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End of Section

Section 01 15 00 – Measurement and Payment

Part 1 - General

1.01 SCOPE

A. The scope of this section of the Contract Documents is to further define the items included in each Bid Item in the Bid Form section of the Contract Documents. Payment will be made based on the specified items included in the description in this section for each bid item.

B. All contract prices included in the Bid Form section will be full compensation for all shop drawings working drawings, labor, materials, tools, equipment and incidentals necessary to complete construction as shown on the drawings and/or as specified in the contract Documents to be performed under this Contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work shown and/or specified to be performed under this Contract.

1.02 WORK OUTSIDE OF AUTHORIZED LIMITS

A. No payment will be made for work constructed outside the authorized limits of work.

1.03 MEASUREMENT STANDARDS

A. Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally and vertically.

1.04 AREA MEASUREMENTS

A. In the measurement of items to be paid for on the area of finished work, the lengths and/or widths to be used in calculations shall be final dimensions measured along the surface of the completed work within the neat lines shown or designated.

1.05 LUMP SUM ITEMS

A. Where payment for items shown to be paid for on lump sum basis, no separate payment will be made for any item of work required to complete the lump sum items. Lump sum contracts shall be complete, tested and full operable prior to request for final payment. Contractor may be required to provide a break-down on lump sum totals.

1.06 UNIT PRICE ITEM

A. Separate payment will be made for items of work described herein and listed on the Bid Form. Any related work not specifically listed, but required for satisfactory

completion of the work shall be considered to be included in the scope of the appropriate listed work items.

B. No separate payment will be made for the following items and cost of such work shall be included in the applicable pay items of work. Final payments shall not be requested by the Contractor or made by the County until as-built (record) drawings have been submitted and approved by the County.

1. Shop Drawings, Working Drawings.
2. Testing and placing system in operation.
3. Any equipment or material required to be installed and utilized for the test.
4. Maintaining the existing quality of service during construction.
5. Appurtenant work as required for a complete and operable system.

1.07 BID ITEM NO. 1 – Mobilization/Demobilization

A. Measurement and payment for this Bid Item shall include full compensation for required 100 percent (100%) Performance Bond, 100 Percent (100%) Payment Bond, all required insurance for the project and the Contractors mobilization and demobilization cost shown in the Bid Form. Mobilization includes, but not limited to: preparation and movement of personnel, equipment, supplies and incidentals such as safety. Demobilization shall include but not limited to: as-builts and intellectual property as defined within the specifications.

B. Payment for mobilization shall not exceed 10 Percent (10%) of the total Contract cost unless the Contractor can prove to the Country that his actual mobilization cost exceeds 10 Percent (10%).

C. The basis of payment for all work associated with Mobilization shall be paid for under the Lump Sum Pay Item and in accordance with the following schedule:

Percent of Original Contract Amount:	Percent Allowable Payment of Mobilization/Demobilization Bid Item Price:
5	25
10	35
25	45
50	50
75	75
100	100

D. Partial pay for this Bid Item will be in accordance with the following schedule:

1. These payments will be subject to the standard retainage provided in the Contract. Payment of the retainage will be made after completion of the work and demobilization.

1.08 BID ITEM NO.2 - Demolition

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price bid listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to perform all the demolition work Partial payments will be based on the breakdown of the Bid Item in accordance with the Schedule of Values submitted by the Contractor and approved by the County. Any equipment in working condition shall be salvaged as requested by the County.

1.09 BID ITEM NO.3 – Site Work and Site Preparation

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to prepare the site for installation of new equipment.

1.10 BID ITEM NO.4 – Integration to Genetec VMS

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to integrate the new security systems into the existing Genetec Security Center Enterprise version 5.5 SR5 VMS.

1.11 BID ITEM NO.5 – Telecom Grounding System

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to provide a new grounding system as specified.

1.12 BID ITEM NO.6 - Pre-Installation Procedures and Inspections

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all travel costs and contractor labor for system inspections.

1.13 BID ITEM NO.7 – Room A109, Data Logger

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to configure and install a PLC data logger on an Owner furnished server.

1.14 BID ITEM NO.8 – Room A115, Master Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Master control on 2 Owner furnished workstations.

1.15 BID ITEM NO.9 – Room A117, System 1, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to cutover and install new PLC, intercom and other equipment in the PLC/telecom room.

1.16 BID ITEM NO.10 – Room B140, Booking Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in booking control on Owner furnished workstations.

1.17 BID ITEM NO.11 - Room B163, System 2, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to cutover and install new PLC, intercom and other equipment in the PLC/telecom room

1.18 BID ITEM NO.12 – Room C152, Medical Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in medical control on Owner furnished workstations.

1.19 BID ITEM NO.13 - Room D104, System 3, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to cutover and install new PLC, intercom and other equipment in the PLC/telecom room.

1.20 BID ITEM NO.14 - Room F107, System 4, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to cutover and install new PLC, intercom and other equipment in the PLC/telecom room.

1.21 BID ITEM NO.15 – Rom H107, D Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.22 BID ITEM NO.16 – Room F203, H Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.23 BID ITEM NO.17 – Room F208, S Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.24 BID ITEM NO.18 - Room H202, System 5, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to cutover and install new PLC, intercom and other equipment in the PLC/telecom room.

1.25 BID ITEM NO.19 - Room I205, Female Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.26 BID ITEM NO.20 - Room J202, System 6, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to cutover and install new PLC, intercom and other equipment in the PLC/telecom room.

1.27 BID ITEM NO.21 – Room J205, G1 Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.28 BID ITEM NO.22 – Room K202, System 7, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.29 BID ITEM NO.23 – Room K205, G2 Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.30 BID ITEM NO.24 – Room L205, G3 Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.31 BID ITEM NO.25 – Room N202, System 9, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to cutover and install new PLC, intercom and other equipment in the PLC/telecom room.

1.32 BID ITEM NO.26 – Room N205, T Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.33 BID ITEM NO.27 – Room P205, G4 Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Pod control on Owner furnished workstations.

1.34 BID ITEM NO.28 – Annex Control 108, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to cutover and install new PLC, intercom and other equipment in the PLC/telecom room.

1.35 BID ITEM NO.29 – Annex Control 108, Annex A Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Annex Master control on Owner furnished workstations.

1.36 BID ITEM NO.30 – Annex Control 108, Furniture

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to install new command and control furniture in Annex Control.

1.37 BID ITEM NO.31 – Annex Control B, PLC & Intercom

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, software, licenses, materials and equipment required to cutover and install new PLC, intercom and other equipment in the PLC/telecom room.

1.38 BID ITEM NO.32 – Annex Control B, Pod Control

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install a new HMI and intercom master stations in Annex Control B Pod control on Owner furnished workstations.

1.39 BID ITEM NO.33 – Annex Dayroom #5, PLC

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install PLC I/O within the existing console.

1.40 BID ITEM NO.34 – Annex Dayroom #6, PLC

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install PLC I/O within the existing console.

1.41 BID ITEM NO.35 – Annex Dayroom #7, PLC

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install PLC I/O within the existing console.

1.42 BID ITEM NO.36 – Annex Dayroom #8, PLC

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price listed in the Bid Form and shall represent full compensation for all labor, licenses, materials and equipment required to install PLC I/O within the existing console.

1.43 BID ITEM NO.37 – Convergint Technologies Sub-Contractor

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price bid listed in the Bid Form and shall represent full compensation for all labor, materials, Genetec software, Genetec licenses and equipment required to receive commands from the PLC for the existing Genetec Security Center video management system.

1.44 BID ITEM NO.38 – Miscellaneous Work and Cleanup

A. Payment for all work included under this Bid Item shall be made at the Contract lump sum price bid listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to perform all the work as shown on the Contract Drawings and specified herein and any other miscellaneous work not specifically included for payment under other Bid Items obviously necessary to complete the Contract. Partial payments will be based on the breakdown of the Bid Item in accordance with the Schedule of Values submitted by the Contractor and approved by the County. Payment shall also include full compensation for project photographs, as-builts record drawings, project signs, traffic control, rubbish and spoil removal, repair, replacement or relocation of all signs, walls, irrigation systems and related items and any and all other items required to complete the project in accordance with Contract Documents.

End of Section

Section 27 00 00 – General Technology Requirements

Part 1 - General

1.01 Project Summary

A. Scope: Successful bidder shall provide, install, configure, and provide a 1-year warranty service for technology systems described herein.

1.02 Related Documents

A. Documents: Provisions of Invitation for Bid and the sections included under Procurement & Contract Requirements are included as part of this section as though bound herein.

1.03 Related Work

A. Section 27 05 23 – Pathways for Technology Systems

B. Section 27 05 26 – Grounding and Bonding for Technology Systems

C. Section 27 16 00 – Communications Connecting Cords

D. Section 27 18 00 – Communications Labeling and Identification

E. Section 27 51 00 – Distributed Communications Systems

F. Section 27 60 00 – Physical Security General Requirements

G. Section 27 61 00 – Command and Control Systems

1.04 Definitions

A. Approved or Approval: Where approval is called for, only persons with the authorized authority may grant approval. Owner reserves all rights to govern over and grant approval and will appoint authority of agents acting on their behalf.

B. As Required: Contractor shall provide the quantity of said item that is necessary. Owner and Consultant reserve the right to make the final determination of necessary quantities to provide for a complete system.

C. Basis of Design: The documentation of the concepts, calculations, decisions, and product selections used to meet the Owner's project requirements. These Consultant produced documents are not shop drawings. Product selections depict minimum functionality and overall quality and are open to substitution requests within 10 days prior to the final bid opening.

D. Consultant: Elert & Associates.

E. Contractor: The qualified party responsible to provide all items and perform services as described within these documents. The Contractor referred to within a specific

specification section shall be the successful qualified party contracted to perform and complete that work.

F. Documents: The complete package of Bid and Contract Requirements, General Technology Requirements, related Division 27 sections, drawings, schedules, and addenda that make up this Request for Bid.

G. End-User: Individual(s) who will ultimately operate the completed system.

H. ETR: Existing to Remain. Item is to remain in current location and maintain current functionality.

I. Furnish: To supply and deliver to project site, ready for installation.

J. Install: To place in a position of service or use.

K. NIC: Not in Contract. Item will be the responsibility of others.

L. Notice to Proceed: Formal communication from Owner to Contractor stating the date the Contractor can begin work subject to the conditions of the contract. The performance time of the contract starts from the Notice to Proceed date.

M. OFCI: Owner Furnished Contractor Installed. Item will be provided by Owner and shall be installed by Contractor.

N. OFE: Owner Furnished Equipment. Item will be provided and integrated by Owner.

O. OFOI: Owner Furnished Owner Installed. Item will be provided and installed by Owner.

P. Owner: The party named in the Procurement and Contract Requirements as the advertising party.

Q. Provide: To furnish and install, complete and ready for intended use.

R. Substantial Completion: The stage in the progress of installation when the systems described herein are sufficiently complete, in accordance with the Contract Documents, so that the Owner can utilize such systems for their complete intended use.

S. Turnkey: Of or involving the provision of a complete product or service that is ready for immediate use.

T. Work: The provision of products and/or services to meet the requirements specified in these documents.

1.05 Reference Standards and Codes

A. Standards and other procedures referenced by this bid package are as follows:

1. ADA – Americans with Disabilities Act of 2010
   www.ada.gov/2010ADAstandards_index.htm
2. AIA – American Institute of Architects
   www.aia.org
3. ANSI – American National Standards Institute
   www.ansi.org
4. ASTM – American Society of Testing and Materials
   www.astm.org
5. BICSI – Building Industry Consulting Service International, Inc.
   (RCDD Standards)
   www.bicsi.org
6. CFR – Code of Federal Regulations
   www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR
   (Available from the Government Printing Office)
   (Material is usually first published in the Federal Register)
7. U.S. Copyright Law, December 2011
   www.copyright.gov/title17
8. ECIA – Electronic Components Industry Association
   ESC – EIA Standards Council
   www.eciaonline.org
9. IACS – International Annealed Copper Standard
   www.ndt-ed.org/GeneralResources/IACS/IACS.htm
10. IEC – International Electrotechnical Commission
    www.iec.ch
11. IEEE – Institute of Electrical and Electronics Engineers
    standards.ieee.org
12. ISO – International Organization for Standardization
    www.iso.org
13. ITU-T – International Telecommunication Union – Telecommunication
    www.itu.int
14. NEC – National Electrical Code (NFPA 70), 2011 edition
    maintained by NFPA – National Fire Protection Association
    www.nfpa.org
15. NECA – National Electrical Contractors Association
    www.necanet.org
16. NEMA – National Electrical Manufactures' Association
    www.nema.org

17. OSHA – Occupational Safety and Health Administration
    (U.S. Department of Labor, OSHA)
    www.osha.gov

18. TIA – Telecommunications Industry Association
    www.tiaonline.org/standards

19. UL – Underwriters' Laboratories
    www.ul.com

B. Standards: Referenced standards and/or procedures shall be binding on the Contractor and work shall be judged against such standards and procedures unless otherwise stated in writing.

C. Local/State Codes: Contractor shall comply with all local and state code requirements as determined by the authority having jurisdiction (AHJ).

D. Owner Standards: Contractor shall obtain and abide by all published Owner standards as they pertain to the work described herein.

E. Contractor shall use the latest versions of all standards and codes unless otherwise directed by the authority having jurisdiction (AHJ) or expressly noted herein.

1.06 Required Sub-Contractors

A. The Prime Contractor shall sub-contract the incumbent video surveillance contractor for integration purposes. Use the following contacts to obtain a pre-defined scope of work. The Prime Contractor shall take full responsibility of this sub-contractor.

1. Convergint Technologies:

   Alissa Tasler
   Account Executive
   Convergint Technologies LLC
   6996 Anderson Road Tampa, Florida 33634
   Cell: 813-629-8173
   Email: alissa.tasler@convergint.com

   Mark Besser
   Sales Engineer
   Convergint Technologies LLC
   813-885-3705
   813-440-8767
   Email: mark.besser@convergint.com

B. The scope of work shall include but not limited to the following:

1. Provide and apply all Genetec licensing required to be able to receive Pelco ASCII commands.

2. Install and configure Security Desk on up to 15 owner furnished workstations.
3. Configure each individual Security Desk to receive Pelco ASCII serial strings following the selected PLC contractor's instructions for the serial port communication settings. This will include a physical connection to the workstations for equipment furnished by the PLC contractor.
4. Set the Security Desk monitor ID on all owner furnished workstations. The Owner will provide the specific monitor IDs to use.
5. Set the logical ID on all ~380 security cameras. The Owner will provide the specific logical IDs to use.
6. Coordinate with the selected PLC contractor.
7. Perform on-site testing after each cut over to be sure each camera calls up correctly. Provide feedback to the PLC contractor for any call ups that are non-functional or incorrect. There will be 10 cutovers.
8. Perform a final system test once all cut overs are complete.
9. Coordinate any other scope of work as required by the successful prime contractor.

1.07 Qualifications

A. The Contractor shall have a minimum of 5 years of experience and performed at least 6 similar projects exceeding $500,000. A similar project would be defined as a project where the PLC and intercom systems were replaced and this scope of work exceeded $500,000. Projects where video surveillance systems were replaced as well are ok so long as the PLC and intercom scope of work exceed $500,000.

