



E-MAILED/MAILED

TO: All Vendors
Tywana Scott, Quality Assurance Analyst
Herbert Judon, Jr., Augusta Regional Airport

FROM: Geri Sams *Geri Sams*
Procurement Director *GS*

DATE: September 11, 2024

SUBJ: **Clarifications to the Specifications and Responses to Vendor's Questions**

BID ITEM: **Bid Item #24-224 Security Camera Improvement for Augusta, GA - Augusta Regional Airport**

BID OPENING DATE: Friday, September 20, 2024 @ 11:00 a.m.

ADDENDUM NO. 1

This Addendum shall form a part of the referenced Bid Item #24-224 Security Camera Improvement and any agreement entered into in connection therewith equally as if bound into the original document. Acknowledge receipt of all Addendums on Attachment "B" within the Specifications package.

Clarifications to the Specifications:

When you are instructed to **ADD, DELETE, or MAKE CHANGES** to a **BID ITEM PAGE OR PAGES**, these additions, deletions, or changes **MUST** be made on the bid item pages you submit with your bidding proposal, whether handwritten or computer generated.

Changes to other pages:

When you are instructed to **DELETE** something which is **NOT** on a Bid Item Page, you may line through the text diagonally and/or print or write the word "**DELETE**" on the text being deleted. Physically removing the page(s) is not necessary.

When you are instructed to **ADD A NON-BID ITEM PAGE(S), OR PORTIONS THEREOF**, you **MUST CONSIDER** it/them in developing your bid, but the physical insertion of the new page(s) into the proposal is not necessary.

Project Manual Changes/Clarifications:

1. **Specification 271323: Add Item C. under section 1.8 Quality Assurance to update Installer Qualifications. Delete and replace Specification 271323 with Specification 271323- attached to this Addendum 1.**
2. **Specification 271513: Add Item C. under section 1.8 Quality Assurance to update Installer Qualifications. Delete and replace Specification 271513 with Specification 271513- attached to this Addendum 1.**
3. **Specification 282000: Add section 2.7 Camera Poles and 3.5 Camera Pole Installation. Delete and replace Specification 282000 with Specification 282000-attached to this Addendum 1.**

Room 605 - 535 Telfair Street, Augusta Georgia 30901
(706) 821-2422 - Fax (706) 821-2811

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Response to Questions:

1. Question: The bid spec literature lists the Head End of the System as an Extension of their existing ExacqVision VMS System. Our question is since it is listed as an extension, will the only Bids that will be accepted be for the ExacqVision Brand?
Response: Yes, the intent of the project is to update and expand the existing Exacqvision VMS, therefore only ExacqVision VMS solutions are acceptable for the Head End equipment.
2. Question: Or will another Brand of System meeting or exceeding the Specs be accepted, such as Pelco, Avigilon, Or Milestone?
Response: No other VMS will be accepted.
3. Question: Is this just an addition to the existing VMS, or will it be a complete replacement of the entire VMS?
Response: The project will consist of an upgrade and expansion of the existing VMS.
4. Question: On the Camera Specs will other brands outside Axis Branded Cameras be accepted?
Response: Camera brands are open to any manufacturer that meets the specifications.
5. Question: If other brands for either portion of the VMS System and Camera hardware be accepted, does the Airport have a preference to those remaining ExacqVision and Axis?
Response: ExacqVision is required. No preference will be given for Axis Cameras.
6. Question: Are equal camera manufactures allowed?
Response: Yes, equal manufacturers are allowed.
7. Question: Will our installers be able to get badged or is it by escort only?
Response: Installers will be able to be badged. Coordinate all badging requirements with Augusta Regional Airport. Any costs associated with badging shall be at the contractor's expense.
8. Question: Is there a cable manufacturer standard that is implemented? If so, what brand?
Response: No specific cable manufacturer is required. Cable must meet standards as outlined in 271513 attached to this Addendum 1.
9. Question: What are the authorized working hours?
Response: Please refer to the plans and specifications and coordinate with Augusta Regional Airport.
10. Question: Are camera poles and concrete handled by the security installer?
Response: The project is responsible for the camera poles and concrete. The winning contractor is responsible to provide a subcontractor qualified to install all components necessary to provide the system and infrastructure as defined in the drawings and specifications.
11. Question: Can the IDF closets be marked on the drawings?
Response: All Comm Room locations are currently marked on the drawings.
12. Question: All network switches are existing, correct? Including enough for the new cameras or do we supply for the addition? If we supply, what brand is standard for your facility?
Response: Unless specifically noted, i.e. the Electrical Vault, network switches are provided by owner. Network switch specifications are noted in 282000 attached to this Addendum 1.
13. Question: In Section 271523-2 – 1.8 Quality Assurance, A. 2. it is written that a Level 2 Installer shall be present at all times when Work of this Section is performed at Project site. Also, A. 3. States that the Testing Supervisor shall be a BICSI certified RCDD. Are both of these conditions mandatory else a company is unqualified to bid? If so, should it be assumed the winning bidder will comply with these requirements at all times?
Response: In lieu of BICSI certification, contractor may be an active participant and certified in Installers Program operated by Manufacturer of Cabling or Termination

Components used. Contractor shall be a participant in this program at time of Bidding and remain so throughout project.

14. Question: What are the anticipated working hours for the project?
Response: Please refer to the plans and specifications and coordinate with Augusta Regional Airport.
15. Question: Does ARA require that all cameras be NDAA compliant?
Response: Yes, all cameras shall be NDAA compliant on a federally funded project.
16. Question: Will rack space be provided for each IDF for patch panels and network switches?
Response: It is anticipated that there is sufficient space for any additional patch panels and network switches required for the project.
17. Question: If ARA will be providing switches will the switches be able to provide P OE++ power?
Response: The current model that the ARA provided for the security system switch is the Cisco Catalyst 9300 2400 POE+.
18. Question: Who will be responsible for providing patch panels, patch cables, and pathways?
Response: The project is responsible for the patch panels, patch cables, and pathways. The winning contractor is responsible to provide a subcontractor qualified to install all components necessary to provide the system and infrastructure as defined in the drawings and specifications.
19. Question: Is ARA providing all UPS rack power at each IDF location to maintain power to the camera switches?
Response: Yes, UPS rack power is existing at all existing IDF locations.
20. Question: Does ARA expect full coverage of:
 - interior areas to include all hallways, admin office, cafeterias, and backage area?
 - exterior areas to include dumpsters, parking lot, entrances and exits, terminal exterior?**Response: Coverage requirements are noted under Note 2 of T-601 and should be coordinated with Marshall's office. Provide camera quantities as shown on drawings.**
21. Question: Can any existing camera network cables be repurposed for new cameras?
Response: Yes, per General Note 2 on Demolition drawings and the Notes provided on the T-601 Schedules existing pathway and cabling to be re-used wherever possible.
22. Question: Who will provide power and Internet to the areas on the RFP that do not currently have internet and power (parking lot poles)
Response: The project is responsible for the required power and communications infrastructure at the camera poles. The winning contractor is responsible to provide a subcontractor qualified to install all components necessary to provide the system and infrastructure as defined in the drawings and specifications.
23. Question: What is the minimum warranty of service or product expectations?
Response: Warranty requirements are included in the specifications section of each product.
24. Question: What is the Allocated Budget for this Project?
Response: Allocated budget will not be released.
25. Question: Would you consider a demo of our solution before the RFP is due?
Response: There will not be time allowed for demonstrations prior to the BID being due.
26. Question: Is there available fiber connection in between buildings?
Response: With the exception of the Parking booth and East Runway locations, fiber connection is available between the airport buildings and the terminal building.
27. Question: Can you provide additional information regarding the mobile users (i.e. anticipated concurrent users)?

Response: The airport is not currently using this feature.

28. Question: Will constant accessible power be available at the poles?

Response: Cameras are expected to be powered via power over ethernet. Please refer to the one-line diagram on T-701 for camera locations that exceed 300' requirements.

