cd, and 110cd devices.
    - b. Basis of Design: Edwards Integrity series.
  7. Low Profile Strobes
    - a. Provide low profile wall mounted strobes at the locations shown on the drawings. In and out screw terminals shall be provided for wiring. Strobes shall provide synchronized flash outputs. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 60cd, 75cd, or 110cd devices. Low profile strobes shall mount in a single gang box.
    - b. Provide factory manufactured boxes for all surface mounted applications.
    - c. Basis of Design: Edwards Genesis series.

- 8. Strobe Ceiling Mount
  - a. Provide low profile, 7 inch diameter ceiling mounted strobes at the locations shown on the drawings. Devices shall be round and shall not extend more than 1.6 inches past the finished ceiling surface.
  - b. Strobes shall provide synchronized flash outputs. Strobe output shall be from a family of 15cd, 30cd, 75cd, and 110cd devices.
  - c. Low profile ceiling strobes shall mount to a 4 inch square x 2-1/8 inch deep box.
  - d. Basis of Design: Edwards Genesis "GC" series.
- 9. Speaker-Strobe and Speakers Weatherproof
  - a. Provide low profile, weatherproof, wall mounted speaker-strobes or speakers at the exterior locations shown on the drawings.
  - b. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections for speaker with clear fire strobe.
  - c. Rated for outdoor use and wall mounted.
  - d. The weatherproof speaker-strobe or speaker shall mount in a factory supplied back box.
  - e. Strobe lights rated light output shall be 15/30/75/110 CD, field selectable and synchronized.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Individual fire alarm speakers do not provide the speaker coverage or voice intelligibility required within large, open areas with high ambient noise levels. Medium power speaker arrays shall be provided within large workrooms or platforms with ceiling heights exceeding 25' AFF.*  
 \*\*\*\*\*  
Include paragraph 2.4F. below when MPSA clusters are to be utilized.  
 \*\*\*\*\*

- Formatted: NotesToSpecifier
- Formatted: Font: Bold
- Formatted: NotesToSpecifier, Centered
- Formatted: NotesToSpecifier
- Formatted: Font color: Blue

- F. Interior Medium Power Speaker Arrays:
  - 1. Provide UL864 interior medium power speaker arrays MPSA at the locations shown on the drawings.
  - 2. Each MPSA site shall include a local control unit, amplifier, standby batteries, charger, power supply, mounting bracket.
    - a. Sound levels at any location where personnel may be located shall be at least 15dBA above ambient but not exceed 120 dBA when measured on the A-scale of a standard sound level meter at slow response.
  - 3. Speakers and control unit
    - a. 650 Watt Omni-directional MPSA Assembly (5 of 5 Active Panels) with lockable cabinet, 250 Watt amplifiers, amplifier terminal panel(s), universal riser supervisory module(s) and 110V/60 Hz. battery backup.
    - b. Provide MPSA amplifier cabinets and components as indicated on the drawings.
  - 4. The MPSA shall be an Edwards MN-HSMP650G70 series.]

2.5 INITIATION AND CONTROL MODULES

- A. General
  - 1. It shall be possible to address each intelligent module without the use of DIP or rotary switches. Devices using DIP switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller. Modules requiring EPROM, PROM, ROM changes or DIP switch and/or jumper changes shall not be acceptable. The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes which can be retrieved for troubleshooting assistance. Input and output circuit

wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:

- a. Temperature: 32oF to 120oF (0oC to 49oC)
- b. Humidity: 0-93% RH, non-condensing

B. Control Relay Module

1. Provide intelligent control relay modules at the locations shown on the drawings. The Control Relay Module shall provide one form "C" dry relay contact rated at 2 amps @ 24 Vdc to control external appliances or equipment shutdown. The control relay shall be rated for pilot duty and releasing systems. The position of the relay contact shall be confirmed by the system firmware. The control relay module shall be suitable for mounting on 2 ½" (64mm) deep single gang boxes or 1 ½" (38mm) deep 4" square boxes with single gang covers.
2. Basis of Design: Edwards model SIGA-CR.