B. Refer to related sections for additional specific requirements.

1.08 Permits and Inspections

A. Responsibility: Obtain permits and inspections required for the work. Contractor is responsible for all permit and inspection costs.

B. Performance: Perform tests required herein, or as may be reasonably required to demonstrate conformance with the specifications or with the requirements of any legal authority having jurisdiction.

C. Review: Obtain approvals from authorities responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with all requirements of reference codes indicated herein and required by the appropriate jurisdiction. Make corrections, changes or additions as required and deliver certificates of acceptance, operation, and/or compliance with the Operation and Maintenance Manuals described herein.

1.09 Drawings and Basis of Design

A. General: Work, equipment, or material delineated on any drawing in this package is expected to be provided by Contractor unless noted otherwise.

B. Interpretation: Work shall be installed in accordance with the basis of design diagrammatically expressed on the drawings and described in the written specifications and equipment schedule(s). Contractor shall not make limiting interpretation that provides for incomplete work or a non-functioning system.

1.10 Product Substitution Procedures

A. Requests for Substitutions: Should the Contractor request a change in the material that is to be supplied, from that which was specified in the contract, the Contractor shall provide the Owner and the Consultant with a written request for said change.

B. Substitutions for Non-Specified Products: Where no product specification is provided, Contractor may use manufacturer's specification for the identified product as a guide for suggesting appropriate substitutions.

C. Substitutions shall be submitted prior to the deadline for questions and clarifications for approval by the consultant.

D. Requirements: The Request for Substitution shall include:

1. Reason for substitution.

2. Material data sheets for both the proposed item(s) and the item(s) to be replaced.

3. Any cost impact to the Owner.

E. Changes: Proposed changes to Contract Documents shall be clearly identified in the pre-construction submittals.

F. Approval: The Owner may approve or deny any Requests for Substitution. The Owner reserves the right to govern over and proclaim whether proposed products are equal to the specifications. The Contractor shall not procure any substitute materials until the Owner has approved and signed the Request for Substitution and passed copies to the Contractor and the Consultant. Any procurement or work performed prior to this approval is at the Contractor's own risk.

G. Deviation: Products provided or installed that deviate from the products specified in make, model, color, or other significant characteristic (i.e., non-approved substitutions) shall be removed and replaced with specified products at no additional expense to Owner.

1.11 Software

A. Versions: Consultant used the following software versions for this project:

1. Autodesk AutoCAD MEP 2015

1.12 Submittal Conditions

A. The Contractor shall not consider the Consultant or Owner's review of submittals to be exhaustive or complete in every detail. Approval of shop drawings or submittals including substitutions indicates only the acceptance of the Contractor's apparent intent to comply with general design or method of construction and quality as specified. The finished product shall meet functional requirements, operations, arrangements, and quantities and comply with the contract documents unless specifically approved otherwise.

B. The Contractor shall be held responsible for delivery of systems as specified. Any errors or omissions in the submittals shall not relieve Contractor of responsibility to deliver complete systems as specified.

1.13 Pre-Construction Procedures

A. Pre-Construction Submittal Meeting: Contractor shall schedule web conference (WebEx or similar) with Consultant to review basis of design and submittal expectations.

B. Prior to Work: Pre-construction submittals shall be provided to Consultant with appropriate promptness as to cause no delay to the work.

C. Project Timeline: Project timeline will not be altered due to lateness of submittals. Contractor is bound to deliver a timely, complete, and finished project as stipulated in their contract and specified herein.

D. Format and Distribution: Contractor shall provide one (1) electronic copy in PDF format to Consultant of all pre-construction submittals. The Contractor shall provide hard copies sets as required up to five (5) sets.

E. Provision: Contractor shall submit pre-construction submittals including any corrections or additions to Consultant prior to the procurement of equipment or commencement of work.

F. Review: Pre-construction submittals shall be received and formally approved by Consultant prior to the procurement of material or the commencement of work. Any procurement or work performed prior to this approval is at Contractor's own risk.

G. Failure to Provide: The failure of Contractor to provide pre-construction submittals as required herein may result in the withholding of payment for work and/or the cancellation of the contract.

1.14 Pre-Construction Submittals

A. Pre-construction submittals are intended to document the details of installation. Exact copies of original drawings and specifications are not acceptable as pre-

construction submittal drawings. Consultant schematic diagrams describe the basis of design as defined herein.

B. Contractor shall provide to Consultant the following pre-construction submittals for approval in addition to specific requirements identified in subsequent sections.

1. Qualifications: Shall include documentation of all required qualifications.

2. Shop Drawings:

a. Title: Each drawing shall have a descriptive title and all subparts of each drawing shall have unique identifiers.

b. Floor Plans: Shall include device locations, Contractor provided furniture and installation notes.

c. System Drawings: Shall include functional diagrams for each system detailing system flow including all equipment, routing, inputs/outputs, wiring signal type, cable identification detail, connectors, adapters, intra/inter-rack power distribution, installation notes and any other information required to convey the complete turnkey system design.

d. Equipment Rack and Cabinet Elevations: Shall include placement of all mounted equipment.

e. Structurally Mounted Elements: Shall include both plan view of placement as well as a detail of structural mounting techniques to be used.

f. Furniture: Shall include all Contractor provided furniture showing dimensional drawings, cable management and finishes with samples for Owner approval.

3. Product Data:

a. Equipment Schedules: Shall include manufacturers, part numbers, quantities and unit pricing.

b. Product Cut Sheets: Shall identify (highlight, arrow, etc.) actual part numbers to be utilized including but not limited to equipment, mounting hardware, cabling, connectors, software and power distribution equipment.

4. Manufacturer's Recommendations:

a. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, copies of these recommendations shall be provided prior to installation. Installation of the items will not be allowed to proceed until the recommendations are received and approved.

1.15 Pre-installation Procedures and Inspections

A. The system shall be pre-racked, programmed and fully tested before arriving on site to minimize the cut over process and down time of the system.

B. The Contractor shall provide the Owner and the Consultant the opportunity to travel to the Contractors shop to get a functional system demo and the opportunity to provide comments prior to the equipment shipping to the site. The Owner will pay for all expenses. The Contractor shall give at least a 2-week notice so travel can be booked.

C. Refer to individual sections for additional information.

1.16 Change Order Procedures

A. Definition

1. Change Order: A written order signed by the owner, the Consultant/Engineer and the Contractor authorizing a change in the Project Plans and/or Specifications and, if necessary, a corresponding adjustment in the Contract Sum and/or Contract Time, pursuant to Article V of the General conditions of the Construction Agreement.

2. Administrative Change Adjustment: Minor change order under 10% of project cost or 20% time, does not have to be Board approved.

3. Field Directive: A written order issued by the Owner which orders minor changes in the Work not involving a change in Contract Time, to be paid from the Owner contingency funds.

4. Field Order: Minor change to contract work that does not require adjustment of contract sum or expected date of completion.

B. Requirements Included

1. The Contractor shall promptly implement change order procedures:

a. Provide full written data required to evaluate changes.

b. Maintain detailed records of work done on a time-and-material/force account basis.

c. Provide full documentation to County on request.

C. Preliminary Procedures

1. Project Manager may initiate changes by submitting a Request to Contractor. Request will include:

a. Detailed description of the change, products, cost and location of the change in the Project.

b. Supplementary or revised Drawings and Specifications.

c. The projected time extension for making the change.

d. A specified period of time during which the requested price will be considered valid.

e. Such request is information only and is not an instruction to execute the changes, nor stop work in progress.

2. Contractor may initiate changes by submitting a written notice to the Project Manager, containing:

a. Description of proposed changes.

b. Statement of the reason for making the changes.

c. Statement of the effect on the Contract Sum and Contract Time.

d. Statement of the effect on the work of separate contractors.

e. Documentation supporting any change in Contract sum or Contract Time, as appropriate.

D. Field Order Change

1. In lieu of a Change Order, the Project Manager may issue a Field Order to the Contractor to proceed with additional work within the original intent of the Project.

2. Field Order will describe changes in the work, the attachments of backup information to define details of the change.

3. Contractor must sign and date the Field Order to indicate agreement with the terms therein.

E. Documentation of Proposals and Change

1. Support each quotation for a lump sum proposal and for each unit price which has not previously been established, with sufficient substantiating data to allow the County to evaluate the quotation.

2. On request, provide additional data to support time and cost computations:

a. Labor required.

b. Equipment required.

c. Products Required.

i. Recommended source of purchase unit cost.

ii. Quantities required.

d. Taxes, insurance and bonds.

e. Credit for work deleted from Contract, similarly documented.

f. Overhead and profit.

g. Justification for any change in Contract Time.

3. Support each claim for additional cost and for work done on a time and material/force account basis, with documentation as required for a lump sum proposal.

a. Name of the County's authorized agent who ordered the work and the date of the order.

b. Date and the time work was performed and by whom.

c. Time record, summary of hours work and hourly rates paid.

d. Receipts for invoices for:

i. Equipment used, listing dates and time of use.

ii. Products used, listing quantities.

iii. Subcontracts.

F. Preparation of Change Orders

1. Project Manager will prepare each Change Order.

2. Change Order will describe changes in the Work, both additions and deletions, with attachments as necessary to define details of the change.

3. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

G. Lump Sum/Fixed Price Change Order

1. Project Manager initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by the Contractor, or request from the County, or both.

2. Once the form has been completed, all copies should be sent to the Contractor for approval. After approval by the Contractor, all copies should be sent to the County for approval. The County will distribute executed copies after approval by the Board of County Commissioners.

H. Unit Price Change Order

1. Content of Change Orders will be based on, either:

a. Counties definition of the scope of the required changes.

b. Contractors Proposal for a change, as approved by the County.

c. Survey of completed work.

2. The amounts of the unit prices to be:

   a. Those stated in the Agreement.

   b. Those mutually agreed upon between County and Contractor.

I. Time and Material/Force Account Change Order/Construction Change Authorization

1. Refer to the General Conditions of the Construction Agreement.

J. Correlation with Contractor's Submittals

1. Periodically revise Schedule of Values and Application for Payments forms to record each change as a separate item of work, and to record the adjusted Contract Sum.

2. Periodically revise the Construction Schedule to reflect each change in the Contract Time. Revise sub schedules to show changes for other items of work affected by the changes.

1.17 Construction Progress Procedures

A. Meeting Attendance: Contractor is required to attend job progress meetings in accordance with requirements set by Owner or Consultant. The Contractor shall take meeting minutes and submit to the Owner and project.

B. Additional Coordination: Contractor shall request additional job construction coordination meetings it deems to be necessary to ensure coordination of their responsibilities with other parties.

C. Progress Inspection: Consultant may perform periodic progress inspections. At Consultant's request, Contractor shall make Project Manager and/or Lead Technician available.

D. Test Plan: Ten (10) business days prior to the proposed Contractor test date, Contractor shall provide a test plan defining the tests required.

1. The test plan shall be approved by Consultant prior to any testing.

E. Consultant Inspections: The Contractor shall inform the consultant when the progress is at 30%, 60%, 90% and 100% so the Consultant may perform an inspection and provide comments.

1.18 Construction Progress Submittals

A. Completion: Contractor shall complete and submit via email all construction progress documentation in PDF format as requested by Owner and Consultant.

B. Contractor shall provide to Consultant the following construction progress submittals in addition to specific requirements identified in subsequent sections.

1. Weekly Report: Weekly written report to be submitted to Consultant through appropriate project channels in PDF format outlining progress from previous week, plans for progress in the current week, and any coordination issues that may require Consultant or Owner attention.
2. Test Plan: Shall ensure the system meets Owner operational and performance specifications and include the following:
    a. Identification of the capabilities and functions to be tested.
    b. Detailed instructions for the setup and execution of each test.
    c. Procedures for evaluation and documentation of the results.

C. Failure to Complete: Failure to complete requested construction progress documentation may result in the withholding of payment by Owner.

1.19 Closeout Procedures

A. Notification: Contractor shall provide written notification to Consultant and Owner when Contractor is satisfied that the work has reached Substantial Completion and is ready for inspection.

B. Pre-Inspection Submittals: Contractor shall submit an electronic copy of all closeout submittals to Consultant in accordance with the requirements found in these documents no less than ten (10) business days prior to the scheduled Final Inspection.

1. Test Results
2. As-built drawings (full-size sheets)
3. Operation and Maintenance Manuals
4. End User Software

C. Punch List: Work or materials found to be incomplete, of unsatisfactory quality, failing to meet the specifications in these documents, and/or unacceptable to Consultant or Owner shall be documented by Consultant and provided to Contractor to rectify at no additional cost. Contractor shall provide written notification to Consultant and Owner when all punch list items have been completed.

D. Final Inspection: At Consultant's request, Contractor shall make Project Manager and/or Lead Technician available.

E. Re-Inspection: If more than one (1) re-inspection is necessary, the costs of the additional travel, time, and expenses of Owner and Consultant may be deducted by Owner from the contract amount due to the Contractor.

F. Punch List Approval: Once all punch list items are complete, the Contractor shall return an initialed punch list to the Consultant and Owner for verification. Punch list

shall be considered complete only after having been signed by Owner and Consultant.

G. Closeout Submittals: Upon approval of closeout submittals and prior to final acceptance, Contractor shall provide three (3) electronic copies to Owner and Consultant in format(s) noted below.

1. Record Drawings – AutoCAD 2013 editable .dwg format AND PDF.
2. Operation and Maintenance Manuals – CD OR DVD.
3. End User Software – CD OR DVD.
4. Documentation of testing and system certification.

H. Closeout Submittal Format and Distribution: Upon approval of closeout submittals and prior to final acceptance, Contractor shall provide a total of three (3) bound hard copies and one (1) digital copy with labeled dividers of all record drawings (full-size sheets) and operation and maintenance manuals, three (3) copies to Owner and one (1) digital copy to Consultant. Title on front and spine of binder shall be "Operation and Maintenance Manual – [Project Name]". The following additional items shall be identified on the binder cover:

1. Client Name
2. Contractor Name and Contact Information
3. Consultant Name and Contact Information
4. Date

I. All documentation prepared by the Contractor, including hard copy and electronic forms, shall become the property of the Owner.

J. Payment Authorization: Final payment will be authorized only after all closeout procedures and requirements have been followed and fulfilled by Contractor and approved in writing by Owner and Consultant, including punch list(s) and/or re-inspection(s) and delivery of closeout deliverables.

1.20 Closeout Submittals

A. Closeout submittals are intended to document the details of the final installation that substantially conforms to the construction documents and functions as intended to meet the Owner's needs.

B. Contractor shall provide to Consultant the following closeout submittals for approval in addition to specific requirements identified in subsequent sections.

1. As-built drawings: As-built drawings are prepared by the Contractor. They show, in red ink, on-site changes to the Consultant-approved pre-construction

submittal documents. As-built drawings shall be submitted to Consultant for approval prior to submitting record drawings and include:

a. Changes made by Addenda, Change Orders, Requests for Information (RFIs), Architect's Supplemental Instruction (ASIs), or Requests for Proposal (RFPs) in addition to any other changes to the original documents.

b. Actual device locations, conduit routing, wiring and relationships as they were constructed.

c. Nomenclature showing as-built wire designations and colors.

d. Room numbers coinciding with Owner space planning numbering.