29. Question: Can poles be used to mount cameras? Can specs on poles be provided?

Response: Yes, poles will be required for parking lot cameras to be mounted to. Please see attached revised Specification 282000 Part 2.7 Camera Poles for pole specification and 3.5 Camera Pole Installation attached to this Addendum 1.

30. Question: Will the integrator be responsible for removing the existing cameras and cable?

Response: Yes, integrator is responsible for the coordination and removal of the existing cameras. Existing cable to re-used wherever possible.

Please acknowledge addendum in your submittal

END OF ADDENDUM

**ATTACHMENTS: REVISED SECTION 271323 (10 PAGES)
 REVISED SECTION 271513 (14 PAGES)
 REVISED SECTION 282000 (23 PAGES)**

SECTION 271323 - COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. 9/125 micrometer single-mode, indoor-outdoor optical fiber cable (OS2).
 - 2. 9/125 micrometer single-mode, inside plant optical fiber cable (OS1).
 - 3. Optical fiber cable connecting hardware, patch panels, and cross-connects.
 - 4. Cabling identification products.

1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- C. RCDD: Registered Communications Distribution Designer.

1.4 OPTICAL FIBER BACKBONE CABLING DESCRIPTION

- A. Optical fiber backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Reviewed and stamped by RCDD.
 - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
 - 2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling.
 - 3. Cabling administration drawings and printouts.
 - 4. Wiring diagrams to show typical wiring schematics including the following:

- a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications system access points.
 - d. Telecommunications grounding system.
 - e. Cross-connects.
 - f. Patch panels.
 - g. Patch cords.
5. Cross-connects and patch panels. Detail mounting assemblies and show elevations and physical relationship between the installed components.
- C. Optical fiber cable testing plan.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Product Certificates: For each type of product.
- D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For optical fiber cable, splices, and connectors to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
 - 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: Testing agency must have personnel certified by BICSI on staff.
- C. In lieu of BICSI certification, contractor may be an active participant and certified in Installers Program operated by Manufacturer of Cabling or Termination Components used. Contractor shall be a participant in this program at time of Bidding and remain so throughout project.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.

1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
2. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.11 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Backbone cabling system shall comply with transmission standards in TIA-568.1-E, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.
- C. Grounding: Comply with TIA-607-D.

2.2 9/125 MICROMETER, SINGLE-MODE, INDOOR-OUTDOOR OPTICAL FIBER CABLE (OS2)

- A. Description: Single mode, 9/125-micrometer, 24 fibers, stranded loose tube, armored optical fiber cable.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. Berk-Tek Leviton; a Nexans/Leviton alliance.
 2. CommScope, Inc.
 3. Superior Essex Inc.
- C. Standards:
 1. Comply with TIA-492CAAB for detailed specifications.
 2. Comply with TIA-568.3-D for performance specifications.
 3. Comply with ICEA S-104-696 for mechanical properties.
- D. Armored cable shall be aluminum armored type.

- E. Maximum Attenuation: 0.5 dB/km at 1310 nm; 0.5 dB/km at 1550 nm.
- F. Jacket:
 - 1. Jacket Color: Yellow.
 - 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 - 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.
- G. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1. Plenum Rated, Armored (Conductive): Type OFCP or Type OFNP in listed plenum communications raceway.

2.3 9/125 MICROMETER, SINGLE-MODE, INSIDE PLANT OPTICAL FIBER CABLE (OS1)

- A. Description: Single mode, 9/125-micrometer, 6 fibers, tight buffered, optical fiber cable.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. CommScope, Inc.
 - 2. Corning Cable Systems.
 - 3. Superior Essex Inc.
- C. Standards:
 - 1. Comply with TIA-492CAAA for detailed specifications.
 - 2. Comply with TIA-568.3-D for performance specifications.
 - 3. Comply with ICEA S-83-596 for mechanical properties.
- D. Conductive cable shall be aluminum armored type.
- E. Maximum Attenuation: 1.0 dB/km at 1310 nm; 1.0 dB/km at 1550 nm.
- F. Jacket:
 - 1. Jacket Color: Yellow.
 - 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 - 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.
- G. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1. Plenum Rated, Nonconductive: Type OFNP in listed plenum communications raceway.

2.4 OPTICAL FIBER CABLE HARDWARE

- A. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Corning Cable Systems.
 2. Hubbell Premise Wiring; Hubbell Incorporated, Commercial and Industrial.
 3. Panduit.
- B. **Standards:**
1. Comply with Fiber Optic Connector Intermateability Standard (FOCIS) specifications of the TIA-604 series.
 2. Comply with TIA-568.3-D.
- C. **Cross-Connects and Patch Panels:** Modular panels housing multiple-numbered, duplex cable connectors.
1. **Number of Connectors per Field:** One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.
- D. **Connector Type:** Type LC complying with TIA-604-10-B, connectors.
- E. **Plugs and Plug Assemblies:**
1. **Male:** color-coded modular telecommunications connector designed for termination of a single optical fiber cable.
 2. Insertion loss not more than 0.75 dB.
 3. Marked to indicate transmission performance.
- F. **Jacks and Jack Assemblies:**
1. **Female;** quick-connect, simplex and duplex; fixed telecommunications connector designed for termination of a single optical fiber cable.
 2. Insertion loss not more than 0.75 dB.
 3. Marked to indicate transmission performance.
 4. Designed to snap-in to a patch panel or faceplate.

2.5 GROUNDING

- A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.
- B. Comply with TIA-607-D.

2.6 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-C and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test optical fiber cable assemblies according to TIA-526-7 and TIA-568.3-D.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 – EXECUTION

3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays. Conceal raceway and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for pathways specified in Section 270528 "Pathways for Communications Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

- A. Comply with NECA 1, NECA 301, and NECA/BICSI 568.
- B. General Requirements for Optical Fiber Cabling Installation:
 - 1. Comply with TIA-568.1-E and TIA-568.3-D.
 - 2. Terminate all cables; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - 3. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 4. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
 - 5. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cable Installation" Chapter. Use lacing bars and distribution spools.
 - 6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
8. In the communications equipment room, provide a 10-foot-long service loop on each end of cable.
9. Pulling Cable: Comply with BICSI ITSIMM, Chapter, "Cable Installation." Monitor cable pull tensions.
10. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

3.3 FIRESTOPPING

- A. Comply with TIA-569-E, Annex A, "Firestopping."
- B. Comply with BICSI ITSIMM, "Firestopping Practices" Chapter.

3.4 GROUNDING

- A. Install grounding according to BICSI ITSIMM, "Bonding, and Grounding (Earthing) and Electrical Protection" Chapter.
- B. Comply with TIA-607-D and NECA/BICSI-607.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.5 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-C. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."
 1. Administration Class: Class 3.
 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- B. Paint and label colors for equipment identification shall comply with TIA-606-C for Class 3 level of administration.

- C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
- E. Cable and Wire Identification:
 - 1. Label each cable within 6 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
 - 4. Label each unit and field within distribution racks and frames.
 - 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- F. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606-C, for the following:
 - 1. Flexible vinyl or polyester that flexes as cables are bent.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections.
- E. Tests and Inspections:
 - 1. Visually inspect optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments and inspect cabling connections for compliance with TIA-568.1-E.