C. Dual Input Module

1. Provide intelligent dual input modules at the locations shown on the drawings. The Dual Input Module shall provide two (2) supervised Class B input circuits each capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on 2 ½" (64mm) deep single gang boxes or 1 ½" (38mm) deep 4" square boxes with single gang covers. The dual input module shall support the following circuit types:
  - a. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
  - b. Normally-Open Alarm Delayed Latching (Waterflow Switches)
  - c. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
  - d. Normally-Open Active Latching (Supervisory, Tamper Switches)
2. Basis of Design: Edwards model SIGA-CT2.

D. Dual Input Signal Module

1. Provide intelligent dual input signal modules at the locations shown on the drawings. The Dual Input (Dual Riser Select) Signal Module shall provide a means to selectively connect one of two (2) signaling circuit power risers to one (1) supervised output circuit. The module shall be suitable for mounting on 2 ½" (64mm) deep 2-gang boxes or 1 ½" (38mm) deep 4" square boxes with 2-gang covers. The dual input signal module shall support the following operation:
2. Audible/Visible Signal Power Selector (Polarized 24 Vdc @ 2A, 25 Vrms @ 50w or 70 Vrms @ 35w of Audio).
3. Basis of Design: Edwards model SIGA-CC2.

E. Isolator Module

1. Provide intelligent fault isolators modules at the locations shown on the drawings. The Isolator Module shall be capable of isolating and removing a fault from a class A data circuit while allowing the remaining data loop to continue operating. The module shall be suitable for mounting on 2 ½" (64mm) deep 2-gang boxes or 1 ½" (38mm) deep 4" square boxes with 2-gang covers.
2. Basis of Design: Edwards model SIGA-IM.

F. Single Input Module

1. Provide intelligent single input modules at the locations shown on the drawings. The Single Input Module shall provide one (1) supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on 2 ½" (64mm) deep 1-gang boxes or 1 ½" (38mm) deep 4" square boxes with 1-gang covers. The single input module shall support the following circuit types:
  - a. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
  - b. Normally-Open Alarm Delayed Latching (Waterflow Switches)
  - c. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
  - d. Normally-Open Active Latching (Supervisory, Tamper Switches)
2. Basis of Design: Edwards model SIGA-CT1.

G. Single Input Signal Module

1. Provide intelligent single input signal modules at the locations shown on the drawings. The Single Input (Single Riser Select) Signal Module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation. When selected as a telephone power selector, the module shall be capable of generating its own "ring tone". The module shall be suitable for mounting on 2 1/2" (64mm) deep 2-gang boxes or 1 1/2" (38mm) deep 4" square boxes with 2-gang covers. The single input signal module shall support the following operations:
  - a. Audible/Visible Signal Power Selector (Polarized 24 Vdc @ 2A, 25Vrms @50w or 70 Vrms @ 35 Watts of Audio)
2. Basis of Design: Edwards model SIGA-CC1.

H. Suppression System Releasing Module

1. Provide addressable suppression system releasing interface modules at the locations shown on the drawings. The interface shall be suitable for preaction and deluge sprinkler systems and clean extinguishing agent release. The interface shall provide supervised Class B circuits required for solenoid activation, manual release, system abort, and audible and visible notification of pending release. The interface shall provide all required release and abort timing functions. The interface shall be listed for use with solenoid releasing valves that has both ULI listing and FM approval. The solenoid release circuit shall be provided with a manual disconnect switch for system maintenance.
2. Basis of Design: Edwards model SIGA-REL.