2. Record drawings: Record drawings are the final drawings prepared by the Contractor and incorporate all as-built drawing changes previously approved by Consultant. Record drawings should be electronically produced without any handwritten, red ink, or clouded changes.

3. Operation and Maintenance Manuals: Notwithstanding requirements specified elsewhere, submit one (1) copy of each of the following per binder:

a. A final Bill of Materials for each system.

b. A Microsoft Excel (.xlsx format) spreadsheet for each device that resides on the network provide the following:

i. IP Address

ii. MAC Address

iii. Serial Number

iv. Manufacturer

v. Model Number

vi. Device Username

vii. Device Password

viii. Telecom Closet or Rack Location

ix. Patch Panel Port Number

x. Switch Port Number

xi. Any other relevant information as requested by Owner

c. Manufacturers Instruction Manuals: Specification sheets, operation manuals and service sheets published by the manufacturers of the components, devices and equipment provided.

d. Information for testing, repair, troubleshooting, assembly, disassembly, and recommended maintenance intervals.

e. Replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.

f. Performance, Test, and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.

g. Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturers' Warranty Registration papers as described herein.

h. Sufficient information, (detailed schematics of subsystems, assemblies, and subassemblies to component level) clearly presented, shall be included to determine compliance with drawings and specifications.

i. Any other items defined herein.

4. Local Reference Diagrams: Within each equipment rack, enclosure, or cabinet, the Contractor shall place a functional diagram of the system(s) in a clear plastic sleeve secured to the equipment rack, cabinet, or enclosure.

5. Intellectual Property: Provide all required items and written release as described herein.

6. Training Program: Proposed training materials and program outline.

7. Spare Parts and Remote Controls: Contractor shall submit record of Owner sign-off of turnover of spare parts and remote controls.

1.21 Project Management

A. Project Manager: Contractor shall appoint a Project Manager who will be the main point of contact for Owner and Consultant regarding the project.

B. Responsibility: Project Manager is responsible for the following:

1. Successfully completing the contract in a timely manner.

2. Overseeing work and performance of all employees and Subcontractors who have been hired by Contractor, and ensuring compliance with specification.

3. Completing and submitting required documentation.

4. Attending project coordination meetings as required by Owner, Consultant, and Contractor. Contractor is responsible for taking minutes of these meetings and distributing copies to all participants in a timely manner.

5. Coordinating with Owner, Consultant, Architect, Prime Contractor, and other Contractors involved in the project to ensure smooth flow of work and on-time project completion.

6. Providing a written weekly progress update to the Owner and Consultant in a PDF format emailed to the project team.

7. Reporting all unexpected conditions and problems that may result in delay or expense to Owner and Consultant immediately upon discovery.

C. Change of Project Manager: If Contractor seeks to change Project Manager during the course of the Project, such change is subject to prior written approval from Owner.

D. The Owner reserves the right to request a change of project manager at any time for any reason.

1.22 Examination of Existing Conditions

A. Examination: Contractor shall examine the facility and construction documents to the extent necessary to plan for efficient installation strategies prior to the delivery of materials to the site or the commencement of work. Other documents (Architectural Drawings, hardware schedules…) may be made available upon request. Failure to adequately complete the examination shall not result in change order requests.

B. Acceptance of Conditions: Commencement of work by Contractor shall indicate acceptance of existing conditions, unless a written notice of exceptions has been provided to Owner prior to commencement.

C. Observation: If Contractor observes—during preliminary examinations or subsequent work—existing violations of fire stopping, electrical wiring, grounding, or other safety- or code-related issues, Contractor shall report these to Owner in a timely manner.

D. Pre-Existing Damage: If Contractor observes damage to finished surfaces before they begin installation in any area, Contractor shall document by taking digital photos of the damaged area(s) and immediately notify Construction Manager and Consultant via email with attached photos.

E. Damage during Installation: Any damage caused by, or reasonably believed by the Construction Manager to be caused by the Contractor shall result in back-charges for said damages. Repairs shall match preexisting color and finish of walls, floors, and ceilings. Any Contractor damaged ceiling tiles, floor, and carpet shall be replaced to match color, size, style, and texture.

1.23 Product Storage and Handling Requirements

A. Storage: Contractor shall provide secure material storage. If Contractor chooses to store cabling or equipment at project site, that Contractor shall receive written approval from GC or Owner to identify acceptable location. All equipment provided by the Contractor remains the responsibility of that Contractor until Owner has beneficial use of the equipment.

B. Protection: Contractor shall take all necessary precautions to protect materials from the following:

1. Theft
2. Vandalism/Tampering
3. Dents
4. Scratches
5. Dust
6. Temperature
7. Weather
8. Cutting
9. Paint
10. Other hazardous conditions

C. Replacement: Contractor shall replace any damaged or lost material as required by Owner or Consultant.

D. Installed Materials: Installed materials remain the responsibility of the Contractor until Acceptance. Contractor shall take necessary precautions to ensure the safety and security of installed materials.

1.24 Interference with the Facility

A. Transportation and storage of materials at the facility, work involving the facility, and other matters affecting the habitual use by the Owner of the Owner's buildings, shall be conducted to minimize interference, and at times and in a manner acceptable to the Owner.

1.25 On-Site Conduct

A. Conduct: Any demonstration of rudeness, use of profanity, or lack of respect by Contractor Personnel to a building tenant will be cause for immediate removal from the premises, and such Personnel will not be allowed to return. Contractor and Contractor's Personnel are to remain in project area.

B. Vandalism: Graffiti or vandalism will not be tolerated. Any Contractor/Personnel caught in the act shall be immediately removed from the premises and will not be allowed to return.

C. Hazardous Conditions: No one shall be allowed to endanger the building, its premises, or its occupants in any manner whatsoever. In the event that a situation occurs which threatens the building or its occupants in any manner, Contractor, Contractor Personnel, Subcontractor, etc. shall take immediate steps to correct the hazardous condition. In the event that Contractor's Personnel fail to correct hazardous condition, Owner reserves the right to immediately take steps to correct the situation at Contractor's expense.

1.26 Safeguards and Protection

A. Barriers: Provide and maintain suitable barriers, guards, fences and signs where necessary to accommodate the safety of others relative to and/or for the protection of this work.

B. Regulations: Comply with OSHA, Federal, State, Local, and Owner regulations and standards pursuant to this work.

C. Protection: Protect all materials and equipment to prevent the entry or adhesion of any and all foreign material. If necessary, cover equipment with temporary protective material suitable for this purpose.

D. Finishing: Check, clean and remove defects, scratches, fingerprints and smudges if necessary from all equipment and devices immediately prior to Acceptance of the Installation.

E. Damage: Replace all damaged or defective material or work at no additional cost prior to Final Acceptance.

F. Documentation: Provide written description of accidents by workers, staff, and general public of any incident occurring on the project. Report incident in writing to Owner's representative immediately and to the Project Manager for follow up.

1.27 Owner-Furnished Products

A. Delivery: Owner is responsible for delivery of Owner-furnished products to the project site, unless otherwise specified in this document.

B. Placement: Contractor is responsible for locating, inspecting, and moving Owner-furnished products to their final installation position.

C. Inspection: Contractor shall report any damage, discrepancies in quantity, type, or function to Owner and Consultant immediately upon discovery.

D. Warranty: Contractor assumes no responsibility for any material warranty for Owner-furnished products. Contractor shall be responsible for integrating, cabling, and installing Owner-furnished products under the same warranty conditions as other products furnished by Contractor.

1.28 Quality Assurance

A. Assurance: It is the intent of these specifications to describe and provide for a complete, professional, and reliable installation.

B. Qualifications: Contractor employees who are engaged in installation shall be properly trained in the tasks they are expected to perform.

C. Acceptability: Owner shall determine the acceptability of work.

D. Regulatory Requirements: Contractor shall comply with code requirements that apply to the work being performed.

E. Certifications: Where manufacturer certifications are required for warranty or for authorized resale, installation personnel shall have received such certification prior to the start of installation of those manufacturers' materials.

1.29 Quality Control

A. Installation: During installation period, when connections are made to the Owner's existing infrastructure, Contractor shall use care to ensure that such connections will not have a negative impact which could reduce or hamper existing systems.

1.30 Owner's Right to Use Equipment

A. The Owner reserves the right to use equipment, material and services provided as part of this work prior to Acceptance of the Work, without incurring additional charges and without commencement of the Warranty period.

1.31 Intellectual Property Ownership

A. All custom developed intellectual property such as the Human Machine Interface (HMI) for control of the Programmable Logic Controllers (PLCs) shall remain in escrow for an unlimited period of time. All supporting documentation including but not limited to: software, firmware, admin and root level passwords, programming, uncompiled source code, graphic files, diagrams, written and electronic files, including all latest versions of the documentation and software necessary to edit and adapt the system(s), shall be provided to the Owner on a CD or DVD for all spaces and all systems. The integrator and/or programmer shall also maintain a current live copy incorporating all system modifications to be provided at the Owner's request and for system restoration upon a failure. These files shall remain in escrow for as long at the County is utilizing this Contractor for service and support of the system. At which time the Owner chooses to utilize a different Contractor for service and support this contractor shall turn over all documentation as described in these sections.

B. A written release shall be given by the Contractor and all other required parties for all programming and configuration done by the Contractor and/or Subcontractors. This release will acknowledge the Owner's ownership and right to modify the intellectual property directly, or to have the intellectual property modified by any party of the Owner's choosing.

Part 2 - Products

2.01 Basic Equipment and Materials Requirements

A. Standards: Equipment and materials used to accomplish the goals of this project shall meet standards for good engineering practice as defined within this document.

B. Quality: Products specified in these documents are intended to establish a baseline or operational, functional, and performance-based standards that all proposed products shall meet or exceed by functionality and quality.

2.02 Factory-Assembled Products

A. Manufacturer: Reference to specific equipment manufacturers does not imply that all products produced by that manufacturer meet the specification requirements.

B. Age of Equipment: Equipment shall be new and unused with full manufacturer's warranties. Contractor shall supplement such warranties as required by the specification. Contractor shall immediately notify Consultant of any product that will be or is expected to be discontinued by the end of the project for resolution.

C. No Modification: Where a product is available from a factory/manufacturer to meet the needs as outlined, that product shall be used without modification to ensure the full factory warranty is maintained.

D. Like Materials: Like materials used shall be of the same manufacturer, model, and quality unless otherwise specified.

E. Software/Firmware: No software or firmware is to be used unless specifically authorized by Owner or its appointed representative.

2.03 Racks, Cabinets, Hardware

A. Equipment Racks and Cabinets: Provide racks and cabinets as specified herein and/or described in accompanying documents, appendices, or drawings. Verify that any existing racks and/or cabinets provided by others are complete, bringing any discrepancies to the attention of Owner and Consultant prior to beginning the installation.

B. Shelves and Mounts: Contractor shall supply necessary mounting hardware to install rack-mounted equipment. Mounting hardware shall be a product of the manufacturer of the equipment to be mounted, or manufacturer of the rack system, or approved by either for use with their product. Provide supporting channels, shelves, rack mounts, and/or rack ears as recommended by equipment manufacturers.

C. Screws and Washers: Contractor shall provide screw head types appropriate to the level of security required for the equipment and racking. Screws shall include polyethylene or nylon washer.

1. Public Access Areas: Star post or square post security screws shall be used for hardware and equipment mounted in equipment racks and consoles in areas that are accessible to the public.

2. Restricted Access Areas: Philips head screws may be used where a secure room entrance or locked rack/console door prevents public access.

2.04 Power Devices

A. Power Strips: Unless otherwise specified, power strips shall be UL listed, surface mounted, and rated for 20 amp continuous electronic loads. Outlets shall be 125 volt, 20 amp, three-wire, grounded, and NEMA 5-20R compliant. Cords shall be 12/3 SJT with molded plug.

B. Power Distribution Panels: Unless otherwise specified, power distribution panels shall be UL listed, rack mounted, rated for 20 amp continuous electronic loads, with switch and pilot light. Up to eight outlets shall be mounted to the back, each rated 125 volt, 20 amp, three-wire, grounded, and NEMA 5-20R compliant. Switch and pilot shall be mounted to the front. Cords shall be 12/3 SJT with molded plug.

C. Contractor shall provide acceptable power distribution units as required in order to provide sufficient outlet connectivity for Contractor-furnished and Owner-furnished equipment indicated on drawings and equipment schedules, plus up to 15% additional capacity for future growth. This may be in addition to any power distribution equipment indicated on equipment schedules.

2.05 Cable and Connectors

A. Cable: Cable shall be selected and applied in a manner defined by signal type, consistent with best industry practices. Highest quality products shall be used with attention given to transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Where required by the NEC, substitutions of air handing plenum cable shall exactly match the normally applied product and shall meet the standards of UL Standard #900 and the NEC Articles 800 and 820.

B. Connectors: Highest quality products shall be used with attention given to transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Strain reliefs and cable clamps shall be sized for the connector and the cable.

C. Color: Cable and connector color shall be coordinated with Consultant to maintain consistency with cable and connector color schemes used by other trades.

2.06 Cable Management

A. Plastic Cable Ties: Single use white nylon plastic cable ties, appropriate screw fittings, or mounting clips may be used for AC power cable management within racks and enclosures. Plastic/nylon cable ties shall not be used for signal and DC cables.

B. Velcro Cable Ties: Velcro straps shall be used for all signal and DC cables. Velcro straps shall be black, with no logo or decoration, except as authorized by Consultant.

2.07 Ancillary Hardware

A. General: Contractor shall provide ancillary and required accessory items necessary to provide a complete and fully functional system to Owner.

B. Interpretation: Exclusion of or limitation in the language used in the drawings or specifications shall not be interpreted as meaning that ancillary or accessory items of work or equipment necessary to complete or make the installed system fully functional can be omitted.

2.08 Grounding Hardware

A. Refer to Section 27 05 26 for specific Grounding and Bonding requirements.

B. Provide data/telecommunication grounding systems indicated in the project drawings and specifications. Products shall include, but are not limited to, cables/wires, connectors, terminals, compression lugs, grounding rods/electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where materials or components are not indicated, provide products complying with NEC, UL, IEEE, ANSI/TIA and established industry standards for applications indicated.

2.09 Fire Stopping Materials

A. All penetrations of walls shall be approved by the Prime Contractor before any penetrations are made. Should the Contractor find it necessary to penetrate any walls extending to the slab, it will be the responsibility of that Contractor to provide satisfactory sleeving and fire caulking both inside and outside of that sleeving. If existing sleeving is to be utilized, it will be the responsibility of the Contractor to fire caulk inside the sleeving.

B. The Contractor is responsible for adhering to the following standards:

1. Conduit penetrations through fire-rated or smoke walls: Completely seal around the conduit penetration with Hilti FS 601 fire-rated sealant or equivalent by Tremco, 3M, or equal.

2. Conduit sleeves through fire-rated or smoke wall: Completely seal around the conduit penetration with Hilti FS 601 fire-rated sealant or equivalent by Tremco, 3M, or equal. Completely seal inner opening of the conduit sleeve with fire wool packing and Hilti FS 611A intumescent firestop sealant.

3. Cable bundles through fire-rated or smoke walls (without sleeves): Completely seal openings with Hilti FS 611A intumescent firestop sealant or equivalent by Tremco, 3M, or equal.