2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Optical Fiber Cable Tests:
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568.1-E. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - b. Test instrument shall have been factory calibrated within one year of test date.
 - c. Link End-to-End Attenuation Tests:
 - 1) Single Mode backbone link measurements: Test at 1310 or 1550 nm in one direction according to TIA-526-7, Method A.2, One Reference Jumper.
 - 2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than those calculated according to equation in TIA-568.1-E.
 - d. OTDR
 - 1) Document all fibers - even those that are left un-terminated (if applicable) - in both directions of transmission using an Optical Time Domain Reflectometer (OTDR).
 - a) Test single-mode fibers at 1310 nm (nominal) and 1550 nm.
 - 2) OTDR(s) used in testing shall incorporate high-resolution optics optimized for viewing of short cable sections. Set Pulse Width to shortest width usable and still obtain clean trace.
 - 3) Use jumpers of adequate length at both ends of cable under test to allow viewing of the entire length of the cable, including the connectors at the launch and tail end.
 - 4) OTDR traces revealing a point discontinuity greater than 0.2 dB in a multi-mode fiber, or 0.1 dB in a single mode fiber at any of the tested wavelengths or any discontinuity showing a reflection at that point shall be a basis for rejection of that fiber by the Owner. The installation of that cable shall be reviewed in an effort to remove any external stress that may be causing the fault. If such efforts do not remove the fault, that cable and the associated terminations shall be replaced at the expense of the contractor.
 - 5) Submitted traces should document connector Reflectance performance as meeting the specified criteria for the connector type(s) installed.

F. Data for each measurement shall be documented as follows:

1. In the native format of the test instrument.
2. In a summary report to include a list of all fibers and the corresponding attenuation. The summary shall be in Adobe Acrobat (.pdf) format.

G. Remove and replace cabling where test results indicate that it does not comply with specified requirements.

H. End-to-end cabling will be considered defective if it does not pass tests and inspections.

I. Prepare test and inspection reports.

3.7 WARRANTY

- A. See Division 1, GENERAL CONDITIONS, and GENERAL REQUIREMENTS - Guarantee Documents for general requirements.
- B. Minimum Warranty period for Fiber Optic Cable System sub-systems shall be as follows:
 - 1. Fiber Optic Backbone – 2 years. Cabling and Connecting Components shall carry a 15 year manufacturer's component warranty.
- C. Warranties shall include all labor, material, and travel time.
- D. Provide Warranty Certification of the Backbone Fiber Optic Link from the manufacturer(s) of cabling and connecting components as part of system documentation.

END OF SECTION 271323

SECTION 271513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Category 6 twisted pair cable.
2. Category 6A twisted pair cable.
3. Twisted pair cable hardware, including plugs and jacks.
4. Cabling identification products.
5. Grounding provisions for twisted pair cable.
6. Source quality control requirements for twisted pair cable.

1.3 DEFINITIONS

- A. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- B. EMI: Electromagnetic interference.
- C. FTP: Shielded twisted pair.
- D. F/FTP: Overall foil screened cable with foil screened twisted pair.
- E. F/UTP: Overall foil screened cable with unscreened twisted pair.
- F. IDC: Insulation displacement connector.
- G. LAN: Local area network.
- H. Jack: Also commonly called an "outlet," it is the fixed, female connector.
- I. Plug: Also commonly called a "connector," it is the removable, male telecommunications connector.
- J. RCDD: Registered Communications Distribution Designer.
- K. Screen: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- L. Shield: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- M. S/FTP: Overall braid screened cable with foil screened twisted pair.

- N. S/UTP: Overall braid screened cable with unscreened twisted pairs.
- O. UTP: Unscreened (unshielded) twisted pair.

1.4 COPPER HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable cabling system shall provide interconnections between Distributor A, Distributor B, or Distributor C, and the equipment outlet, otherwise known as "Cabling Subsystem 1," in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.
 - 1. TIA-568.1-E requires that a minimum of two equipment outlets be installed for each work area.
 - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
 - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
- B. A work area is approximately 100 sq. ft. and includes the components that extend from the equipment outlets to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Reviewed and stamped by RCDD.
 - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
 - 2. System Labeling Schedules: Electronic copy of labeling schedules
 - 3. Cabling administration Drawings and printouts.
 - 4. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment, including the following:
 - a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications system access points.
 - d. Telecommunications grounding system.
 - e. Telecommunications conductor drop locations.
 - f. Typical telecommunications details.
 - g. Mechanical, electrical, and plumbing systems.
- C. Twisted pair cable testing plan.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer installation supervisor, and field inspector.
- B. Product Certificates: For each type of product.
- C. Source quality-control reports.
- D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field testing program development by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
 - 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: Testing agency must have personnel certified by BICSI on staff.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD.
- C. In lieu of BICSI certification, contractor may be an active participant and certified in Installers Program operated by Manufacturer of Cabling or Termination Components used. Contractor shall be a participant in this program at time of Bidding and remain so throughout project.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568.1-E, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.
- C. Grounding: Comply with TIA-607-D.

2.2 GENERAL CABLE CHARACTERISTICS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:
 - 1. Communications, Plenum Rated: Type CMP complying with UL 1685 or Type CMP in listed plenum communications raceway.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- C. RoHS compliant.

2.3 CATEGORY 6 TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250MHz.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. CommScope, Inc.
 - 2. General Cable; Prysmian Group North America.
 - 3. Panduit.
- C. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568.2-D for Category 6 cables.
- D. Conductors: 100-ohm, 23 AWG solid copper.
- E. Shielding/Screening: Unshielded twisted pairs (UTP).
- F. Cable Rating: Plenum.
- G. Jacket: Blue thermoplastic.

2.4 CATEGORY 6a TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6a cable at frequencies up to 500MHz.

- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Commscope, Inc.
 2. General Cable; Prysmian Group North America.
 3. Panduit.
- C. Standard: Comply with TIA-568.2-D for Category 6a cables.
- D. Conductors: 100-ohm, 23 AWG solid copper.
- E. Shielding/Screening: Shielded twisted pairs (FTP).
- F. Cable Rating: Plenum.
- G. Jacket: White thermoplastic.

2.5 GAMECHANGER TWISTED PAIR CABLE

- A. Description: This cable consists of 4 pair solid bare copper; color-coded high-density polyethylene (HDPE) insulation; water-proof gel, inner and outer FRPE jacket with an aluminum/polyester tape shield with 24AWG tinned copper drain wire in between the two jackets. RoHS-2 Compliant
- B. Manufacturers: Gamechanger OSP Shielded Twisted Pair, CM Rated, P/N 248340804
1. Construction: Solid Bare Copper
 2. Insulation: Ultra Low-loss Dielectric; OD: 0.044" nom
 3. Color Code:
 - a. Pair 1: White/Blue, Blue
 - b. Pair 2: White/Orange, Orange
 - c. Pair 3: White/Green, Green
 - d. Pair 4: White/Brown, Brown
 4. Core Assembly: 4 twisted pairs cabled together and fully flooded with a waterproof gel to form the main core, which is then jacketed with an FRPE inner jacket
 5. Jackets:
 - a. Material: FRPE
 - b. Inner Wall Thickness: 0.025" nom.
 - c. Outer Wall Thickness: 0.025" nom.
 - d. OD: 0.380"nom.
 - e. Color: Black
 - f. Ripcord under jacket
 6. Markings: "PAIGE® GAMECHANGER CABLE™, SHIELDED OSP PATENT NO. 10,453,589 C(UL) CM DIRECT BURIAL ROHS SUN RES"
(Ascending/Descending length marking)

7. Electrical Properties

- a. Conductor Resistance: $\leq 6.35\Omega/100m$
- b. Insulation Resistance: $\geq 5000M\Omega Km$ (DC500V charged 1 min.)
- c. Voltage Endurance: DC 1500V/min
- d. Mutual Capacitance: $\leq 7.0nF/100m$
- e. Core-Core Resistance Unbalance: $\leq 5\%$

8. Temperature Rating: $-20^{\circ}C$ to $+75^{\circ}C$ (installation); $-40^{\circ}C$ to $+75^{\circ}C$ (operating)

9. Power Over Ethernet Support: Class 1-8

2.6 TWISTED PAIR CABLE HARDWARE

A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. CommScope, Inc.
2. Hubbell Premise Wiring; Hubbell Incorporated, Commercial and Industrial.
3. Panduit Corp.

C. General Requirements for Twisted Pair Cable Hardware:

1. Comply with the performance requirements of Category 6 or Category 6a for Wireless Access Points.
2. Comply with TIA-568.2-D, IDC type, with modules designed for punch-down caps or tools.
3. Cables shall be terminated with connecting hardware of same category or higher.