I. Universal Class AB Module

1. Provide intelligent class A/B modules at the locations shown on the drawings. The Universal Class A/B Module shall be capable of a minimum of fifteen (15) distinct operations. The module shall be suitable for mounting on 2 1/2" (64mm) deep 2-gang boxes or 1 1/2" (38mm) deep 4" square boxes with 2-gang covers. The universal class A/B module shall support the following circuit types:
  - a. Two (2) supervised Class B Normally-Open Alarm Latching.
  - b. Two (2) supervised Class B Normally-Open Alarm Delayed Latching.
  - c. Two (2) supervised Class B Normally-Open Active Non-Latching.
  - d. Two (2) supervised Class B Normally-Open Active Latching.
  - e. One (1) form "C" dry relay contact rated at 2 amps @ 24 Vdc.
  - f. One (1) supervised Class A Normally-Open Alarm Latching.
  - g. One (1) supervised Class A Normally-Open Alarm Delayed Latching.
  - h. One (1) supervised Class A Normally-Open Active Non-Latching.
  - i. One (1) supervised Class A Normally-Open Active Latching.
  - j. One (1) supervised Class A 2-wire Smoke Alarm Non-Verified.
  - k. One (1) supervised Class B 2-wire Smoke Alarm Non-Verified.
  - l. One (1) supervised Class A 2-wire Smoke Alarm Verified
  - m. One (1) supervised Class B 2-wire Smoke Alarm Verified
  - n. One (1) supervised Class A Signal Circuit, 24Vdc @ 2A.
  - o. One (1) supervised Class B Signal Circuit, 24Vdc @ 2A.
2. Basis of Design: Edwards model SIGA-UM.

2.6 CONDUCTORS

- A. The requirement of this section apply to all system conductors, including all signaling line, initiating device, notification appliance, auxiliary function, remote signaling, AC and DC power and grounding/shield drain circuits, and any other wiring installed by the Contractor pursuant to the requirements of these Specifications.
- B. All circuits shall be rated power limited in accordance with NEC Article 760.
- C. [\[Installed in conduit or enclosed raceway.\]](#)

- D. All new system conductors shall be of the type(s) specified herein.
1. All initiating circuit, signaling line circuit, AC power conductors, shield drain conductors and grounding conductors, shall be solid copper, stranded or bunch tinned (bonded) stranded copper.
  2. All signaling line circuits, including all addressable initiating device circuits shall be 18 AWG minimum multi-conductor jacketed twisted cable or twisted shielded or as per manufacturer's requirements.
  3. All non-addressable initiating device circuits, 24 VDC auxiliary function circuits shall be 18 AWG minimum or per manufacturer's requirements.
  4. All notification appliance circuit conductors shall be solid copper or bunch tinned (bonded) stranded copper. Where stranded conductors are utilized, a maximum of 19 strands shall be permitted for #12/AWG and larger conductors. Minimum size conductor shall be #12 AWG.
  5. All audible notification appliance circuits shall be 14 AWG minimum twisted pairs or twisted pairs shielded or per manufacturer's requirements.
  6. All visual notification appliance circuits shall be #12 AWG minimum THHN or twisted pairs or twisted shielded pairs or per manufacturer's requirements.
  7. Color code fire alarm conductors as follows:

<u>ITEM</u>	<u>COLOR</u>
Initiating Device	Orange/Brown
<u>Speakers</u>	<u>Red</u>
Horn (Exterior)	Blue and Yellow
Flashing Lights	Blue and Yellow
Control Panel Power	[Black,] White and Green
Air Handler Shutdown	Purple
Door Holders	White

8. All conductors shall be terminated with crimp type, open end, space lugs using tool approved by lug manufacturer. Terminal cabinets shall be provided with screw type terminal strips and plywood backboards.

2.7 CONDUCTORS [AND RACEWAY]

- A. Except as otherwise required by Code and/or these Specifications, the installation of all system circuits shall conform to the requirements of Article 760 and raceway installation to the applicable sections of NFPA 70, National Electrical Code. Fire alarm circuit wiring shall include all circuits described in Section 760.1 including Fine Print Note No. 1 (FPN No. 1), and as defined by the manufacturer's UL listing.
- B. The entire system shall be installed in a skillful manner in accordance with approved manufacturer's installation manuals, shop drawings and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type required by the NEC and approved by local authorities having jurisdiction for the purpose.
- C. Any shorts, opens, or grounds found on new or existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.
- D. The contractor shall neatly tie-wrap all field-wiring conductors in the gutter spaces of the control panels and secure the wiring away from all circuit boards and control equipment components. All field-wiring circuits shall be neatly and legibly labeled in the control panel. No wiring except home runs from life safety system circuits and system power supply circuits shall be permitted in the control panel enclosures. No wiring splices shall be permitted in a control panel enclosure.
- E. All penetration of floor slabs and firewalls shall be fire stopped in accordance with all local fire codes.