4. Cable tray penetrations through fire-rated or smoke walls: Completely seal openings with Hilti FS 635 (trowelable type), or equivalent by Tremco, 3M, or equal.

C. A submitted response to this specification assumes that all firestopping will be provided as specified. The firestop manufacturer's specifications and instructions shall be submitted with the final documentation.

2.10 Compatibility of Related Equipment

A. Existing Equipment: Equipment and systems specified in these documents shall be assumed to be compatible with the systems already installed at Owner site(s) and as identified in this document as related to this project.

B. Installed Equipment: Specified equipment and systems shall be compatible with all other equipment and systems as offered by Contractor, thus placing the responsibility on Contractor to ensure proper interaction.

2.11 Licenses

A. Any and all licenses required for system functionality shall be provided.

2.12 Spare Parts

A. Suggested List: Contractor shall submit a list of suggested spare parts above and beyond what was specified with an offered price near the substantial completion of the project, allowing Owner to select appropriate parts as they see fit.

B. Means of Obtainment: The successful Contractor shall state where spare parts can be obtained after the installation.

2.13 Maintenance Manuals

A. Contractor shall produce a maintenance manual showing interconnection of equipment and any special procedures necessary for proper operation and maintenance of the systems.

Part 3 - Execution

3.01 General

A. Contractor shall provide, furnish, deliver, transport, erect, install, connect and configure all of the material and equipment described herein or depicted on any bid package document or drawing, as required for a turnkey solution.

3.02 Coordination

A. General: The Prime Contractor shall cooperate with other Contractors for proper provisioning, anchorage, placement, and execution of all work. Interference between the work of various Contractors shall be resolved before installation. In the event of conflict on space requirements or location of devices, refer the matter to Owner and Consultant for decision.

B. Related Work: References to the following related work do not limit or release Contractor from the responsibility of coordination with other trades or from having the necessary knowledge of other non-referenced work.

1. Work by Prime Contractor.
2. Work by other Technology and Security Contractors.
3. Work by Electrical Contractor.

C. Delays: Contractor shall coordinate with all other trades to avoid causing delays in the installation schedule.

D. AC Power: Contractor shall coordinate with Prime Contractor its requirements for proper AC power to service all equipment installed by Contractor.

E. Low Voltage Sleeving: Contractor shall provide openings through walls as necessary, with sleeving and fire-stopping materials installed in a professional manner to meet local and national codes.

F. Grounding and Bonding: Contractor shall coordinate with Prime Contractor its requirements for proper grounding and bonding to their equipment.

G. Surface-Mounted Raceway Coordination

1. Prime and Electrical Contractors: Contractor shall coordinate with Prime Contractor and Electrical Contractor the installation of surface-mounted-raceway where not provided but made necessary by non-penetrable wall.
2. Verification: Contractor shall field verify and coordinate the proposed use of surface-mounted raceway at any location with Consultant and Owner.

3.03 Basic Execution Requirements

A. General: Contractor is responsible for following industry standards of good practice for telecommunications and networking equipment.

B. Aesthetic Factors: With the installation of equipment and cables, consideration shall be given not only to operational efficiency but also to overall aesthetic factors. Contractor shall redo, at no cost to Owner, any work deemed by Owner to appear sloppy, hastily done, or unprofessional. Owner shall make final decision over whether work shall be redone.

C. Manufacturers' Recommendations: Manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers or as indicated in their published literature unless otherwise noted herein.

D. Protection of Work Area: Work shall be properly protected during construction; including shielding soft or fragile materials, protecting against dust and dirt, protecting and supporting cable ends off of the floor and from other traffic,

protecting floor box lids, and temporarily plugging open conduits during construction. Upon completion, installation shall be thoroughly cleaned and all tools, equipment, obstructions, or debris present as a result of work shall be removed from the premises.

E. Protection of Cable and Equipment: Contractor shall make appropriate preparations to protect all cabling and equipment from foreign material. Foreign material is defined as any substance or material that would void the manufacturer's performance warranty, impact ratings (UL, Plenum, etc.), or cover up markings needed for inspection. Foreign material includes, but is not limited to, paint overspray (intentional or not), fire-stopping material, drywall compound, or any other chemical, liquid, or compound that could come in contact with cables, cable jackets, cable termination points, or other equipment.

   1. Cleaning of cables or equipment with harsh chemicals from a failure to comply with Protection of Cable and Equipment clause is unacceptable. Contractor shall replace any affected cable, cable components, or equipment in their entirety at Contractor's sole cost.

F. Waste Materials: Contractor shall keep work area neat, orderly, and free from accumulation of waste materials. Remove trash and debris from the building and job site as required to maintain a clean work environment at all times. Rubbish shall be moved to a common trash point or receptacle on the job site as determined and directed by Prime Contractor or Owner.

G. Dumpsters: No construction debris shall be placed in building's dumpsters. Contractor shall provide a dumpster for construction waste and debris at own expense. Said dumpster shall be emptied on a regular schedule. Location of dumpster shall be arranged through Building Management. Appropriate measures shall be taken to protect asphalt or other ground surfaces.

H. Ceiling Grid: Contractor shall not hang cable supports from ceiling grid wire.

I. Roof Deck: Contractor shall not shoot into the roof deck for mounting cable hangers.

J. Mounting: Equipment and enclosures shall be mounted plumb and square in relation to the structure.

K. Raised Floor: All cabling installed below the raised floor shall be placed in the provided cable trays with appropriate means to hold cable in place. If no cable tray exists, Contractor shall provide J-hooks to hold cables in place. Sleeves shall be utilized for cable egress.

L. Motorized Furniture: Care shall be taken to properly dress all cables placed within motorized furniture and provide sufficient cable length and strain relief to allow motorized elements to operate within their full range of travel.

M. Flexible Furniture: Care shall be taken to properly dress all cables placed within flexible or re-configurable furniture to provide sufficient cable length and strain relief to allow full range of travel for flexible furniture configurations.

3.04 Preparation

A. Existing Equipment: Prior to any installation, the Contractor shall prepare the site by removing any remaining debris, leveling equipment racks (where appropriate), and verifying information and systems stated to be in-place are ready for use.

B. Equipment for Installation: Prior to installation, Contractor shall ensure that required major equipment has been secured and is ready for installation.

3.05 Cleaning

A. Tool Clean-up: Contractor is not permitted to use restrooms for tool clean-up.

B. Daily: At the end of each work period or day, Contractor shall remove excess packing, drilling remnants, and other non-equipment related parts, materials, or debris to ensure a clean, safe, and professional working environment.

C. Carpet: Contractor shall ensure that no damage to carpeting occurs as a result of their work. Contractor shall cover carpets in areas of work to prevent wire and other debris from entering the carpet.

3.06 Fire Stopping

A. Contractor is responsible for applying fire-stopping material in and around all openings that it creates or are created for it, whether or not specifically indicated in specifications or project drawings, where code requires the use of fire stopping material.

B. Contractor shall ensure that all fire-stopping materials meet appropriate codes and are installed in a neat and workman like manner.

3.07 Waterproofing

A. Contractor is responsible for creating a waterproof seal in and around any openings to the outside environment that are created by Contractor or for systems being installed.

B. Contractor shall ensure that all waterproof materials meet appropriate codes and are applied according to good engineering practice.

3.08 Racks, Cabinets, and Hardware

A. Racks and Cabinets: Contractor shall assemble and install racks and cabinets.

B. Installation Hardware: Install hardware in a secure manner. Screws shall be tightened to a torque just sufficient to secure equipment without deforming washers beyond their original diameter.

C. Considerations: Rack mount equipment shall be secured as recommended by the manufacturer with consideration to airflow, power, and in/out connections.

D. Cross Connections: Where cross connections are required between equipment, interconnections shall be installed using cable management devices to secure cables in a neat and workmanlike manner, applying best industry practices.

3.09 Installation Requirements

A. Cable pulling shall be done in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Recommended pulling tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed.

B. All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to ensure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a "break-away", or other approved method.

C. Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all installation work. During pulling operation, an adequate number of workers shall be present to allow cable observation at all points of pathway entry and exit.

D. All cable shall be free of tension at both ends.

E. PLENUM rated cable shall be used in areas used for air handling or where required by code.

F. Contractor shall replace any cables that have been damaged or abraded during installation.

G. Pulling lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used and will not harden or become adhesive with age.

H. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit or surface mount raceway.

3.10 Cable

A. Cable treatment: Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient

temperatures or moisture conditions above or below the rating of the manufacturer.

B. Splicing

1. Voice, data, and other twisted pair cables: No splices shall be installed in any voice, data or twisted pair cables.
2. Technology systems: No splices shall be installed in any cable less than five hundred (500) feet in length.
3. Digital multimedia/video cables: No splices are allowed in any digital multimedia/video cable.
4. Overhead paging systems: Cable splices for constant voltage overhead paging system shall occur only at speaker, amplifier or volume control knob locations.

C. Lengths

1. Variations: Where cables are to be of the same length, variations in the length shall be less than plus or minus ½ inch. Lengths of cables are based on the length of the unterminated signal conductors.
2. Labeling: Cables, regardless of length, shall be marked with a labeling scheme approved by Consultant.
3. Service Loops: A surplus of cable, located at or near the point of termination to facilitate potential future changes, shall be provided where appropriate. Cables shall have a minimum cable slack of 10ft (3m) at the telecommunication room(s) and 3.28ft (1m) at each telecommunications outlet in the suspended ceiling unless noted otherwise. Service loops shall be stored in an extended loop or in a figure-eight configuration, not in bundled loops.

D. Grouping

1. Cables shall be separated into like groups according to signal or power levels.
2. Power Cable Group: Power cables shall be secured to one side of the rack separate from any low-energy signal cable groups. Separation shall be a minimum of 4” in all directions.
3. Signal Cable Group: Signal cables shall be grouped according to signal type and secured to one side of the rack separate from any power cable groups. Separation shall be a minimum of 4” in all directions.

E. In Equipment Racks

1. Equipment rack wiring and cabling shall be neatly dressed.
2. Fastening: Rack cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame.

F. Support for Cables Outside of Equipment Racks

1. External wire and cables shall be supported at least every 5 feet (1.5m) from the structure and as required to maintain less than 12 inches of cable sag between supports without over-tensioning the cables. Contractor shall vary the precise distance between cable supports on long runs to avoid harmonics issues.

2. Hardware: Cables shall be supported by J-hooks, cable tray, or ladder rack. Hardware shall be secured to building structure using 3/8" threaded rod supports.

a. Right Angles: Cables are to run at right angles to the structure, placed above ceiling in halls or corridors.

b. Height: Cables shall not run above red iron joist.

G. Concealment: Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests. Cabling systems installed in public areas shall be installed within walls, ceiling, or floors or within surface wiring pathways, as dictated by codes and good engineering practice.

H. Velcro Straps for Horizontal Cabling: Straps shall be installed snugly without deforming cable insulation. Straps shall be spaced at uneven intervals not to exceed 4 feet.

I. Cable Ties and Velcro Straps within Equipment Racks and Cabinets: Ties and straps shall be installed snugly, without deforming cable insulation, at uneven intervals not to exceed 8 inches. Cable ties shall only be used for non-signal carrying cables. No sharp burrs shall remain where excess length of the cable tie has been cut.

J. Obstruction: Contractor shall notify Owner immediately if any obstruction or hazard is discovered in a pathway provided by others.

3.11 Connectors

A. Preparation: Cables shall be carefully prepared and connectors installed as directed by the manufacturer. Proper stripping devices and crimping tools shall be used.

B. Terminations: Connectors shall be carefully fitted to mating devices on equipment to avoid damage to mating contacts, inserts, or bodies. Specialized terminations shall be made in a neat and secure manner suited to the service of the wire and as directed by the manufacturer. Contractor shall use manufacturer specified terminations when those specifications exist.

C. Soldering: A person skilled in that practice shall execute soldered terminations. Any excessive insulation displacement resulting from soldering shall be grounds to require the Contractor to re-terminate the connector.

D. Adapters: Adapters shall be used only where the identity of the necessary type of connector is unknown at the time of installation, such as for Owner-provided equipment or in anticipation of future equipment upgrades, with Consultant's approval.

3.12 Spare Parts and Remote Controls

A. Keys: Contractor shall turnover all keys, tagged and organized by type on individual key rings, to Owner upon project completion.

B. Refer to individual sections for spare parts and remote control requirements.

3.13 Equipment Installation

A. General: Contractor shall make system properly operational and physically secure by mounting equipment and related accessories into furniture, consoles, and racks as required. Manufacturer's guidelines for installation shall be followed. Discrepancies in installation procedure or inability to complete a given task due to a shortage of materials or malfunctioning equipment shall be reported to Consultant immediately upon discovery.

B. Equipment Placement: Contractor shall locate equipment as indicated on drawings and as specified herein. Where such information is not provided, Contractor shall follow industry best practices and locate operable devices at convenient positions; heat generating devices at the top and seldom-accessed equipment below.

1. Unless otherwise specified, end user-operable devices shall be positioned within the range of front wheelchair access per ADA standards.

C. Equipment Installation: Equipment shall be installed as directed by the manufacturer using equipment manufacturer's desktop mounting frames, equipment tubs, installation hardware, and techniques. Contractor shall be responsible for moving equipment from storage and for providing necessary personnel or devices to carry and lift equipment around obstacles and into operating position.

3.14 Firmware

A. Firmware shall be latest version supported by software and/or equipment as of Date of Acceptance.

3.15 Rough-In

A. Scheduling: Contractor shall make every effort to install systems per this specification in a timely manner including rough-in of cabling and other apparatus where appropriate to stay on schedule.

B. Protection of Environment: Where cabling and/or equipment is installed prior to other trades completing their work in an area, Contractor shall take necessary precautions to cover, wrap, or otherwise protect to reduce possible damage which

may result from plastering, painting, cleaning, or other such work completed after installation and before substantial completion of the project.

3.16 Cutting, Drilling, Patching, and Painting

A. Coordination: Contractor is responsible for coordinating with the Prime Contractor and other trades when any cutting or drilling is required for the installation or proper performance of the specified systems.

B. Restoration: Contractor is responsible for returning all surfaces (including walls, floors, and ceilings) to their previous condition after any cutting.

3.17 Labeling

A. General: Rack-mounted equipment and hardware shall be labeled as required herein. Connectors, jacks, receptacles, outlets, cables, cable terminations, terminal blocks, rack mounted equipment, active slots of card frame systems, etc. shall be clearly, logically, and permanently labeled in a manner acceptable to Consultant.

B. Approval: Proposed wording and/or numbering schemes for labeling shall be provided to Consultant for review and written approval prior to procurement or installation.

C. Labels used shall be permanent and secure. Provide labeling as follows unless otherwise noted in a specific section:

1. Like Size: All labels, including engraved labels, shall be sized to match other labels used for same purpose.

2. Equipment Racks: For enclosed racks containing equipment, provide labels on each equipment rack rear door or console rear panel reading “No user serviceable parts. Refer service to qualified technician.”

3. Installer and Consultant Identification: Position at the front top center section of each equipment rack a label that states the names of system Installer and Consultant.

4. Custom Panels: Custom panel nomenclature shall be engraved, etched, or screened. Markings are to be designed to ensure consistency and clarity within and without of system. Verify markings and placements by submitting label sample layouts to Consultant for approval prior to procurement.