D. Source Limitations: Obtain twisted pair cable hardware from same manufacturer as twisted pair cable, or from a certified partnership that has been in effect for more than 3 years.

E. Connecting Blocks:

1. 110-style IDC for Category 6.
2. Provide blocks for the number of cables terminated on the block, plus 25 percent spare, integral with connector bodies, including plugs and jacks where indicated.

F. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.

1. Number of Terminals per Field: One for each conductor in assigned cables.

G. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.

1. Features:

- a. Universal T568A and T568B wiring labels.
 - b. Labeling areas adjacent to conductors.
 - c. Replaceable connectors.
 - d. 24 or 48 ports.
2. Construction: 16-gauge steel and mountable on 19-inch equipment racks.
 3. Conductor termination range: Compatible with 22-26 AWG solid or stranded cable with conductor insulation diameter of .060 in. max and overall cable outside diameter of .200 to .380 in.
 4. Number of Jacks per Field: One for each four-pair cable indicated.
- H. Plugs and Plug Assemblies:
1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
 2. Standard: Comply with TIA-568.2-D Modular Plug Termination (MPTL) standards
 3. Conductor termination range: Compatible with 22-26 AWG solid or stranded cable with conductor insulation diameter of .060 in. max and overall cable outside diameter of .200 to .380 in.
 4. Marked to indicate transmission performance.
- I. Jacks and Jack Assemblies:
1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
 2. Designed to snap-in to a patch panel or faceplate.
 3. Standard: Comply with TIA-568.2-D.
 4. Conductor termination range: Compatible with 22-26 AWG solid or stranded cable with conductor insulation diameter of .060 in. max and overall cable outside diameter of .200 to .380 in.
 5. Marked to indicate transmission performance.
- J. Faceplate:
1. Four port, vertical single gang faceplates designed to mount to single gang wall boxes.
 2. Plastic Faceplate: High-impact plastic. Coordinate color with existing devices.
 3. Metal Faceplate: Stainless steel.
 4. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.
 - a. Flush mounting jacks
- K. Legend:
1. Machine printed, in the field, using adhesive-tape label.
 2. Snap-in, clear-label covers and machine-printed paper inserts.

2.7 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-C and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.8 GROUNDING

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Comply with TIA-607-D.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test cables on reels according to TIA-568.1-E.
- C. Factory test twisted pair cables according to TIA-568.2-D.
- D. Cable will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

PART 3 – EXECUTION

3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, attics, and gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways and boxes specified in Section 270528 "Pathways for Communications Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

3.2 INSTALLATION OF PATHWAYS

- A. Comply with requirements for demarcation point, cabinets, and racks specified in Section 271100 "Communications Equipment Room Fittings."
- B. Comply with Section 270528 "Pathways for Communications Systems."
- C. Comply with Section 260529 "Hangers and Supports for Electrical Systems."

D. Drawings indicate general arrangement of pathways and fittings.

3.3 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

A. Comply with NECA 1 and NECA/BICSI 568.

B. General Requirements for Cabling:

1. Comply with TIA-568.0-E, TIA-568.1-E, and TIA-568.2-D.
2. Comply with BICSI's "Information Technology Systems Installation Methods Manual (ITSIMM), Ch. "Cable Installation".
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI Information Technology Systems Installation Methods Manual, Ch., "Cable Installation". Use lacing bars and distribution spools.
9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
10. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
11. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
12. Pulling Cable: Comply with BICSI Information Technology Systems Installation Methods Manual, Ch., "Cable Installation".

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend twisted pair cabling, not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Group connecting hardware for cables into separate logical fields.

E. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-E for separating unshielded copper

- communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
 4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 FIRESTOPPING

- A. Comply with TIA-569-E, Annex A, "Firestopping."
- B. Comply with "Firestop Systems" Article in BICSI's "Telecommunications Distribution Methods Manual."

3.5 GROUNDING

- A. Install grounding according to the "Bonding and Grounding (Earthing) and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."
- B. Comply with TIA-607-D and NECA/BICSI-607.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding bus bar. Connect grounding

bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.

- D. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

3.6 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-C. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."

- 1. Administration Class: Class 3.
- 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

- B. Paint and label colors for equipment identification shall comply with TIA-606-C for Class 3 level of administration.

- C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

- D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

- E. Cable and Wire Identification:

- 1. Label each cable within 6 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
- 2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
- 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
- 4. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
 - b. Label each unit and field within distribution racks and frames.
- 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and

data communication cabling, use a different color for jacks and plugs of each service.

- F. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-C requirements for the following:
1. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections.
- E. Tests and Inspections:
1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments and inspect cabling connections for compliance with TIA-568.1-E.
 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 4. Performance Testing:
 - a. Test Performance per ANSI/TIA-568.2-D Permanent Link test configuration and procedures.
 - b. Test using a test instrument designed for use with the installed cable type(s) and specified standards. The instrument shall verify "PASS" on each cable and record the results of all tests, comparing measured values with standards-based limits.
 - c. Test Transmission Performance of Horizontal Cabling to include the following:
 - 1) Length
 - 2) Attenuation (Insertion Loss)
 - 3) Pair-to-Pair NEXT Loss
 - 4) PSNEXT Loss
 - 5) Attenuation-to-Crosstalk Ratio (ACR)
 - 6) Power-sum ACR (PSACR)
 - 7) Propagation Delay

- 8) Delay Skew
- 9) Return Loss

- d. Test instruments shall meet or exceed applicable requirements in TIA-568.2-D. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- e. Test instrument shall be factory calibrated within one year of test date.
- f. The maximum length of horizontal cable Permanent Link shall not exceed 90 meters (295 feet).
- g. Where F/UTP cabling is installed, testing shall include Shield Continuity.
- h. Where a Surge Protector is in place as part of the Horizontal Permanent Link, performance testing shall include the Surge Protector as part of the link.
- i. Program test unit to match Net Propagation Velocity (NPV) of the installed cable type.

5. Test Results shall be:

- a. In the native format of the test instrument (e.g.. flw for Fluke, .sdf for Agilent or Ideal, etc.).
- b. Summarized in a fashion that includes a graphical display of key test parameters. The Summary shall be in Adobe Acrobat (.pdf) format and include all records. Individual .pdf documentation of individual records (e.g. for each horizontal cable) are not required.

6. The cabling must pass all the specified requirements. Conditional passing test results that are within the measurements accuracy of the test equipment (e.g. "*PASS") are not acceptable.

F. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

G. End-to-end cabling will be considered defective if it does not pass tests and inspections.

H. Prepare test and inspection reports.

3.8 WARRANTY

A. See Division 1, GENERAL CONDITIONS, and GENERAL REQUIREMENTS - Guarantee Documents for general requirements.

B. Minimum Warranty period for Structured Cable System sub-systems shall be as follows:

- 1. Horizontal Copper Permanent Link – 15 years. Warranty shall be direct from manufacturer(s) of cabling and connecting components to Owner.

C. Warranties shall include all labor, material, and travel time.

- D. Provide Warranty Certification of the Horizontal Copper Permanent Link from the manufacturer(s) of cabling and connecting components as part of system documentation.

END OF SECTION 271513

SECTION 282000 - VIDEO SURVEILLANCE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes a video surveillance system consisting of cameras, digital video recorder, data transmission wiring, and a control station with its associated equipment.

1.3 DEFINITIONS

- A. AGC: Automatic gain control.
- B. B/W: Black and white.
- C. CCD: Charge-coupled device.
- D. FTP: File transfer protocol.
- E. IP: Internet protocol.
- F. LAN: Local area network.
- G. MPEG: Moving picture experts group.
- H. NTSC: National Television System Committee.
- I. PC: Personal computer.
- J. PTZ: Pan-tilt-zoom.
- K. RAID: Redundant array of independent disks.
- L. TCP: Transmission control protocol - connects hosts on the Internet.
- M. UPS: Uninterruptible power supply.
- N. WAN: Wide area network.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 2. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
 3. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
 4. UPS: Sizing calculations.
 5. Wiring Diagrams: For power, signal, and control wiring.
- C. Design Data: Include an equipment list consisting of every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of preset positions, description of alarms, and description of unit output responses to an alarm.