2.8 [OPEN CABLE

- A. Power-limited cable in accordance with NEC Article 760, where used, not installed in UL listed metal conduit or raceway shall be mechanically protected by building construction features:
- B. Installation shall be in areas not subjected to mechanical injury.
- C. All circuits shall be supported by the building structure. Cable shall be attached by straps to the building structure at intervals not greater than 10 feet. Wiring installed above drop ceilings, cable shall not be laid on ceiling tiles. Cable shall not be fastened in a manner that puts tension on the cable.
- D. Cable type shall be FPLP, FPLR or FPL, or permitted substitutions, selected for the installation application as required by NEC 70, Section 760-61.
- E. All cable that is not enclosed by conduit shall be supported and anchored with nylon straps or clamps. The use of staples is prohibited.]

2.9 [CONDUIT RACEWAY

- A. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems maybe installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.
- B. The requirements of this section apply to all system conduits, raceways, electrical enclosures, junction boxes, pull boxes and device back boxes.
- C. All system conduits shall be of the sizes and types specified.
- D. All system conduits shall be EMT, 3/4 -inch minimum, except for flexible metallic conduit used for whips to devices only, maximum length 6 feet, 3/4-inch diameter, minimum.
- E. All system conduits, which are installed in areas, which may be subject to physical damage or weather, shall be IMC or rigid steel, 3/4 -inch minimum.
- F. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40%.
- G. All fire alarm conduit systems shall be routed and installed to minimize the potential for physical, mechanical or by fire damage, and so as not to interfere with existing building systems, facilities or equipment, and to facilitate service and minimize maintenance.
- H. All conduits, except flexible conduit whips to devices, shall be solidly attached to building structural members, ceiling slabs or permanent walls. Conduits shall not be attached to existing conduit, duct work, cable trays, other ceiling equipment, drop ceiling hangers/grids or partition walls, except where necessary to connect to initiating, notification, or auxiliary function devices.
- I. All system conduits, junction boxes, pull boxes, terminal cabinets, electrical enclosures and device back boxes shall be readily accessible for inspection, testing, service and maintenance.
- J. All electrical junction boxes shall be labeled "Fire Alarm System" with decal or other approved markings and shall be painted "red".]

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION

- A. General
  - 1. All equipment shall be attached to walls and ceiling/floor assemblies and shall be mounted firmly in place. Detectors shall not be supported solely by suspended ceilings. Fasteners and supports shall be sized to support the required load.
- B. Installation Sequence
  - 1. Installation of the systems shall be conducted in stages and phased such that circuits and equipment are installed in the following order:
    - a. Riser conduits, AC power conduits and control cabinets.
    - b. Control panel(s), control component(s), remote annunciator(s), and printer(s).
    - c. **[Conduits and]** wiring for complete notification circuits and appliance installation throughout facility.
    - d. Pre-test the audible and visual notification appliance circuits.
    - e. Install all new detection devices.
    - f. Terminate between field devices and the associated control equipment.
    - g. Complete the interface to all suppression and ancillary shutdown systems.
    - h. Complete contractor pre-test of system.
    - i. Complete system testing
- C. Detectors:
  - 1. A unique identification number shall be assigned to each detector. (Identification shall be by zone number and device number within the zone.) This number shall be noted on the submittals and as built plans, and also be permanently mounted adjacent to the detector or affixed to its base.
  - 2. Smoke- or Heat-Detector Spacing:
    - a. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
    - b. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
    - c. Smooth ceiling spacing shall not exceed 30 feet (9 m).
    - d. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A or Appendix B in NFPA 72.
    - e. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.