5. Documentation: Labeling information shall appear on the as-built drawings.

3.18 Demolition

A. General: Contractor shall be responsible for removal and collection at designated storage areas within the jail of all abandoned cabling and components. All demolished material shall remain the property of the County. The Contractor shall coordinate a suitable location with the jail for the storage of the demolished material. The County will dispose of the material in a safe and legal manner.

B. Verification: Contractor shall field-verify existing conditions prior to beginning demolition work. Any discrepancies between existing conditions and written instructions shall be reported to Consultant prior to the start of work in order to prevent disturbance of existing installation(s). Beginning work shall indicate acceptance of existing conditions. Contractor is responsible for immediately restoring any outages caused as a result of removing or damaging adjacent cabling, systems, or services.

C. Abandoned Cable: Any installed low voltage cable that is not terminated at both ends at a connector or other equipment and not identified for future use with a tag is considered abandoned cable. Contractor shall remove all abandoned cable back to headend. Where it is not possible to remove cables without damaging other cables that are to remain, such as in a shared conduit, Contractor shall cut cables at entry and exit point of constriction, leaving a minimum of 24” of cable at each end.

D. Cover Plates: Contractor shall provide and install blank cover plates for any outlets or junction boxes that are to be left in place and from which all cables have been removed. Cover plates shall match the Project standard color and finish.

3.19 Fire-Stopping

A. If Contractor removes anything from an opening in a fire-rated wall, Contractor shall restore the fire-rating condition of the wall to the same condition as before Contractor started its work. Depending on the size of the opening, this may involve sheetrock patching, in addition to use of other appropriate fire-stopping materials

3.20 Additional Engineering Services

A. General: Contractor is responsible for securing necessary engineering services where needed to meet the needs of the installation.

B. Change Orders: Only when Contractor can show that additional engineering services are needed as a result of changes to the scope of the services being requested in the contract documents will Owner entertain a Change Order Request for these services. Change order shall include cost new – cost old = new.

3.21 Testing

A. Procedure: Contractor shall develop a rigorous testing procedure to ensure full functionality and durability of installed systems under heavy-use conditions.

B. Supplies: Contractor shall supply testing equipment needed to verify compliance with specifications found in these documents.

C. Schedule: Contractor shall complete required testing prior to the substantial completion inspection by Owner and Consultant.

D. Data: Test data shall be properly documented and recorded so that it is available for final inspection.

E. Quality Control: Testing may be repeated during the inspection process at the request of Owner or Consultant.

F. Prior to energizing or testing the system, Contractor shall ensure the following:

1. Installation: Products are installed in a proper and safe manner per the manufacturer's instructions.

2. Cleanliness: Products are neat, clean, and unmarred and parts securely attached. Dust, debris, solder, splatter, etc. is removed.

3. Cables and Connections: Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.

4. Grounding: Electronic devices are properly grounded.

5. AC Power: Each AC power receptacle is tested with a circuit checker for proper hot, neutral, and ground connections prior to connecting equipment.

3.22 Testing and Acceptance

A. The Contractor shall perform acceptance tests as indicated below for each subsystem (backbone, station, etc.) as it is completed.

B. The Contractor shall supply all equipment and personnel necessary to conduct the acceptance tests. Prior to testing, the Contractor shall provide a summary of the proposed test plan for each cable type, including equipment to use, setup, test frequencies or wavelengths, results format, etc. The Consultant will approve the method of testing.

C. The Contractor shall visually inspect all cabling and termination points to ensure that they are complete and conform to the wiring pattern defined herein. The Contractor shall provide the Consultant with a written certification that this inspection has been made.

D. The Contractor shall conduct acceptance testing according to a schedule coordinated with the Consultant. Representatives of the Owner may be in attendance to witness the test procedures. The Contractor shall provide a minimum of one (1) week advance notice to the Consultant and Owner to allow for such participation. The notification shall include a written description of the proposed conduct of the tests, including copies of blank test result sheets to be used.

E. Tests related to connected equipment of others shall be done only with the permission and presence of Contractor involved. The Contractor shall ascertain that testing only as required to prove the wiring connections are correct.

F. The Contractor shall provide Consultant with test results and descriptions of the testing methodology, including the date of the tests, the equipment used, and the procedures followed. At the request of the Consultant, the Contractor shall provide copies of the original test results.

G. All cabling shall be 100% fault free unless noted otherwise. If any cable is found to be outside the specification defined herein or as standards require, that cable and the associated termination(s) shall be replaced at the Contractor's expense. The applicable tests shall then be repeated.

H. The Consultant or Owner may request that a 10% random field re-test be conducted on the cable system to verify documented findings.

1. If requested, the Contractor shall test up to 10% of cable links at no cost to the Owner.

2. Tests shall be a repeat of those defined above and under Testing and Acceptance. If findings contradict the documentation submitted by the Contractor, additional testing shall be performed to the extent determined necessary by the Consultant, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

I. Each PLC closet shall be fully cut over, completed and signed off on before the next cut over proceeds regardless of schedule.

3.23 Grounding

A. Refer to Section 27 05 26 for specific Grounding and Bonding installation requirements.

3.24 Training Program

A. Contractor shall provide training in the manner delineated below in addition to specific requirements identified in subsequent sections.

B. Contractor shall provide audio-video recording of each training session to Owner.

C. Prior to scheduling or delivering End User training, Contractor shall confirm that:

1. Closeout submittals have been accepted by Owner and Consultant.

2. Final closeout inspection has been completed and punch list items rectified.

3. Training schedule dates have been coordinated with and approved by Owner and Consultant.

D. Training shall include:

1. Approved handouts.

2. Practical and comprehensive operation of systems.

3. Basic system troubleshooting techniques.

4. Basic system maintenance.

E. Training Blocks

1. Training time is defined as those hours specifically set aside for the sole purpose of training end users. Credited time will not be given for any time spent providing instructions to the Owner's staff for a system not completed or that has not passed final acceptance by the Owner and Consultant, or training performed outside of the approved training program.

2. This training will be divided into training session "Blocks" as coordinated with the Owner.

    a. The first training session block shall consist of training intended for the common system operators. Such training, at a minimum, shall include the day to day use of the system.

    b. The second training session block shall consist of training administrators of the day to day administration of the system. Such training, at a minimum, shall include use of the administration control functions of the systems, user setup, and filtering and pulling reports.

    c. The third training session block shall consist of training administrators on system troubleshooting, maintenance, and updates. Such training, at a minimum, shall include using the system tools to diagnose issues, diagnosing common physical equipment issues, performing simple maintenance, and performing system updates.

    d. The forth training session block shall consist of a training session structured for high-level users, for example staff trainers who will provide instruction to other users and will include advance system configuration and operational knowledge needed to maintain and manage all specified technology systems. The Contractor may elect to engage the Manufacturer(s) in certifying the high-level end users in the systems at no cost to the Owner.

F. The Contractor shall issue a certificate of training completion to the trainees upon completion of their training. Such certificates must be signed by both the trainer and trainee(s) for the Contractor to receive training credit.

3.25 Warranty, Service, Support and Maintenance Program

A. Contractor shall provide a warranty conforming to the stipulations below in addition to specific requirements identified in subsequent sections.

B. As part of the base bid cost, the Contractor shall include a 1-year turnkey warranty period with full support costs.

C. The Warranty period shall begin after all punch list items have been rectified. The Contractor shall receive a letter of completion from the Consultant and Owner indicating project completion and starting the warranty period.

D. The warranty and support work included in this contract shall cover the following materials, software, and services, without additional cost to the Owner:

1. Inspections, preventative maintenance, and testing of equipment and components. The Contractor shall schedule a 10-month on-site preventative system review 10-months into each year of warranty and support including system inspections, preventive maintenance, software upgrades/patches, and testing of equipment and components.
2. Regular Service, Emergency Service, and Normal Service.
3. Labor, travel, equipment, materials, and transportation cost for all services covered by this warranty.

E. Response Time: Contractor shall respond to calls for warranty services in a timely manner as delineated below.

1. The Owner reserves the right to make the final determination of emergency or normal service calls and the right to coordinate the best times for service of any system failure.
2. Emergency service calls are defined as failures which prohibit the use of a typical system function(s) and pose a life safety concern, or such failures which cause a major impact to the Owner's daily operations.
    a. The Contractor shall provide remote service diagnosing the impact within two (2) hours after notification by the Owner.
    b. If remote service does not correct the reported issue, the Contractor shall provide on-site service correcting the impact within four (4) hours after notification by the Owner.
3. Normal service calls are defined as failures which prohibit the use of typical system function(s) but which do not inhibit critical system usage, do not pose life safety concerns, and do not create a major impact to Owner's daily operations.
    a. The Contractor shall provide remote service correcting the impact within twenty-four (24) hours after notification by the Owner.
    b. If remote service does not correct the reported issue, the Contractor shall provide on-site service correcting the impact within forty-eight (48) hours after notification by the Owner.
4. The Contractor shall supply Service Request forms and or proper contact procedure to the Owner with instructions for proper notification of the Contractor for warranty service. By following said instructions, the Owner shall constitute proper notification for any needed warranty service

F. Repair Time: Contractor shall locally stock critical parts in sufficient quantities such that emergency repair or replacement shall be guaranteed within twelve (12) hours. Temporary replacements within this time period shall be acceptable, provided temporary replacements do not compromise system functionality and provided permanent replacement is achieved within ninety-six (96) hours. Contractor may

contact the Owner for use of Owner supplied spare parts where delay of system repair will have negative impact on system performance.

G. Transmittal: A copy of this Warranty shall be delivered to and signed for by the Owner's representative whose primary responsibility is the operation and care of these systems. A copy of the signed Warranty document shall be delivered for review as part of the Final Submittals.

H. Registration: Contractor shall register Warranty papers for all equipment and software in the name of the Owner and furnish reproductions of all equipment Warranty papers to the Owner with the Final Submittals.

I. Subcontracting: Warranty service work may not be subcontracted except with specific permission and approval by the Owner.

1. Service/Warranty Procedures: Contractor shall submit a warranty service plan containing all contact information and Owner service call directions for Owner review with project close-out submittals.

J. Resolution of Conflicts:

1. The Owner retains the right to resolve unsatisfactory warranty service performance at any time by declaring the work unsatisfactory and stating specific areas of dissatisfaction in writing.

2. If the Contractor or his approved Subcontractor does not resolve such stated areas of dissatisfaction within ninety-six (96) hours, the Owner may appoint an alternative service agency or person to fulfill the terms of the Warranty at the expense of the Contractor. This action may be taken repeatedly until the Owner is satisfied that Warranty service performance is satisfactory. Satisfactory resolution of a malfunction shall be considered adequate when the device, equipment, system or component which is chronically malfunctioning is brought into compliance with the standards of performance as contained herein and published by the manufacturers of the equipment installed.

K. Maintenance Support After the Warranty Period

1. The Contractor shall provide pricing for a labor, software, and support only extended service agreement for use in establishing a separate maintenance support agreement with the successful Contractor at the end of the warranty period.

2. The extended service agreement shall follow the same requirements listed for the warranty period.

3. Should the successful Contractor not meet their obligations during the warranty period, the Owner reserves the right contract with another Contractor to provide the extended service agreement.

End of Section

Section 27 05 23 – Pathways for Technology Systems

Part 1 - General

1.01 Scope

A. All security cable or cable used for security when required shall be installed within conduit or pathway outside of the security rooms. No exposed cable shall be allowed.

B. Refer to Section 27 00 00 for additional project scope information.

1.02 Related Work

A. Section 27 00 00 – General Technology Requirements

B. Section 27 05 26 – Grounding and Bonding for Technology Systems

C. Section 27 16 00 – Communications Connecting Cords

D. Section 27 18 00 – Communications Labeling and Identification

E. Section 27 51 00 – Distributed Communications Systems

F. Section 27 61 00 – Command and Control Systems

1.03 Definitions

A. Refer to Section 27 00 00 for additional definitions.

1.04 Reference Standards and Codes

A. Refer to Section 27 00 00 for additional requirements.

1.05 Qualifications

A. As required all pathway shall be installed by a licensed electrician.

B. Refer to Section 27 00 00 for additional requirements.

1.06 Pre-Construction Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.07 Construction Progress Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.08 Closeout Submittals

A. Refer to Section 27 00 00 for additional requirements.

Part 2 - Products

2.01 Substitutions

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 Surface Raceway

A. In areas where surface raceway will be used as a cable path, no exposed cable shall be permitted.

B. With the agreement of the Consultant and Owner, where telecommunications outlets are to be located in areas where the walls cannot be fished, the station wire serving these outlets shall be covered with raceways. No exposed wire shall be permitted within offices, laboratories, conference rooms, or like facilities. Contractor shall attempt to fish hollow walls, use existing conduit, or exhaust all other options to conceal cabling prior to installing surface raceway.

C. The raceway shall originate from a surface mounted box located off the floor, be attached to the wall, and terminate above the ceiling. The outlet box height shall match existing electrical receptacle height. Raceway for wall-mounted phone locations shall originate from a surface mounted box with the top of the box located 48" off the floor.

D. Raceway finish shall match finish of project electrical raceway. All fittings including but not limited to extension boxes, elbows, tees, and fixture boxes shall match the color of the raceway.

E. Technology/security outlet faceplates shall match electrical faceplate standards for finish.

F. The raceway and all system devices shall be UL listed, exhibit nonflammable self-extinguishing characteristics, tested to specifications of UL94V-0.

G. Raceway turns or bends shall conform to manufacturer specifications or recommendations and industry best-practices for UTP and fiber optic cable minimum bend radius.

2.03 Cable Pathway Sleeves

A. The Contractor shall provide all necessary wall penetration for cable pathways whether or not specifically shown on Project Drawings.

B. All wall penetrations shall have a metallic sleeve(s) as required to maintain a maximum 40% fill ration.

C. All sleeves shall be properly firestopped by this Contractor.

D. Contractor shall provide all core holes, pathways and sleeves (minimum 1.25" c).

E. Contractor shall install non-metallic threadless insulating bushings on end of all conduits.

F. Conduit Core Holes and Sleeves thru Floor: For all floor penetrations, Contractor shall provide IMC conduits with threaded steel couplings set flush with finish floor. Extend 6” above finish floor with IMC before any termination.

G. Manufacturer:

1. STI EZ Path
2. Hilti Speedsleeve
3. Or approved equal

2.04 Metal Conduits and Fittings

A. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. EMT: Comply with ANSI C80.3 and UL 797.
5. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
    a. Fittings for EMT:
        i. Material: Steel
        ii. Type: Setscrew
6. Expansion Fittings: Steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.

2.05 Outlet Boxes

A. General Requirements for Outlet Boxes

1. Comply with TIA-569-B.

B. Metallic outlet boxes and device covers shall be galvanized steel not less than 1/16'' thick.

C. The dimensions of the metallic outlet box shall be 2''x4'', 4''x4'' and 6''x4'' with a minimum depth of 2.5''. See drawings for details.

D. Metallic outlet boxes shall be equipped with single device cover (or two-device cover where needed).

E. Where installed in plaster, gypsum board, etc., covers shall be raised to compensate the thickness of the wall.

F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

G. Where metallic outlet boxes are to be empty for future use, blank covers shall be used.

H. Gangable boxes are not allowed.

2.06 Jail/Detention Center Appropriate Fittings, Connectors, Boxes and Support Hardware

A. All fitting, conduit, boxes and anchoring hardware must be secure to building structure and design and installed in a manner that inmates are unable to remove materials.