1.5 QUALITY ASSURANCE

A. Contractor Certification:

1. The Contractor shall be a factory-authorized and trained dealer/integrator of the existing Airport Software House Video Management System and shall be factory-trained and certified to maintain/repair the system after system acceptance.
 - a. This certification must be in good standing and in place at time of Bidding and remain so throughout project.
2. Contractor performing camera installation shall have on the project team at a minimum one (1) Certified Installer trained by the manufacturer(s) of the system installed under this project.
3. Manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, material and services specified for this project for commercial, military or industrial use.

1.6 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Product Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For cameras, power supplies, infrared illuminators, monitors, videotape recorders, digital video recorders, video switches, and control-station components to include in emergency, operation, and maintenance manuals.

1.8 PROJECT CONDITIONS

- A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
2. Interior, Controlled Environment: System components, except central-station control unit, installed in temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph. Use NEMA 250, Type 4 enclosures.
4. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Three (3) years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 SYSTEM REQUIREMENTS

- A. System shall be an extension of Augusta Regional Airport existing Exacqvision Video Surveillance system.
- B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.
 1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
 2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.
- C. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
- B. 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.
- C. Comply with NECA 1.
- D. Comply with NFPA 70.
- E. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.

2.3 VIDEO MANAGEMENT SYSTEM (VMS)

A. Exacqvision Enterprise

- 1. Server
 - a. Expand existing system by providing new primary server.
 - 1) Existing server shall be configured as a back up as part of this project.
 - b. Provide new Rackmount 2U Enterprise Management server:
 - 1) Supports up to 500 ExacqVision Enterprise VMS
 - 2) RAID 6
 - 3) Windows 10 on SSD
 - 4) Dual GB NIC
 - 5) DisplayPort
 - 6) HDMI
 - 7) DVI-D
 - 8) VGA (2 max. simultaneous)
 - 9) Keyboard and mouse
 - 10) ExacqVision Enterprise Manager software pre-installed
 - 11) 3-Year Warranty
 - 12) Manufacturer Part Number: EXACQ EM-04T-2S
- 2. Network Video Recorder
 - a. Provide (4) new Rackmount 4U 324T recorder with 8 IP licenses (128 max)
 - 1) Dual NICs
 - 2) HDMI
 - 3) VGA
 - 4) DisplayPort (3 max. simultaneous)
 - 5) RS-232/485
 - 6) Serial port

- 7) RAID 6
 - 8) Win10 on SSD
 - 9) Redundant power supplies
 - 10) Keyboard and mouse
 - 11) ExacqVision Enterprise client and server software pre-installed,
 - 12) 3 year warranty and 5 year software updates
 - 13) Manufacturer Part Number: EXACQ IP08-324T-R4Z-E
3. Provide licenses as required to expand existing AGS Regional Airport system.
 - a. Existing system currently has capacity for 160 cameras.
 4. Provide all components and programming for a complete and functional system.

2.4 IP CAMERAS

A. Indoor Fixed Camera: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AXIS M4216-LV (Basis of design)
 - a. Description:
 - 1) 4 MP
 - 2) Image sensor: 1/2.7" RGB CMOS progressive scan.
 - 3) Lens: Vari-Focal
 - a) Minimum: 3mm
 - b) Maximum: 6mm
 - 4) Minimum illumination:
 - a) Color: .18 lux at 50 IRE F2.0
 - b) B/W: .03 lux at 50 IRE F2.0
 - 5) Shutter time: 1/10000 s to 1/5 s.
 - 6) Video Compression: H.264, H.265, MJPEG.
 - 7) Resolution (pixels): 2304x1728.
 - 8) Frame rate: 25/30 frames per second (fps).
 - 9) Video Streaming: Multiple, in H.264, H.265 and MJPEG formats.
 - 10) Pan/Tilt/Zoom (PTZ): Digital.
 - b. Audio: None.
 - c. Video Analytics: Camera shall work bidirectionally with Exacqvision system to use camera analytics.
 - 1) Privacy Shield
 - 2) Object Analytics
 - 3) Scene Metadata
 - a) Humans
 - b) Faces
 - c) Vehicles
 - d) License plates
 - e) Color

- 4) Video Motion Detection
- 5) Face Detector
- 6) People Counter
- 7) Queue Monitor

- d. PoE power. Compliant with IEEE 802.3af/802.3at
- e. IR illumination: 850 nm IR LED
- f. Storage: MicroSD onboard.
- g. Operating temp. 32 deg. F to 113 deg. F, with 15 – 100% RH, non-condensing.
- h. Casing: Polycarbonate transparent cover dehumidifying membrane. IP42 rated, IK08 impact-resistant.
- i. Cybersecurity: ETSI EN 303 645 approved
- j. Warranty: 5 year

B. Multi-sensor Cameras: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Axis P3737-PLE (Basis of design)

a. Description

- 1) 20 MP (4x 5MP)
- 2) Image sensor:
 - a) 4x 1/2.7" progressive scan RGB CMOS
- 3) Lens: Varifocal
 - a) Minimum: 3.2 mm
 - b) Maximum: 8.1 mm
- 4) Minimum illumination:
 - a) Color .19 lux
 - b) B/W .06 lux
- 5) Shutter time:
 - a) 1/28000 s to 1/5 s
- 6) Camera Angle Adjustment:
 - a) Pan $\pm 90^\circ$, tilt $+25$ to $+95^\circ$, rotation -5° to $+95^\circ$, twist ± 20
- 7) Video Compression: H.264, H.265, MJPEG.
- 8) Resolution (pixels):
 - a) Overview: 4:3 4x 2592x1944 (4x 5 MP) to 4x 320x240
- 9) Frame rate:
 - a) 5 MP: Up to 20/20 fps (50/60 Hz) in all resolutions
 - b) Quad HD: Up to 25/30 fps (50/60 Hz) in all resolutions
- 10) Pan/Tilt/Zoom (PTZ): Digital, with preset positions.

b. Video Analytics: Camera shall work bidirectionally with Exacqvision system to use camera analytics.

- 1) Privacy Shield

- 2) Object Analytics
 - 3) Scene Metadata
 - a) Humans
 - b) Faces
 - c) Vehicles
 - d) License plates
 - e) Color
 - 4) Video Motion Detection
 - 5) Face Detector
 - 6) People Counter
 - 7) Queue Monitor
- c. Audio:
- 1) None.
- d. PoE power:
- 1) IEEE 802.3at Type 2 Class 4
- e. Storage: microSD/microSDHC/microSDXC slot
- f. Operating temp.: -40 deg. C to 55 deg. C, with 10 – 100% RH, non-condensing.
- g. Casing: Polycarbonate transparent cover with aluminum inner camera module with encapsulated electronics, IK10, IP66 and NEMA-4X rated.
- h. Cybersecurity: ETSI EN 303 645 approved
- i. Warranty: 5 year

C. Exterior Fixed Cameras: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Axis P3268-LVE (Basis of design)
 - a. Description
 - 1) 8 MP
 - 2) Image sensor:
 - a) 1/1.8" RGB CMOS Progressive Scan
 - 3) Lens: Varifocal
 - a) Minimum- 4.3 mm
 - b) Maximum- 8.6 mm
 - 4) Shutter time:
 - a) 1/8500 s to 1/5 s
 - 5) Video Compression: H.264, H.265, MJPEG.
 - 6) Resolution (pixels):
 - a) 3840x2160
 - 7) Frame rate:

- a) 25/30 fps with power line frequency 50/60 Hz
 - 8) Video Streaming: Multiple, in H.264, H.265 and MJPEG formats.
 - 9) Pan/Tilt/Zoom (PTZ): Digital, with preset positions.
 - 10) Audio:
 - a) None
 - b. Video Analytics: Camera shall work bidirectionally with Exacqvision system to use camera analytics.
 - 1) Privacy Shield
 - 2) Object Analytics
 - 3) Scene Metadata
 - a) Humans
 - b) Faces
 - c) Vehicles
 - d) License plates
 - e) Color
 - 4) Video Motion Detection
 - 5) Face Detector
 - 6) People Counter
 - 7) Queue Monitor
 - c. PoE power:
 - 1) 802.3af/802.3at Type 1 Class 3
 - d. IR illumination: 850 nm IR LEDs
 - e. Storage: microSD/microSDHC/microSDXC slot
 - f. Operating temp.: -40 deg. F to 122 deg. F, with 10 – 100% RH, non-condensing.
 - g. Casing: Polycarbonate transparent cover with aluminum inner camera module with encapsulated electronics, IP66, IP67, IK10+ and NEMA-4X rated.
 - h. Cybersecurity: ETSI EN 303 645 approved
 - i. Warranty: 5 year
- D. Exterior Site Cameras: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Axis Q1798-LE (Basis of design)
 - a. Description
 - 1) 10 MP
 - 2) Image sensor:
 - a) 1/1.8" RGB CMOS Progressive Scan
 - 3) Lens:
 - a) Varifocal 12-48 mm
 - 4) Shutter time:

- a) 1/45500 s to 2 s
- 5) Video Compression: H.264, H.265, MJPEG.
- 6) Resolution (pixels):
 - a) 3712x2784 10MP
- 7) Frame rate:
 - a) 4K: 25/30 fps with power line frequency 50/60 Hz
 - b) 10MP: 20 fps with power line frequency 50/60 Hz
- 8) Video Streaming: Multiple, in H.264, H.265 and MJPEG formats.
- 9) Pan/Tilt/Zoom (PTZ): Digital, with preset positions.
- 10) Audio:
 - a) None
- 11) PoE power:
 - a) IEEE 802.3at Type 2 Class 4
- 12) IR illumination: 850 nm IR LEDs
- 13) Storage: SD/SDHC/SDXC card supporting up to 64GB.

b. Video Analytics: Camera shall work bidirectionally with Exacqvision system to use camera analytics.

- 1) Privacy Shield
- 2) Object Analytics
- 3) Scene Metadata
 - a) Humans
 - b) Faces
 - c) Vehicles
 - d) License plates
 - e) Color
- 4) Video Motion Detection
- 5) Face Detector
- 6) People Counter
- 7) Queue Monitor

c. Operating temp.: -40 deg. F to 122 deg. F, with 10 – 100% RH, non-condensing.

- 1) Casing: Polycarbonate transparent cover with aluminum inner camera module with encapsulated electronics, IP66, IP67, IK10+ and NEMA-4X rated.

d. Cybersecurity: ETSI EN 303 645 approved

e. Warranty: 5 year

E. Exterior PTZ Cameras: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Axis Q6135-LE (Basis of design)

- a. Description
- 1) Image sensor: 1/ 2.8" Progressive scan CMOS
 - 2) Lens:
 - a) 4.25- 137.6 mm F1.4-4.0
 - 3) Minimum illumination:
 - a) Color: 0.06 lux at 30 IRE F1.4
 - b) B/W: 0.008 lux at 30 IRE F1.4, 0 lux with IR illumination on
 - c) Color: 0.09 lux at 50 IRE F1.4
 - d) B/W: 0.01 lux at 50 IRE F1.4, 0 lux with IR illumination on
 - 4) Shutter time:
 - a) 1/66500 s to 1 s
 - 5) Video Compression:
 - a) Capable of multiple profiles
 - b) H.264, H.265, MJPEG.
 - 6) Resolution (pixels):
 - a) 1920x1080p
 - 7) Frame rate:
 - a) up to 50/60 fps 1080p HDTV
 - 8) Video Streaming: Multiple, in H.264, H.265 and MJPEG formats.
 - 9) Pan/Tilt/Zoom (PTZ):
 - a) Pan: 360° endless, 0.05°–450°/s
 - b) Tilt: +20 to -90°, 0.05°–450°/s
 - c) Zoom: 32x optical, 12x digital, total 384x zoom
 - d) Nadir-flip, 256 preset positions, tour recording, guard tour, control queue, on-screen directional indicator, set new pan 0°, adjustable zoom speed, speed dry
- b. Video Analytics: Camera shall work bidirectionally with Exacqvision system to use camera analytics.
- 1) Privacy Shield
 - 2) Object Analytics
 - 3) Scene Metadata
 - a) Humans
 - b) Faces
 - c) Vehicles
 - d) License plates
 - e) Color
 - 4) Video Motion Detection
 - 5) Face Detector
 - 6) People Counter
 - 7) Queue Monitor
 - 8) Audio:
 - a) None.

- c. PoE power:
 - 1) Compliant with IEEE 802.3at, Type 2 Class 4 typical 13.5 W, maximum power consumption of 25 W.
- d. Storage: SD/SDHC/SDXC slot
- e. IR Illumination:
 - 1) Optimized IR with power-efficient, long life 850 nm IR LEDs
 - 2) Range of reach 190 m (623 ft)
- f. Operating temp.: -30 deg. C to 50 deg. C, with 10 – 100% RH, non-condensing.
- g. Casing: Polycarbonate transparent cover with aluminum inner camera module with encapsulated electronics, IK08, IK10, IP66 and NEMA-4X rated.
- h. Cybersecurity: ETSI EN 303 645 approved
- i. Warranty: 5 year

F. Exterior MultiSensor Cameras with PTZ: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Axis Q6010-E with Q-60-E PTZ (Basis of design)
 - a. Description
 - 1) 20 MP (4x 5MP)
 - 2) Image sensor:
 - a) 4x 1/2.7" progressive scan RGB CMOS
 - 3) Lens: Fixed 2.8 mm
 - 4) Minimum illumination:
 - a) Color .4 lux
 - b) B/W .03 lux
 - 5) Shutter time:
 - a) 1/32500 s to 1/5 s
 - 6) Camera Angle Adjustment:
 - a) Pan $\pm 90^\circ$, tilt +25 to +95°, rotation -5° to +95°, twist ± 20
 - 7) Video Compression: H.264, H.265, MJPEG.
 - 8) Resolution (pixels):
 - a) Overview: 4:3 4x 2592x1944 (4x 5 MP) to 4x 320x240
 - 9) Image sensor: 1/ 2.8" Progressive scan CMOS
 - 10) Lens:
 - a) 4.25- 137.6 mm F1.4-4.0
 - 11) Minimum illumination:
 - a) Color: 0.06 lux at 30 IRE F1.4
 - b) B/W: 0.008 lux at 30 IRE F1.4, 0 lux with IR illumination on
 - c) Color: 0.09 lux at 50 IRE F1.4

- 12) d) B/W: 0.01 lux at 50 IRE F1.4, 0 lux with IR illumination on
Shutter time:
 - a) 1/66500 s to 1 s
 - 13) Video Compression:
 - a) Capable of multiple profiles
 - b) H.264, H.265, MJPEG.
 - 14) Resolution (pixels):
 - a) 1920x1080p
 - 15) Frame rate:
 - a) up to 50/60 fps 1080p HDTV
 - 16) Video Streaming: Multiple, in H.264, H.265 and MJPEG formats.
 - 17) Pan/Tilt/Zoom (PTZ):
 - a) Pan: 360° endless, 0.05°–450°/s
 - b) Tilt: +20 to -90°, 0.05°–450°/s
 - c) Zoom: 32x optical, 12x digital, total 384x zoom
 - d) Nadir-flip, 256 preset positions, tour recording, guard tour, control queue, on-screen directional indicator, set new pan 0°, adjustable zoom speed, speed dry
- b. Video Analytics: Camera shall work bidirectionally with Exacqvision system to use camera analytics.
- 1) Privacy Shield
 - 2) Object Analytics
 - 3) Scene Metadata
 - a) Humans
 - b) Faces
 - c) Vehicles
 - d) License plates
 - e) Color
 - 4) Video Motion Detection
 - 5) Face Detector
 - 6) People Counter
 - 7) Queue Monitor
 - 8) Audio:
 - a) None.
- c. Pan/Tilt/Zoom (PTZ):
- a) Pan: 360° endless, 0.05°–450°/s
 - b) Tilt: +20 to -90°, 0.05°–450°/s
 - c) Zoom: 32x optical, 12x digital, total 384x zoom
 - d) Nadir-flip, 256 preset positions, tour recording, guard tour, control queue, on-screen directional indicator, set new pan 0°, adjustable zoom speed, speed dry