- f. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture.
  - 3. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
  - 4. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
  - 5. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- D. Install products in accordance with NFPA standards and manufacturer's published instructions.
  - E. Install manual station with operating handle 44 inches (1.12 m) above floor. Install audible and visual signal devices in accordance with NFPA 72 and ANSI/UL 1971.
  - F. End-of-line resistor device at the last easily accessible mount device or separate box adjacent to last device.
  - G. Flush mount outlet box for electric door holder to withstand 80 pounds pulling force.
  - H. Make wiring connections to [door release devices,] [sprinkler flow switches,] [sprinkler valve tamper switches,] [fire suppression system control panels,] and all other devices.
  - I. Surge suppression shall be provided for all 120 Volt fire alarm equipment and all low voltage wiring exiting or exterior of the facility.

### 3.3 CONNECTIONS

- A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet (1m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
  - 1. Alarm-initiating connection to elevator recall system and components.
  - 2. Supervisory connections at sprinkler valve supervisory switches.
  - 3. [Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.]
  - 4. Supervisory connections at elevator shunt trip breaker.
  - 5. Supervisory connections at fire-pump controllers.
  - 6. [Supervisory connections at automatic transfer switch.]
  - 7. Supervisory connects at mail processing equipment shutdown relay.

Formatted: Font color: Blue

Formatted: Font color: Blue

### 3.4 PREPARATION

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

### 3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Manufacturer's Field Services: Provide services of NICET certified Level III technician to supervise installation, adjustments, final connections, and system testing. Submit written certification on manufacturers letterhead to Contracting Officer/USPS Project Manager that system has been installed in accordance with applicable codes and is functioning properly. Provide copy of "Certificate of Completion" and place inside plastic envelope at Fire Alarm Control Panel.

- C. Tests and Inspections: The contractor shall perform all testing in occupied facilities at times of day that present the lowest impact and disruption to business and activities. Coordinate all testing in occupied buildings with the building owner's representative to assure that fire alarm system testing does not interrupt operations. This may require extensive after hours work to perform such testing.
- D. Visual Inspection:
  - 1. Conduct visual inspection prior to testing.
    - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
    - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
  - 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
  - 3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72. The systems operation matrix created by the equipment supplier shall be used to identify each alarm input and verify all associated output functions.
- E. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.
- G. Advise Plant, Engineer and authorities having jurisdiction in advance of dates and times that tests are to be performed on fire alarm systems.
- H. The system test plan shall include but not be limited to the following:
  - 1. Visually inspect all wiring.
  - 2. Verify the absence of unwanted voltages between circuit conductors and ground. The tests shall be accomplished at the preliminary test with results available at the final acceptance test.
  - 3. System wiring shall be tested to demonstrate correct system response for the following conditions:
    - a. Open, shorted and grounded signal line circuits.
    - b. Open, shorted and grounded notification appliance circuits.
  - 4. System indications shall be demonstrated as follows:
    - a. Correct message content for each alarm input at all system displays.
    - b. Correct annunciator light for each alarm input at each graphic display.
    - c. Correct history logging for all system activity.
    - d. Correct sensitivity for all smoke detection devices. The use of system generated sensitivity reports is acceptable in meeting this requirement.
    - e. Correct signals sent to the Central Monitoring Station.
  - 5. Notification appliances shall be demonstrated as follows:
    - a. All alarm notification appliances actuate as programmed
    - b. The system shall be tested for interior building audibility of 15 dBA-fast over ambient condition.
    - c. MPSA's shall be tested for an outside audibility level of 15 dBA-fast over ambient condition and intelligibility. Intelligibility shall be tested to ensure Common Intelligibility Standard (CIS) rating of 0.7 or Sound Transmission Index of 0.5 in outdoor areas during normal weather conditions. Intelligibility may be less than 0.7 CIS in areas of the zone if it can be determined that a voice signal is being broadcast and an individual could walk less than 164 feet to find a location in the zone with at least 0.7 CIS. Values of 0.65 through 0.74 shall be rounded to 0.7. The mean value of at least 3 readings shall be required to compute the intelligibility score at each test location.