B. All fitting, conduit, boxes and anchoring hardware must be designed and installed to ensure no sharp corners of edges can be used to injury inmates or jail staff.

C. All surface mounted backboxes shall have no exposed knockouts or removable objects.

D. All accessible equipment and exposed screws shall use a Torx security screw.

E. All accessible screw connections shall be secured with Blue Loctite when located in areas where inmates are unsupervised such as housing unit cells, holding cells, ect.

2.07 Jail/Detention Security Caulking

A. All conduits, fitting, cameras, intercoms or other miscellaneous items that pose a potential ligature risk or where inmates are not under direct supervision such as cells, holding cells, bathrooms or other areas of risk shall have all edges sealed with a flexible, tamper proof security caulk with a Shore A hardness of 80+. Inaccessible areas 10’ AFF shall be sealed with a tamper resistant security caulk with a Shore A hardness of 50. Inaccessible is defined as an area where an inmate cannot reach even while standing on fixtures, furniture, rails, ect.

Part 3 - Execution

3.01 Testing

A. Refer to Section 27 00 00 for additional requirements.

3.02 Training

A. Refer to Section 27 00 00 for additional requirements.

3.03 Warranty

A. Refer to Section 27 00 00 for additional requirements.

3.04 Surface Raceway System

A. In areas where surface raceway will be used as a cable path, no exposed cable shall be permitted.

B. With the agreement of the Consultant and Owner, if a telecommunications outlet is required in an area where the walls cannot be fished, the station cable serving these outlets shall be covered with raceway. No exposed cable shall be permitted within offices, laboratories, and conference rooms, or like facilities. Contractor shall attempt to fish hollow walls, use existing conduit, or exhaust all other options to conceal cabling prior to installing surface raceway.

C. The raceway shall originate from a surface mounted box located off the floor and be attached to the wall and terminate above the ceiling. The outlet box height shall match existing electrical receptacle height. Raceway for a wall-mounted location shall originate from a surface mounted box with the top of the box located 48" off the floor.

D. Minimum bend radius shall be adhered to for UTP and fiber optic cable.

E. Where raceway is to be installed on painted, smooth, finished surfaces, the Contractor shall clean surface prior to installing raceway.

F. Where non-metallic raceway is to be installed on non-smooth surfaces such as wallpaper, unpainted brick, concrete, etc., the Contractor shall use flat-head screws in addition to the adhesive backing to fasten channel to surfaces.

G. Where Contractor is required to install metallic raceway, the raceway base shall be installed using flat-head screws and following all manufacturer's recommendations.

H. Where new outlet locations are indicated on Project Drawings as having existing Wiremold™ type raceway, the Contractor shall remove existing raceway from wall and install new specified raceway to cover any damage or markings caused from removing existing raceway product.

I. All surface raceway shall be mounted level and plumb. Where the Owner considers raceway channels to be installed unsatisfactorily, the Contractor shall remove and replace necessary channels at no additional cost to the Owner.

J. Suitable insulating bushings and inserts shall be used at connections to outlets and corner fittings. Dropped ceiling end fittings shall be utilized where raceway channel connects to dropped accessible ceiling tile. In rooms with drywall ceilings, open ceilings, or non-accessible ceilings, the Contractor shall extend raceway to the nearest location, hallway, or corridor that has accessible ceiling cavity. All cables shall be concealed.

3.05 Pathway Applications

A. Indoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT

2. Concealed in Ceilings and Interior Walls and Partitions: EMT

B. Minimum Pathway Size for Data: 1-inch trade size. Cable fill shall not exceed a 40% fill ratio.

C. Pathway Fittings: Compatible with pathways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.

2. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.

3.06 Installation

A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

B. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

C. Complete pathway installation before starting conductor installation.

D. Comply with requirements in Division 27 Section "Hangers and Supports for Communication Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches of enclosures to which attached.

I. All conduit penetrations shall comply with all applicable fire codes. All conduit penetrations in fire-rated walls or floors shall be sealed and fire proofed to at least the rating of the penetration area.

J. Conduits shall be routed in the most direct route, with the fewest number of bends.

K. There shall be no continuous conduit sections longer than 100 feet. For runs that total more than 100 feet, insert junction or pull boxes (or gutters if appropriate) so that no continuous run between pull boxes is greater than 100 feet.

L. There shall be no more than two 90-degree bends (180 degrees total) between conduit pull boxes.

M. Changes in direction shall be accomplished with sweeping bends observing minimum bend radius requirements above. Do not use pull boxes for direction changes unless specifically designated otherwise in the Drawings.

N. Stub-ups to Above Recessed Ceilings:

1. Use EMT for pathways.

2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

O. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

P. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

Q. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

R. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

S. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb. tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

3.07 Outlet Boxes

A. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

B. Exact locations of the outlet boxes shall be coordinated with the electrical contractor and other trades.

C. The approximate locations of the outlets are indicated on the drawings. The exact locations shall be determined at the building. The right is reserved to change

without additional cost, the exact location of any outlet, a maximum of 10' before it is permanently installed.

D. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a rain tight connection between box and cover plate or supported equipment and box.

E. Horizontally separate boxes by a minimum of 12'' mounted on opposite sides of walls so they are not in the same vertical channel.

F. Outlet boxes installed back to back in fire-rated walls shall be separated horizontally by a minimum of 24''.

G. Install all outlet boxes in finished areas flush with the wall. Maintain ¼'' or less space between outlet box front and finished wall surface.

H. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

I. Outlet boxes shall be firmly anchored in place and shall not depend on the cover plate to hold it secure to the wall.

J. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

K. Any surface boxes shall have rounded corners and edges. Surface boxes must be approved by Owner prior to installation.

3.08 Riser Conduits

A. Conduits entering equipment rooms shall be reamed or bushed and terminated not more than 4" from a wall and within 12” of room corners.

B. Conduits entering equipment rooms from below floor shall be terminated not more than 4" above finished floor.

C. Conduits shall not be less than 4" trade size and be equipped with a measured pull line at 12” increments rated at a minimum 1200 pound test.

D. Provide restorable fire stops inside and around conduits as recommended by UL1479 or ASTM E814 for all conduits penetrating fire-rated construction.

E. Provide an insulating press fit bushing on all telecommunications riser conduits. Bushings must be rated to be used in an environmental air handling space (Plenum).

3.09 Sleeve-Seal Installation for Communications Penetrations

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.10 Firestopping

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

End of Section

Section 27 05 26 – Grounding and Bonding for Technology Systems

Part 1 - General

1.01 Scope

A. A complete new grounding system in the Central Jail and Annex shall be provided.

B. All existing and new components shall be grounding to the building grounding system including but not limited to: new or existing racks and enclosures, conduit, sleeves, raceway, ect.

C. Provide TGB and TMGB in the rooms as well as rack mounted strips grounded directly to the TGB or TMGB.

D. Refer to Section 27 00 00 for additional project scope information.

1.02 Related Work

A. Section 27 00 00 – General Technology Requirements

B. Section 27 05 23 – Pathways for Technology Systems

C. Section 27 16 00 – Communications Connecting Cords

D. Section 27 18 00 – Communications Labeling and Identification

E. Section 27 51 00 – Distributed Communications Systems

F. Section 27 60 00 – Physical Security General Requirements

G. Section 27 61 00 – Command and Control Systems

1.03 Definitions

A. Refer to Section 27 00 00 for additional definitions.

1.04 Reference Standards and Codes

A. IEEE C2 - National Electrical Safety Code

B. IEEE Std. 837-2002, or latest version – Standard for Qualifying Permanent Connections Used in Substation Grounding

C. ANSI/TIA-607 - Commercial Building Grounding and Bonding Requirements for Telecommunications

D. NFPA 70E - Standard for Electrical Safely in the Workplace

E. ANSI/NECA/BICSI-607 - Telecommunications Bonding and Grounding Planning and Installation methods for Commercial Buildings

F. UL 467 - Standard for Grounding and Bonding Equipment

G. Refer to Section 27 00 00 for additional requirements.

1.05 Qualifications

A. As required all grounding backbone and connections shall be completed by a licensed electrician.

B. Refer to Section 27 00 00 for additional requirements.

1.06 Pre-Construction Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.07 Construction Progress Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.08 Closeout Submittals

A. Refer to Section 27 00 00 for additional requirements.

Part 2 - Products

2.01 Substitutions

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 Grounding and Bonding Cable

A. The grounding and bonding cable shall be solid stranded copper conductors.

B. The grounding and bonding cables shall have a green jacket color and riser or plenum rated as required.

C. Feeder and Branch Circuit Equipment Ground: Size as shown on drawings, specifications, or as required by NFPA 70, whichever is larger. Differentiate between normal ground and isolated ground when both are used within the same facility.

2.03 Grounding and Bonding Busbars

A. Telecommunications Main Grounding Busbar (TMGB)

1. Factory-drilled solid copper with holes to accommodate lugs. Field manufactured busbars are not acceptable.

2. 0.25” thick x 4” wide x 12” long

3. Sized for current applications and future growth

4. Insulated from its support
5. Shall be an electro-tin plated busbar
6. Maintain a minimum of 2” of clearance from wall
7. UL listed and BICSI certified

B. Telecommunications Grounding Busbar (TGB)

1. Factory-drilled solid copper with holes to accommodate lugs. Field manufactured busbars are not acceptable.
2. 0.25” thick x 2” wide x 12” long
3. Sized for current applications and future growth
4. Insulated from its support
5. Shall be an electro-tin plated busbar
6. Maintain a minimum of 2” of clearance from wall
7. UL listed and BICSI certified

C. Horizontal Equipment Rack or Cabinet Busbar

1. Mounts to standard 19” Rack or Frame
2. Capacity: 6 Double hole lugs
3. Shall be an electro-tin plated busbar
4. UL listed and BICSI certified

D. Equipment Rack or Cabinet Busbar

1. Mounts to vertical rail or inside of cabinet in 19” or 23” equipment rack or frame.
2. Capacity: 9 Double hole lugs
3. Shall be an electro-tin plated busbar
4. UL listed and BICSI certified

2.04 Mechanical Connectors

A. Mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers, and lock washers shall be made of Silicon Bronze and supplied as a part of the connector body and shall be of the two bolt type.

B. Split bolt connector types are not allowed.

C. Connectors shall meet or exceed UL 467.

2.05 Compression Lugs

A. Shall be UL & CSA listed

B. Shall meet or exceed the performance requirements of IEEE 837, latest revision

C. Compression type

D. Shall be manufactured from pure wrought copper. Conductivity of this material shall be no less than 99% by IACS standards.

E. Shall be electro-tin plated

F. Lugs shall be 2-hole. Single hole lugs are not allowed

G. Long barrel that will allow a minimum of two crimps with standard industry colors

H. Each connector shall be filled with an oxide-inhibiting compound

I. Crimped with a compression, tool and die system, according to manufacturer's recommendation

2.06 Taps

A. Connections to the Conductor shall be made with irreversible compression connectors

B. Shall be UL & CSA listed

C. Requires a minimum of (2) crimps for C Tap or H Tap, 1 crimp for I-Beam and busbar Tap

D. Crimp according to manufacturer's recommendation

Part 3 - Execution

3.01 General

A. Install products in accordance with manufacturer's recommendations.

B. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

C. Mechanical connections shall be accessible for inspection and maintenance.

D. No insulation shall be installed over mechanical ground connections.

E. Ground connection surfaces shall be cleaned and all connections shall be made so that disconnection or removal is impossible.

3.02 Resistance Measurement

A. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Resistance shall not exceed 2 ohms.

3.03 Telecommunications Bonding Backbone (TBB)

A. The intended function of a TBB is to reduce or equalize potential differences between telecommunications systems. While the TBB will carry some current under ac power ground fault conditions, it is not intended to provide the only ground fault return path.

B. The TBB shall:

1. Be connected to the TMGB & TGB.

2. Be a continuous copper conductor that shall be sized no less than 6 AWG to a maximum of 3/0 AWG. The TBB shall be sized in accordance to the following table:

Linear Length – ft.	Size (AWG)
Less than 13	6
14 - 20	4
21 - 26	3
27 - 33	2
34 - 41	1
42 - 52	1/0
53 - 66	2/0
Greater than 67’	3/0

3. The TBB conductors shall be installed and protected from physical and mechanical damage.

4. The TBB conductors should be installed without splices.

a. Where splices are necessary, the number of splices should be kept to a minimum and they shall be accessible and located within telecommunications spaces or j-box labeled as a telecommunications bonding backbone splice.

b. Joined segments of a TBB shall be connected using exothermic welding, irreversible compression-type connectors or equal.

C. A metallic cable shield shall not be used as a TBB.

3.04 Building Structure Ground

A. Connects the TMGB/TGB to building steel reducing the backbone resistance to ground.

B. Scrape away material to building steel to form a clean bond.

C. All TMGB/TGB shall be grounded to building steel.

3.05 Telecommunications Equipment Bonding Conductor (TEBC)

A. Connects the TMGB/TGB to equipment racks and cabinets.

B. Shall be a continuous copper conductor that shall be sized per the length of cable.

C. Shall be separated from ferrous materials by 2” or be bonded to the ferrous metal.

D. May be routed within cable trays or suspended 2” under or off the side of the cable tray or ladder rack.

E. Shall be supported every 3ft.

F. 8” minimum bend radius.

G. May come cross other cable groups at a 90 degree angle only.

H. A metallic cable shield shall not be used as a TEBC.

3.06 Rack or Cabinet Bonding Conductor

A. A bonding conductor shall be used to connect the equipment racks and cabinets directly to the TMGB, TGB or underfloor ground mesh network.

B. All metallic enclosures, including remote mounted equipment cabinets and racks for telecommunications, security or audio/visual shall be bonded to the nearest TMGB or TGB using a minimum sized conductor of 6 AWG. Remote bonds shall be labeled on both ends stating the destination of the bond.

3.07 Electrical Distribution Panel (EDP)

A. The AC EDP serving the Telecommunications Room shall be bonded to the TMGB or TGB using a minimum of a 6 AWG cable.

B. A qualified electrician shall make all connections within an AC electrical distribution panel.

3.08 Optical Fiber Conductive Cables

A. Conductive fiber-optic cables should be bonded and grounded as specified in the NEC.

3.09 Conduit and Sleeve Bonding

A. All conduits and sleeves entering a telecommunications room shall be grounded.

3.10 Ladder Rack and/or Cable Tray

A. All low voltage cable runway sections shall be bonded together and bonded back to the nearest Telecommunications Room the runway is serving as close TMGB or TGB as practical.

B. Maintain an 8” minimum bend radius on the TEBC.

C. Keep a 2” separation from other cables both power and telecommunications.

D. Remove any paint, oxidation, etc. from the runway surfaces that are being bonded.

E. Drill two holes as required to accommodate the 2-hole compression lug.

F. Apply a thin coat of antioxidant around the holes and on the surface where the lug will be in contact.

G. Attach straps to the runway using stainless steel hardware sized for the lug holes.

H. Wipe off any excess antioxidant after installation of the lug.

3.11 Labeling

A. Each grounding/bonding cable shall be labeled at the TMGB or TGB.

B. All taps to the TBB shall be within an enclosure and labeled as to its purpose.

C. Mechanical connectors shall be clearly marked with the catalog number, conductor size, and manufacturer.

D. Compression lugs shall be clearly marked with manufacturer, catalog number, conductor size, and required compression tool settings.