- d. PoE power:
 - 1) Compliant with IEEE 802.3at, Type 2 Class 4
 - e. Storage: mircoSD/microSDHC/microSDXC slot
 - f. IR Illumination:
 - 1) OptimizedIR with power-efficient, long life 850 nm IR LEDs
 - 2) Range of reach 190 m (623 ft)
 - g. Operating temp.: -30 deg. C to 50 deg. C, with 10 – 100% RH, non-condensing.
 - h. Casing: Polycarbonate transparent cover with aluminum inner camera module with encapsulated electronics, IK08, IK10, IP66 and NEMA-4X rated.
 - i. Cybersecurity: ETSI EN 303 645 approved
 - j. Warranty: 5 year
- G. License Plate Verifier Cameras: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- 1. Axis P1465-LE-3 (Basis of design)
 - a. Description
 - 1) Compute Platform: Edge
 - 2) Detection Range: 20 feet -65 feet
 - 3) Vehicle Speed: Up to 65 mph
 - 4) Image sensor:
 - a) 1/2.8" RGB CMOS Progressive Scan
 - 5) Lens:
 - a) Varifocal 10.9-29mm
 - 6) Shutter time:
 - a) 1/45500 s to 2 s
 - 7) Video Compression: H.264, H.265, MJPEG.
 - 8) Resolution (pixels):
 - a) 1920x1080
 - 9) Frame rate:
 - a) 25/30 fps with power line frequency 50/60 Hz
 - 10) Video Streaming: Multiple, in H.264, H.265 and MJPEG formats.
 - 11) Pan/Tilt/Zoom (PTZ): Digital, with preset positions.
 - 12) Audio:
 - a) None
 - 13) PoE power:
 - a) IEEE 802.3at Type 1 Class 3
 - 14) IR illumination: 850 nm IR LEDs

- 15) Storage: SD/SDHC/SDXC card supporting up to 64GB.
 - b. Video Analytics: Camera shall work bidirectionally with Exacqvision system to use camera analytics.
 - 1) License Plate Verifier
 - 2) Privacy Shield
 - 3) Speed Monitor
 - 4) Video Motion Detection
 - 5) Active Tampering
 - c. Operating temp.: -40 deg. F to 140 deg. F, with 10 – 100% RH, non-condensing.
 - 1) Casing: Polycarbonate transparent cover with aluminum inner camera module with encapsulated electronics, IP66, IP67, IK10+ and NEMA-4X rated.
 - d. Cybersecurity: ETSI EN 303 645 approved
 - e. Warranty: 5 year
- H. Accessories: As required to meet conditions of camera mounting location and desired field of view, products that may be required include, but are not limited to, the following:
- 1. Pendant adapter kit with weather shield.
 - 2. Pole Mount Enclosure
 - 3. Wall bracket.
 - 4. Corner bracket.

I. Sun shield.

2.5 CAMERA INTERFACE BOX

A. Manufacturer:

- 1. Axis T98A18-VE or Equal

B. Casing:

- 1. Polycarbonate cabinet and stainless steel mounting plate
- 2. IP66- and NEMA 4X-rated, IK10 impact-resistant
- 3. Color: White NCS S 1002-B and stainless steel

2.6 SIGNAL TRANSMISSION COMPONENTS

A. Refer to Division 27 specifications for all cabling requirements.

B. Long Range Ethernet Transceiver: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Altronix eBridge200WPM (Basis of Design)
- 2. Description:

- a. Power Input: PoE+ 802.3at 60W
- b. Power Output: 2 ports PoE+ (30W) per port or 1 port Type 3 4PPoE (60W) Total output power: 60W
- c. Ethernet
 - 1) 100Mbps up to 500m
- d. UL 60950-1 Compliant
- e. Enclosure;
 - 1) 9.5" x 7.32" x 4.92"
 - 2) NEMA 3R
- f. Operating Temperature:
 - 1) -40° to 167° F
- g. Compatible with Long Range Ethernet Receiver as a fully functional system.

C. Long Range Ethernet Receiver: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Altronix Pace4PRM (Basis of Design)
- 2. Description:
 - a. Power Input: PoE+ 802.3at 30W
 - b. Power Output: 2 ports PoE+ (30W) per port or 1 port Type 3 4PPoE (60W) Total output power: 60W
 - c. Ethernet
 - 1) 100Mbps up to 500m
 - d. UL 60950-1 Compliant
 - e. Operating Temperature:
 - 1) -4° to 120° F
 - f. Enclosure;
 - 1) 9.5" x 7.32" x 4.92"
 - 2) NEMA 3R
 - g. Compatible with Long Range Ethernet Transceiver as a fully functional system.

D. Wireless Point to Point Antenna System: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Siklu EtherHaukl – 8010FX (Basis of Design)
- 2. Description:
 - a. Power Input: PoE++ (4 pairs 802.3at type 2 PD) or 42+57VDC; 50W; Hot standby
 - b. Topology: Point to Point

- c. Frequency/Duplexing:
 - 1) 71-76GHz / 81-86GHz, FDD
- d. Ethernet
 - 1) Up to 10,000Mbps full duplex
- e. Interfaces:
 - 1) 1 combo 10GE port: 802.3ab/bz/an (RJ-45, CAT6a or better)
 - 2) 1GE port: 802.3ab (RJ-45, CAT5e or better)
- f. UL 60950-1 Compliant
- g. Operating Temperature:
 - 1) - 4° to 120° F
- h. Security:
 - 1) AES 128-bits
- i. Conformance:
 - 1) Radio: USA FCC Part 15.101 & ETSI EN 302 217
 - 2) EMC: USA FCC 47CFR.part 15 & ETSI EN 301 489
 - 3) Safety UL/EN 62368-1 and 60950
 - 4) Safe Skies Compliant
- j. Operating Temperature:
 - 1) - 45° to 131° F
- k. IP67 Rated

E. PoE Switch: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Manufacturers:
 - a. Omnitron
 - b. Antaira
- 2. Description:
 - a. 10/100/1000tx
 - b. Supports PoE (802.3bt) up to 90W PoE++ standard on copper ports
 - c. Includes ports:
 - 1) One (1) Ethernet
 - 2) Four (4) PoE Ethernet
- 3. 48-55VDC Redundant input
- 4. Standards:
 - a. IEEE 802.3 10Tx Ethernet
 - b. IEEE 802.3u 100Tx Fast Ethernet
 - c. IEEE 802.3ab 1000Tx Gigabit Ethernet