Formatted: Font color: Blue

- d. For 24VDC NACS, measure and record the voltage at the most remote appliance on each notification appliance circuit, while operating.
  - 6. System control functions shall be demonstrated as follows: In accordance with the system operation matrix.
  - 7. [System off premises reporting functions shall be demonstrated as follows: Correct information received for each "Contact ID – Point Address" alarm and trouble event.]
  - 8. Secondary power supply (battery) capacity capabilities shall be demonstrated as follows, if all ACU/FACPs and associated booster power supplies are not connected to an emergency power circuit that is supported by an on-site generator:
    - a. System battery voltages and charging currents shall be measured and recorded at the fire alarm control panels.
    - b. System primary power shall be disconnected for 24 hours. At the end of that period, an alarm condition shall be created and the system shall perform as specified for a period of 5 minutes.
    - c. System primary power shall be restored for forty-eight (48) hours.
    - d. System battery voltages and charging currents shall again be measured and recorded at the fire alarm control panels.
  - 9. Verify the "As Built" record drawings are accurate.
- I. Preliminary Testing: Conduct preliminary tests to ensure that all devices and circuits are functioning properly. Tests shall meet the requirements of the written test plan. Correct any deficiencies, omissions or anomalies and retest the affected devices to assure proper function per the specification.
- J. Acceptance Testing:
- 1. A final acceptance test shall not be scheduled until the system manuals are provided to and approved by the owner and the following are provided at the job site:
    - a. (1) "As Built" Record drawings of the system as actually installed
    - b. (2) A copy of the system operation matrix.
  - 2. The acceptance inspector shall use the system "As Built" record drawings in combination with the system operation matrix and the written acceptance test plan during the testing to verify system operation.
  - 3. Should the system not perform to the above criteria it shall not be accepted and the Contractor shall correct all deficiencies and shall re-test the system at Contractor's expense in the presence of the Architect using the same test criteria.
  - 4. The building owner's representative shall witness the final tests.
  - 5. [The central station monitoring company, station and/or fire department shall be notified before final test in accordance with local requirements.]
  - 6. Operate every installed device to verify proper operation and correct annunciation at control panel.
  - 7. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
- K. Test Reports:
- 1. A "Fire Alarm System Record of Completion" per the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in shall be prepared by the Contractor. Submit three (3) copies to the Architect. The report shall include, but not be limited to:
    - a. A list of all equipment installed and wired.
    - b. Certification that all equipment is properly installed and functions and conforms to these specifications.
    - c. Sensitivity settings for each ionization and photoelectric detector as measured in place with the HVAC system operating.
    - d. Technician's name, certificate number and date.

Formatted: Font color: Blue

Formatted: Font color: Blue

3.6 WARRANTY AND MAINTENANCE

- A. Warranty: The contractor shall warranty all materials, installation and workmanship for [24 months][36 months] year from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with close-out documentation and included with the operation and installation manuals. The full cost of maintenance labor and materials required to correct any defect during the warranty period shall be included in the submitted bid.

\*\*\*\*\*  
**NOTE TO SPECIFIER**  
*Remote central station monitoring is required for MPF's not occupied 24/7 or those equipped with FACP's that are not "constantly attended". Include paragraph 3.6B. below for these MPF's.*  
 \*\*\*\*\*

- B. Remote monitoring: The contractor shall provide the cost of furnishing the 1<sup>st</sup> year of monitoring service from the chosen remote central station monitoring company. The cost of monitoring after the initial first year shall be borne by the USPS.

Formatted: NotesToSpecifier  
 Formatted: Font: Bold  
 Formatted: NotesToSpecifier, Centered  
 Formatted: NotesToSpecifier  
 Formatted: Superscript  
 Formatted: 3

3.7 TRAINING

- A. The System Supplier shall schedule and present a minimum of [four (4)] hours of documented formalized instruction for the building owner, detailing the proper operation of the installed System.
- B. The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.
- C. The instruction shall cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer.
- D. Instruction shall be made available to the Local Municipal Fire Department if requested by the AHJPublic Authority.

END OF SECTION

USPS Mail Processing Facility Specifications issued: 10/1/2017<sup>8</sup>  
 Last revised: 9/6/2017/118/2018