3.12 Testing

A. Refer to Section 27 00 00 for additional requirements.

B. Perform testing in accordance with test instrument manufacturer’s recommendations using the fall-of-potential method.

3.13 Training

A. Refer to Section 27 00 00 for additional requirements.

3.14 Warranty

A. Refer to Section 27 00 00 for additional requirements.

End of Section

Section 27 16 00 – Communications Connecting Cords

Part 1 - General

1.01 Scope

A. This section describes the products relating to high quality Category 6 voice and data patch cords.

B. In this section the term patch cords refers to the cords that connect Owner provided data network electronics to the horizontal cable infrastructure.

C. It is important that the horizontal cable system and the provided patch cords work as one complete system for guaranteed channel performance. Patch cords shall be manufactured by the same manufacturer as the jack and patch panels.

D. The Contractor shall provide and deliver all cords as listed in this section. The Owner will be responsible for installation of cords.

1.02 Related Work

A. Section 27 00 00 – General Technology Requirements

B. Section 27 05 23 – Pathways for Technology Systems

C. Section 27 18 00 – Communications Labeling and Identification

D. Section 27 51 00 – Distributed Communications Systems

E. Section 27 60 00 – Physical Security General Requirements

F. Section 27 61 00 – Command and Control Systems

1.03 Definitions

A. Refer to Section 27 00 00 for additional definitions.

1.04 Reference Standards and Codes

A. Refer to Section 27 00 00 for additional requirements.

1.05 Pre-Construction Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.06 Construction Progress Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.07 Closeout Submittals

A. Refer to Section 27 00 00 for additional requirements.

Part 2 - Products

2.01 Substitutions

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 Category 6 Patch Cords

A. The Owner has the right to determine the final length of the patch cords after the contract is awarded.

B. All patch cords shall be round and consist of eight insulated 23 AWG stranded copper conductors, arranged in four color-coded twisted pairs within a flame retardant jacket and be backwards compatible with lower performing categories. Modular patch cords shall utilize ISO termination method that is designed to reduce and control near-end cross talk (NEXT) and far end cross talk (FEXT) without compromising signal impedance.

C. Both ends of the cord shall be equipped with modular 8-position (RJ45 style) plugs wired straight through with standards compliant wiring. All modular plugs shall exceed FCC CFR 47 part 68 subpart F and IEC 603.7 specifications, and have 50 micro inches of gold plating over nickel contacts. Cable shall be label-verifiable. Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level. Patch cords shall have color-coded insert molded strain relief boot with a latch guard to protect against snagging. Additional color-coding shall be available by the use of snap-in icons.

D. Patch cords shall be wired straight through. Pin numbers shall be identical at each end and shall be paired to match T568B patch panel jack wiring per ANSI/TIA/EIA-568-B. Patch cords shall be unkeyed.

E. Cords shall be highest quality patch cords available by connectivity manufacturer.

1. Manufacturer:

a. Belden

b. Berk-Tek

c. Commscope

d. General Cable

e. Leviton

f. Panduit

g. Superior Essex

F. The Contractor shall provide a patch cable of the appropriate length for all network based equipment. The Contractor shall coordinate the connections to the existing network with County IT.

Part 3 - Execution

3.01 Testing

A. Refer to Section 27 00 00 for additional requirements.

3.02 Training

A. Refer to Section 27 00 00 for additional requirements.

3.03 Warranty

A. Refer to Section 27 00 00 for additional requirements.

3.04 Ordering and Delivery

A. Prior to ordering patch cords the Contractor shall schedule meeting with Owner and Consultant to verify patch cord lengths, colors and quantities.

B. Contractor shall coordinate delivery of patch cords with Owner.

End of Section

Section 27 18 00 – Communications Labeling and Identification

Part 1 - General

1.01 Scope

A. This section describes the products and execution requirements relating to labeling of telecommunications cabling, termination components, and related subsystems. Covered systems include the following:

1. Equipment room backboards and equipment racks
2. Cable and terminating equipment
3. Telecommunications grounds and related components

1.02 Related Work

A. Section 27 00 00 – General Technology Requirements

B. Section 27 05 23 – Pathways for Technology Systems

C. Section 27 05 26 – Grounding and Bonding for Technology Systems

D. Section 27 16 00 – Communications Connecting Cords

1.03 Definitions

A. Refer to Section 27 00 00 for additional definitions.

1.04 Reference Standards and Codes

A. Refer to Section 27 00 00 for additional requirements.

1.05 Pre-Construction Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.06 Construction Progress Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.07 Closeout Submittals

A. Refer to Section 27 00 00 for additional requirements.

Part 2 - Products

2.01 Substitutions

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 Labels

A. All labels shall be permanent and be machine generated (e.g., Brady or Panduit). No handwritten or non-permanent labels shall be allowed. Labels shall be Brady "I.D. Pro" or XC-Plus or equivalent. Labeling on backboards and/or equipment racks may be pre-cut adhesive type.

B. Characters on all labels shall be black printed on a white background.

C. Label size shall be appropriate to the cable size(s), outlet faceplate layout, patch panel design, or other related equipment sizes and layouts.

D. All labels to be used on cables shall be self-laminating, white/transparent vinyl, and be wrapped around the cable sheath. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminated over the full extent of the printed area of the label.

Part 3 - Execution

3.01 Testing

A. Refer to Section 27 00 00 for additional requirements.

3.02 Training

A. Refer to Section 27 00 00 for additional requirements.

3.03 Warranty

A. Refer to Section 27 00 00 for additional requirements.

3.04 General

A. The Contractor shall match the Owner's standard labeling scheme.

B. Clean surfaces before attaching labels.

C. Install all labels firmly. Labels attached to terminating equipment such as backboards, faceplates, 110 blocks, and patch panels shall be installed plumb and neatly on all equipment.

3.05 Labeling of Cabling and Termination Components

A. Backboard and Equipment Racks

1. Backboards and equipment racks shall be labeled by the Contractor identifying the telecommunication room. Additionally, equipment racks shall have an alpha character after the room number unique to that particular communications closet.

2. Character height shall be 1-inch (minimum).

B. Cabling

1. Horizontal cables shall have a machine generated wrap around cable label within 4” of each end of the cable. Label shall be clearly legible and meet TIA-EIA 606 standards. Character height shall be .25” (minimum).

2. Voice/data/video backbone cables shall have a machine generated wrap around cable label within 12” of each end of the cable. Label shall be clearly legible and meet TIA-EIA 606 standard. Character height shall be .5” (minimum).

3.06 Standard Outlet Faceplates

A. All faceplates shall be clearly labeled indicating the destination of the cable(s) (telecommunication room number), the data patch panel(s) letter designation, the data port number(s) on the data patch panel(s), and the voice cable number(s).

B. Telecommunications outlets are to be labeled (1) on the cover of the assembly and (2) on each cable terminated at that location.

C. Station cables shall be labeled within two inches of the cable end.

3.07 Ground System Labeling

A. All grounds shall be labeled as close as practical to the point of termination (for ease of access to read the label). Labels shall be nonmetallic and include the following statement: “WARNING: If this connector or cable is loose or must be removed, please call the building telecommunications manger.” Refer to ANSI/TIA/EIA 606 for additional labeling requirements.

End of Section

Section 27 51 00 – Distributed Communications Systems

Part 1 - General

1.01 Scope

A. Refer to Section 27 00 00 for additional project scope information.

B. The two buildings, Central Jail and Annex, shall be able to operate independently but also as one. The Master Control in the Central Jail shall be able to take full control of the Annex's communications.

C. Patch cords for the IP devices to the network switches shall be furnished by this Contractor and installed by the Owner with participation by this Contractor. Patch cords from the IP device to the data jack shall be furnished by this Contractor and installed by this Contractor.

D. System installation shall include, but not be limited to, installation, programming, and configuration of system components as well as all associated software upgrades, patches, and maintenance for the first year.

E. The system to include the following functions:

1. door control intercom
2. cell intercom
3. reception intercom
4. zoned public address
5. intercom station audio monitoring

F. The system to integrate with the following other security and communication systems to form a comprehensive facility management network:

1. Touch screen control system
2. PLC door control system
3. Video surveillance system
4. Existing public address system

G. All existing intercom system field devices (including but not limiting to intercom stations, paging speakers/horns, paging amplifiers, etc.) and their associated wiring shall be reused. Refer to as-built documentation for details of the existing system.

H. The existing intercom stations and paging system shall be connected to a new digital intercom system. Supply and install new paging zone control system. The paging zones shall match existing zones and/or as directed by the owner. The new digital communication controllers (DCC) and expenders (DCE) shall be networked together

via an Ethernet data networks to form a large system. New audio communication interface shall be provided at each control location.

I. The intercom switching system shall be a digital intercom system with software based configuration, fault tolerant design, and rugged construction. No relay based switching system allowed. The system shall integrate to control stations via the electronic security network, allowing intercom functions to occur between each control station and their assigned remote intercom stations and speakers.

J. The purpose of the intercom is to provide fast "duplex," voice master-to-master communication and half duplex master-to-intercom station communications. The system shall be configured to provide instant intercommunications between any stations in the system.

K. Independent system functions and integrated system functions to be fully verified as part of system testing and commissioning.

L. Work of this contract also includes operating and maintenance manuals, training and demonstration, and extended warranty.

1.02 Related Work

A. Section 27 00 00 – General Technology Requirements

B. Section 27 05 23 – Pathways for Technology Systems

C. Section 27 05 26 – Grounding and Bonding for Technology Systems

D. Section 27 16 00 – Communications Connecting Cords

E. Section 27 18 00 – Communications Labeling and Identification

F. Section 27 60 00 – Physical Security General Requirements

G. Section 27 61 00 – Command and Control Systems

1.03 Definitions

A. Refer to Section 27 00 00 for additional requirements.

1.04 Reference Standards and Codes

A. Refer to Section 27 00 00 for additional requirements.

1.05 Qualifications

A. The Contractor shall have a minimum of 5 years of experience and performed at least 6 similar projects with the specified manufacturer of intercom equipment.

B. Training: Programmer shall have received manufacturer-provided and/or manufacturer approved training in the configuration of the distributed communications system(s) being provided.

C. Certification: Programmer shall hold the highest applicable manufacturer programming certification(s) offered by the manufacturer(s) of the distributed communications system(s) hardware.

D. Submittal: Certification certificate shall be submitted with distributed communications system(s) submittals.

E. Refer to Section 27 00 00 for additional requirements.

1.06 Pre-Construction Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.07 Pre-installation Procedures

A. Each existing intercom and PA cable shall be labeled and assigned a port number on the intercom headend before the headend arrives on site.

B. The intercom headend shall be fully programmed and routed before arriving on site.

C. Refer to section 27 00 00 for additional requirements.

1.08 Construction Progress Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.09 Closeout Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.10 Mounting and Installation

A. Contractor shall provide the appropriate mounting hardware for all ceiling types and wall types where devices will be located.

B. Exterior devices shall be installed in a sealed backbox with a weather hood.

1.11 Code and Standard Requirements

A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association and any other codes as required by the AHJ.

B. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

C. Other applicable codes and standards are as follows:

1. ANSI/IEEE C2 – National Electrical Safety Code
2. NFPA 70 – National Electrical Code
3. TIA/EIA 568-C-1, 2, 3 Standards

Part 2 - Products

2.01 Intercom System General Description

A. The Intercom System shall utilize a VoIP SIP based headend capable of communicating with IP, 2-wire digital and the existing 4-wire analog intercom talkback speaker stations as well as outputs to connect to paging systems as an extension.

B. The system shall be capable of system supervision and provide immediate notification of failures.

C. The system shall be capable of group calls, all calls and individual station calls.

D. The system shall be capable of silencing individual call stations that become a nuisance.

E. The system shall be capable of interfacing to the existing intercom sub-stations.

F. The system shall be capable of connecting to a VoIP telephone or analog PBX system to initiate intercom calls or pages.

1. The Contractor shall provide the interface that is compatible with the Owners system. The Owner's existing system is a Cisco VoIP.

G. The system shall be fully firmware and software upgradable from a centralized network location.

H. All software required for programming and licenses required for operation of the system shall be provided.

I. The integrated intercom and communications system to include the following components:

1. Digital Communications Controllers (DCCs)
2. Digital Communication Expanders (DCEs)
3. MicroComm DXL Administrator Software for configuring and maintaining the system
4. VoIP intercom master stations
5. Existing analog intercom stations

J. Digital Communication Controllers and Digital Communication Expanders to be interconnected to form intercom exchanges capable of standalone local operation. Each Digital Communication Controller to be capable of supporting up to four Digital Communication Expanders and/or Talkback Expanders.

K. Intercom system to consist of up to eighty exchanges networked together to form a fully integrated operating system. System capacity to allow for up to:

1. 800 analog master stations and 1,040 VoIP master stations

2. 12,800 analog intercom stations and 16,000 VoIP intercom stations

L. Intercom system to include ability to be controlled by touch screen computers, graphic control panels, and switch selector panels.

M. The intercom manufacturer shall be fully compatible with the existing intercom field devices and cabling.

N. Manufacturer:

1. Harding Instruments MicroComm DXL

2.02 System Operation

A. Call placement from an intercom station:

1. Depressing an intercom station's call push-button to place a call request in the queue of the master station or stations assigned to receive that station's calls. Calls are to be queued in order of priority level associated with the intercom station and time the call was placed.

2. Calls not answered within a pre-programmed time are to place a secondary call request on an assigned master station.

2.03 Voice communication:

A. Voice communications between intercom master stations and intercom stations to be automatically switched half duplex with press-to-talk override.

2.04 Paging

A. Master stations to have the ability to page to pre-determined groups of intercom stations and/or loudspeaker zones.

B. Paging selection to be made by selecting the page function and a group or zone from the selection list. Alternately, the zone number may be entered after the page function has been selected.

2.05 Station audio monitoring:

A. Master stations to be able to monitor an individual intercom station or a pre-defined group of intercom stations. A monitor group may consist of a list of

intercom stations that are monitored in a sequential manner, or up to seven intercom stations that are monitored simultaneously.

B. Each master station is to individually control the rate at which stations in the monitor group are sequenced through, and the level at which their monitor volume is set.

2.06 Tone and message distribution:

A. System is to include the capability to configure up to thirty-two distinct signal tones or pre-recorded messages for distribution over intercom and paging loudspeakers.

B. Tone signals may be triggered in response to a system input, or from the system program scheduler.

C. Program scheduler features to include complete 24 hours per day, 7 days per week, 365+ day per year scheduler with full week, weekday, weekend, and holiday configuration.

2.07 Audio logging:

A. System is to include the capability to interface to audio logging recorders for archival recording of each master station's communication.

2.08 IP Video Surveillance System Interface:

A. System to transmit command signals to the CCTV controller to route camera signals to viewing monitors.

B. Whenever a master station answers a call from an intercom station or places a call to an intercom station, the camera associated with the intercom station to be displayed on the monitor associated with the master station.