- d. IEEE 802.3at/af/bt Power over Ethernet
 - 5. Wide temperature operating range (-40° - 75° C).
 - 6. Housing
 - a. IP30 Protection
 - 7. Lifetime warranty and technical support
- F. Media Converter: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- 1. Basis of Design product: Omnitron Systems OmniConverter GPoE/SE series.
 - 2. Description:
 - a. 10/100/1000 UTP to fiber media converter
 - b. Supports PoE (802.3bt) up to 30W PoE+ standard on copper port
 - c. Includes ports:
 - 1) Two (2) LC singlemode fiber optic connectors
 - 2) Two (2) RJ45 UTP PoE connector
 - 3. External plug-in transformer power supply
 - 4. Wide temperature operating range (-40° - 65° C).
 - 5. Lifetime warranty and technical support
- G. Media converter Chassis
- 1. Basis of Design product: Omnitron Systems 19-module chassis series, model 8201-1 with spare power supply, model 8201-9.
 - 2. Description:
 - a. 2U (3.5") rack-mount chassis
 - b. 19-module capacity
 - c. Redundant, hot-swappable power supply modules
 - d. Lifetime warranty and technical support
- H. Midspan POE Injector
- 1. General: Midspan unit injects power and data to the network device with built-in Power over Ethernet support.
 - a. IEEE 803.3at compliant
 - b. UL listed
 - c. CE approved
 - d. Built in Surge Protection
 - e. 10/100/1000 BaseT
 - f. Operating temp:
 - 1) Outdoor Installation -40°F to 122°F
 - 2) Relative Humidity 10-100%

2. Power:
 - a. High Power PoE, 60W
3. Basis of design
 - a. Axis T8124-E

I. SURGE PROTECTION DEVICES

1. General: Solid state building entrance protector.
 - a. IEE 802.3af and IEEE 803.3at compliant
 - b. UL Primary listed (497)
 - c. Category 6 rated.
 - d. Fused
 - e. 75V Clamping Level
 - f. Response Time 1-5 Nanoseconds
 - g. Termination Type: RJ45
 - h. Wires protected: 4-Pairs
 - i. Capacitance: < 5pF

2.7 CAMERA POLES

- A. Provide poles suitable for cameras, supports, and accessories to be installed.
- B. Structural Design Criteria:
 1. Comply with AASHTO LTS.
 2. Wind Load: Include effective projected area (EPA) of cameras, supports, and accessories to be installed.
 - a. Design Wind Speed: 120 mph, with gust factor of 1.3.
 - b. Dead Load: Include weight of proposed cameras, supports, and accessories.
- C. Pole Configuration:
 1. Material: Heavy Wall, Extruded 6063-T6 Aluminum
 2. Shape: Use square or round
 3. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
- D. Provide ground lug, accessible from handhole.
- E. Provide the following:
 1. Top cap.
 2. Handhole.
 3. Anchor bolts with leveling nuts or leveling shims.
 4. Anchor base cover.
 5. Pole-top tenon, size as required for installed camera/bracket.

- F. Provide components as indicated or as required for connection of video surveillance system to devices and other systems indicated.
- G. Provide cables as indicated or as required for connections between system components.
- H. Provide accessory racks/cabinets as indicated or as required for equipment mounting.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.
- B. Examine roughing-in for LAN, WAN, and IP network before device installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 COORDINATION

- 1. Prior to beginning installation, a pre-installation meeting shall be conducted with the airport, Augusta-Richmond County Marshal's Office and Architect / Engineer / Security Consultant.
- B. Meeting shall cover at a minimum:
 - 1. Camera Naming
 - 2. Network Requirements
 - a. IP Addressing Scheme
 - 3. Existing Video Management System (VMS) Configuration
 - a. New Camera Licensing Requirements (Contractor Provided)
 - b. VMS storage requirements (Owner Provided)
 - 4. Schedule
 - 5. Camera Programming Requirements
 - a. Analytics options
 - b. Access Control Integration
 - 6. Device Field of View Coordination.
 - 7. Acceptance test concept and, on approval, develop specifics of the test.
- C. Provide a schedule with a list of participants to attend monthly coordination and progress update meeting until job completion. Attendees shall include:
 - 1. Owner's Representative of Facilities Management, Information Services, Security Management.

2. Augusta-Richmond County Marshal's Office Representative
3. Contractor Project Manager.
4. Manufacturer(s) Employed Representative.
5. Architect / Engineer / Security Consultant.

3.3 WIRING

- A. Comply with requirements in Section 270528 "Pathways for Communications Systems."
- B. Wiring Method: Install cables in raceways unless otherwise indicated.
 1. Except raceways are not required in accessible indoor ceiling spaces and attics.
 2. Except raceways are not required in hollow gypsum board partitions.
 3. Conceal raceways and wiring except in unfinished spaces.
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- D. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- E. For communication wiring, comply with the following:
 1. Section 271313 "Communications Copper Backbone Cabling."
 2. Section 271323 "Communications Optical Fiber Backbone Cabling."
 3. Section 271513 "Communications Copper Horizontal Cabling."
 4. Section 271533 "Communications Coaxial Horizontal Cabling."
- F. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.4 VIDEO SURVEILLANCE SYSTEM AND CAMERA INSTALLATION

- A. *Airport Security:* Airport must remain secure at all times. Contractor is responsible for maintaining video surveillance throughout project, including during cutover from existing VMS server to new VMS Server.
- B. Provide, install, configure and program new primary Exacqvision Server and NVR devices.
- C. Configure and program existing Exacqvision Server as back up server to new primary server.
- D. Install cameras and infrared illuminators level and plumb.
- E. Install cameras with 84-inch minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

- F. Set pan unit and pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms and adjust.
- G. Install power supplies and other auxiliary components at control stations unless otherwise indicated.
- H. Install Midspan POE injectors as required at exterior site cameras.
- I. Install Surge Protection Devices on any exterior camera.
- J. Install tamper switches on components indicated to receive tamper switches, arranged to detect unauthorized entry into system-component enclosures and mounted in self-protected, inconspicuous positions.
- K. Avoid ground loops by making ground connections only at the control station.
 - 1. For 12- and 24-V dc cameras, connect the cable shields only at the monitor end.
- L. Identify system components, wiring, cabling, and terminals according to Section 270553 "Identification for Communications Systems."
- M. Provide integration with existing Software House C-Cure 9000 Access Control System
 - 1. Camera integration with Door Alarm for Augusta-Richmond County Marshal's Office identified doors
- N. Programming and set up of License Plate Software shall be completed by the contractor.
- O. Programming of IP addresses and Camera Names shall be completed by the contractor.

3.5 CAMERA POLE INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide required support and attachment in accordance with Section 260529.
- C. Pole-Mounted Cameras:
 - 1. Maintain the following minimum clearances:
 - 2. Comply with IEEE C2.
 - 3. Comply with utility company requirements.
- D. Foundation-Mounted Poles:
 - 1. Provide cast-in-place concrete foundations for poles as indicated; see Section 033000.
 - 2. Install anchor bolts plumb using template furnished by pole manufacturer.
 - 3. Position conduits to enter pole shaft.
 - 4. Install foundations plumb.
 - 5. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
- E. Tighten anchor bolt nuts to manufacturer's recommended torque.

- F. Install nonshrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
- G. Install anchor base covers or anchor bolt covers as indicated.
- H. Provide grounding and bonding in accordance with Section 260526.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Coordinate all tests with Augusta-Richmond County Marshal's Office and Augusta Regional Airport.
 - 2. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
 - 3. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:
 - a. Prepare equipment list described in "Informational Submittals" Article.
 - b. Verify operation of auto-iris lenses.
 - c. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
 - d. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
 - e. Set and name all preset positions; consult Owner's personnel.
 - f. Set sensitivity of motion detection.
 - g. Connect and verify responses to alarms.
 - h. Verify operation of control-station equipment.
 - 4. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.
 - 5. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.
- C. Video surveillance system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:

1. Check cable connections.
2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
3. Adjust all preset positions; consult Owner's personnel.
4. Recommend changes to cameras, lenses, and associated equipment to improve Owner's use of video surveillance system.
5. Provide a written report of adjustments and recommendations.

3.8 CLEANING

- A. Clean installed items using methods and materials recommended in writing by manufacturer.
- B. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens.

3.9 DOCUMENTATION

- A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval. All documentation shall become the property of the Owner.
- B. Documentation shall include the additional specific items detailed in the subsections below:
1. Contractor shall provide hard copy and electronic forms of the final test results.
 2. Contractor shall provide a document including the following:
 - a. Camera label/identifier
 - b. Graphical Map showing camera locations.
 - c. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.

END OF SECTION 282000