2.09 Alarm handling:

A. System to annunciate alarms and faults at designated intercom master stations.

B. Alarms to be selectively acknowledged and canceled.

C. Event response programming to permit system output action to be automatically initiated upon receipt of each specific alarm.

2.10 System Functional Requirements

A. Identification numbers for each category of device, group, zone, etc. to range from 1 to 99,999.

B. Alphanumeric description for each device, group, zone, etc. is to allow up to 20 characters and spaces.

C. All system boards to include self-diagnostic functions for complete operational and communication testing.

D. DCC's and DCE's and other devices to be capable of insertion or removal from service while the system is fully operational. Other system activity not directly related to the unit's insertion or removal to not be affected.

E. System diagnostics to include the ability to test system communications and devices from the front panel keyboard on the DCC's.

F. System to include logging functions for system activity and system maintenance.

G. On-line factory support to be available through a modem installed in the DCCs.

2.11 Digital Communication Controllers

A. Digital Communication Controllers to each form an intercom exchange capable of independent local operation. Exchange capacity to be increased by connecting Digital Communication Expanders, Talkback Expanders, and Page Zone Expanders to each DCC.

B. Multiple DCC's to be networked together via digital audio trunks and/or Ethernet data networks to form larger systems. VoIP enabled systems shall utilize IEEE 802.1p/Q Quality of Service (QoS) compliant Ethernet networking equipment.

C. Each DCC to include the following (as needed):

1. A Process Control Card (PCC)
2. A Master Control Card (MCC)
3. One or two Station Control Cards (SCCs)
4. An optional internal PCI card (Lonworks or VoIP accelerator card)
5. A front panel keypad/display for system setup and maintenance.
6. A 110 VAC, 60 Hz power supply for internal functions.

D. Process Control Card:

1. Process Control Card to contain system configuration and data, control exchange operations and switching, and provide exchange network ports.
2. Process Control Card to include:
    a. USB network ports for exchange expansion.
    b. Ethernet network ports for system expansion and external control by touch screen computers and graphic control panels.
    c. Fiber optic or copper digital audio trunk ports. (not required for VoIP over Ethernet audio trunking)

d. Two serial ports.

e. An internal modem for transmitting and receiving data over a telephone line.

E. Master Control Cards:

1. Include ports for any combination of two intercom or telephone set master stations.

2. Include two-line level audio inputs with status and control.

3. Include two-line level audio outputs with status and control.

4. Convert incoming audio signals to digital format and outgoing signals to analog format.

5. Intercom master station audio, press-to-talk and hook switch status transmitted over two single shielded pair cables with wiring supervision to detect open circuit and short circuit faults.

6. Telephone set master station functions transmitted over a single wiring pair.

F. Station Control Cards:

1. Each provide sixteen half-duplex intercom station ports which can be employed in adjacent pairs for full duplex devices.

2. Provide an interface for intercom stations. Units to convert incoming audio signals to digital format and outgoing signals to analog format. Each channel to monitor the status of up to two (2) switches associated with each intercom station.

3. Each card interfaces with 16 half-duplex channels. Each channel includes a separate audio power amplifier for non-blocking call operation and sixteen (16) independent software controlled volume settings.

4. Audio and switch functions on 300-Series (4-wire) station control cards to be transmitted on separate wiring pairs.

2.12 Digital Communication Expanders

A. Digital Communication Expanders to provide master station and intercom features similar to the DCCs to facilitate exchange expansion.

B. Each DCE to include the following (as needed):

1. A Process Control Card (PCC) without exchange control or network functions.

2. A Master Control Card (MCC)

3. Two Station Control Cards (SCCs)

4. A 110 VAC, 60 Hz power supply for internal functions.

2.13 Existing Intercom Sub-Stations

A. The existing intercom sub-stations shall be re-utilized.

B. The existing stations utilize the speaker as the talkback device.

C. Intercom stations between pod control areas have dual buttons on the sally port. One button calls the pod and the corridor side calls master control.

D. Refer to the existing as-built documentation for additional information.

2.14 Quick Connect Boards

A. Quick Connect Boards are designed with a female DB connector to connect a cable from the station control card ports to screw clamp terminals that terminate the field wiring.

B. QCB-120-1 connects the audio port of either the SCC-300 or SCC-400/401 station control card to the field wiring.

C. QCB-120-2 connects the switch ports of an SCC-300 station control card to the field wiring.

D. QCB-120-5 is a 16-channel QCB that interfaces the output from a SCC-300 station control card to 45 ohm speakers.

E. QCB-120-6 is a 16 channel QCB, used in conjunction with up to four quick connect adapters QCA-120, converts the audio output from a SCC-300 or SCC-400/401 station control card to a line-level output or converts a line-level input to an audio levels compatible with SCC-300 or SCC-400/401 station control cards. Individual channels can be set to act as line-level inputs or line-level outputs.

F. Provide with blank rack panels with DIN Rails when rack mounted. Provide with DIN Rails when surface mounted.

2.15 Station Port Adapter

A. Station Port Adapter (SPA-120-0) provides a line-level output for use with external paging amplifiers.

B. Provides a single line-level output.

C. Provides a single control output (when connected to a 400 or 401 series station card audio port).

D. Screw terminal connections.

2.16 Administrator Software

A. Administrator Software to function on a standard PC to support system configuration, diagnostics, maintenance, and logging but not be required for system operation.

B. Administrator Software to employ Windows features including views of system tree structure, tables of devices, screens for system settings and adjustments, and tables of operational data.

C. The Contractor shall install the Administrator Software on the PLC data logger server.

D. Configuration features to include:

1. Creation of overall system architecture.
2. Creation of multiple device templates.
3. Copy and paste functions with auto-numbering and auto-assignment to create device schedules.
4. Configuration error detection and alerts.
5. Device naming and call routing functions.
6. Device setting and performance functions.
7. Diagnostic and Maintenance features to include:
8. Verification of system configuration and installation.
9. Verification of system networks.
10. Verification of device connections.
11. Verification of system operation.
12. Diagnostics via modem or Ethernet ports.

E. Logging features to include:

1. Display of system activity with filtering options.
2. Search by time and date.
3. Search by device.
4. Search by parameter.

2.17 VoIP Touch Screen Intercom Master Stations

A. Desktop loudspeaker/microphone unit is to include compact, slim line bottom plate with stainless steel face, and rubber shock isolation mounting feet.

B. Unit to include a 12 inch, black, slim line electret gooseneck microphone, front mounted loudspeaker, front mounted rotary volume control, and front access headphone jack.

C. Unit to include support for a privacy handset.

D. Unit to include a line level audio output of the speaker signal.

E. The network connection shall be a 10/100Mbps (RJ45 connector) Ethernet port with support for IEEE 802.3af inline power. A separate power connector shall also be provided in case an IEEE 802.3af compliant Ethernet switch is not available. The master station shall also provide support for the IEEE 802.1p/Q Quality of Service (QoS) standard.

F. Unit to include a 2-port 10/100Mbps Ethernet switch to facilitate the connection of a second Ethernet device.

G. Manufacturer:

1. Harding TMM-640

2.18 Paging Zones

A. The Intercom system shall control the existing PA system.

B. Provide a single output from the Intercom system for each paging zone.

C. Provide an individual amplifier channel per zone.

D. Assume up to 16 paging zones for bidding purposes. Coordinate the final paging zones with the Owner and Consultant and field investigation is complete.

E. There shall be all-call zones and grouped zones such as an entire floor or wing.

2.19 Paging Modules

A. VoIP

1. Provide as required when paging amplifiers, relay boards or components are located remotely (not in intercom rack room).

2. Provides an IP interface from the VoIP intercom system to the paging system.

3. DIN rail mountable, provide with appropriate mounting hardware.

4. Manufacturer:

a. Harding PTA-620

B. Digital

1. Provide as required when paging amplifiers, relay boards or other components are located in the same intercom rack room.
2. Adapts signal to line level output to connect to a paging system.
3. DIN rail mountable, provide with appropriate mounting hardware.
4. Manufacturer:
    a. Harding SPA-120

2.20 Paging Relay Boards

A. Can accommodate up to 25 individual lines with 25 dial circuits and 1 program bus

B. (25) 24VDC at 23mA relays

C. Requires 1RU of space

D. Requires 24 VDC power supply

E. Provide quantity as required

F. Relays or relay board shall be non-proprietary and available through multiple suppliers in general distribution.

G. Manufacturer:

1. Dukane 9A1825
2. Or approved equal

2.21 Amplifiers

A. The Contractor shall supply and install appropriate number, size and voltage of amplifiers to ensure amplifiers will normally be operating at no more than 80% of the rated power. The installation shall meet manufacturer recommendations. New amplifiers shall be provided for all paging zones.

B. 4/8 ohm

C. Direct drive 70V operation

D. Thermal protection and cut out with self-resetting

E. Requires 2RU.

F. Manufacturer:

1. Crown DCi Series
2. Or approved equal

2.22 Cable

A. Cable shall be provided and installed that meets manufacturer recommendations for equipment and signal types that are being transmitted. Refer to Division 27 specifications for UTP cable requirements.

B. 70v speaker cable shall be 16 awg, 2-conductor, twisted, shielded cable. Provide plenum rated cable when required.

C. Digital intercom cable shall be 22 awg, 2-conductor, twisted, shielded cable. Provide plenum rated cable when required.

D. Analog intercom cable shall be 18 awg, 4-conductor, twisted, shielded cable. Provide plenum rated cable when required.

E. Intercom headend factory manufactured field interface cables to be provided as required. Provide length as required.

1. CBL-MST-AA male DB-15 connector with 6 individually shielded twisted pairs for connecting to master station ports.

2. CBL-STN-AA-BC with male DB-37 connectors at both ends and with 16 individually shielded twisted pairs for connecting from station control card audio ports to QCB-120-1 Quick Connect Board, or a male DB-37 connector at one end with 16 individually shielded twisted pairs for connecting from station control card audio port to terminal blocks.

3. CBL-SWT-AA-BC male DB-25 connector at one end and male DB-37 connector at the other end for connecting from SCC- 300 station control card switch port to QCB-120-2 Quick Connect Board, or a male DB-25 connector for connecting from SCC- 300 station control card and 16 individually unshielded twisted pairs for connecting to a terminal block.

F. Field wiring to conform to manufacturer's recommendations.

Part 3 - Execution

3.01 Testing

A. Refer to Section 27 00 00 for additional requirements.

3.02 Training

A. Refer to Section 27 00 00 for additional requirements.

3.03 Warranty

A. Refer to Section 27 00 00 for additional requirements.

3.04 Installation Practices

A. All services provided shall be professional and conform to the highest standards for industry practices. The Owner reserves the right to halt any installation due to poor workmanship. All work shall be defect free, and the installer shall replace, at their expense, any work found to be defective.

B. The Owner reserves the right to halt any installation due to failure of Contractor to observe installation-free periods due to instructional or administrative requirements. To the maximum extent possible, the Owner will provide advance notice of such periods.

C. Contractor is responsible for providing a complete and functional intercom and PA systems.

D. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers, or as indicated in their published literature, unless specifically noted herein to the contrary.

E. Contractor shall follow these standards and approved submittals for locations of power supplies. The Owner intends to limit the number and location of power supplies to facilitate more effective long-term support and maintenance of the system.

3.05 Coordination

A. Contractor shall provide up to 8 hours (up to four, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with network configuration.

3.06 Training

A. Provide system operations, administration, and maintenance training by factory-trained personnel qualified to instruct.

1. Contractor shall provide up to 12 hours of scheduled and dedicated training time in four (4) three (3) hour sessions for administration and management of the systems.

2. Contractor shall provide up to 2 hours of scheduled and dedicated training time for maintenance personnel.

3. Provide printed training materials for each trainee, including product manuals, course outline, workbook and student guides.

4. Provide hands-on training with operational equipment.

5. Training shall be oriented to the specific systems being installed under this contract as designed and specified.

6. Contractor shall provide all necessary documentation of system operating parameters prior to scheduled training sessions.

3.07 Aesthetics

A. All cables and equipment terminating at panels frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.

B. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.

C. All surface-mounted devices shall be firmly secured level and plumb

D. All rack mount equipment shall be securely installed.

3.08 Hardware Layout

A. Hardware positioning and layout shall be reviewed and approved by the Consultant and Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.09 Device Cabling/Wiring Installation Practices

A. All external wire and cables shall be supported at least every five feet from the structure or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables. Provide j-hooks as needed where cable tray or raceway is not available.

B. This Contractor shall coordinate installation with Division 27 05 00 cabling Contractor to ensure there is at least 2-inches of physical separation between security cabling and voice/data cabling throughout cable path. Voice/data cabling Contractor has first claim to cable tray.

C. 70-Volt speaker cabling shall not share cable pathways with other cabling.

D. All cables, regardless of length, shall be labeled within 18" of both ends with an identifier that is keyed to the door, room, or corridor number as identified.

E. All cables shall have 6-foot service loops neatly coiled in the equipment room. During initial cable rough-in, this Contractor shall have sufficient slack to route anywhere within the equipment room.

F. Cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame. Cables shall be dressed in a neat and orderly fashion. Any cabling or equipment installation that is deemed unacceptable by the Owner or Consultant shall be replaced or corrected by the Contractor at no additional cost. **Plastic zip ties are not allowed.**

G. All cables are to run at right angles to the structure, placed above the ceiling in halls or corridors.

H. Cables shall not run above red iron joist.

I. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests.

J. Ties and straps shall be installed snugly without deforming cable insulation. Ties shall be spaced at uneven intervals not to exceed four feet. No sharp burrs shall remain where excess length of the cable tie has been cut.

K. Contractor shall notify Owner immediately if obstruction or hazard is discovered in a pathway provided by others.

L. Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the manufacturer's rating.

M. No splices shall be installed in any UTP cable unless prior approval from Consultant is given.

3.10 Cable Termination

A. Termination hardware (blocks and patch panels) positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.11 Integration with Physical Security Systems

A. The intercom system shall be integrated with the video surveillance system, electronic access control system and intrusion detection systems.

1. The integration interface shall be via an Ethernet interface.

2. The intercom to video surveillance integration shall be via SIP (Session Initiation Protocol) interface.

a. The intercom stations shall operate in a SIP to SIP mode with the video surveillance system listening and recording the audio to the associated camera time synchronized for seamless video/audio playback.

B. The intercom stations shall be associated with cameras from the video surveillance system.

C. The Contractor shall provide any and all licensing to integrate the systems together including any additional items to be added to the yearly maintenance agreement.

D. The Contractor shall provide any needed expansion boards for integration.

E. The system shall integrate with Microsoft Exchange Server for the purpose of sending email notifications.

F. Refer to each integrated systems specification sections for additional specific integration requirements.

G. The intercom and PA systems shall be time syncing to a common NTP server as all the integrated systems.

H. The Contractor shall set up a meeting between the Owner, Consultant and manufacturer to determine the exact functionality of the integration before the installation and integration starts.

3.12 Fire Stopping

A. Fire stopping of openings between floors, fire-rated walls, and smoke-rated walls, created by others for This Contractor to pass cable through, shall be the responsibility of the This Contractor. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.

B. Any openings created by or for this Contractor and left unused shall be sealed up by this Contractor.

C. This Contractor shall be responsible for creating a waterproof seal in and around any openings that This Contractor creates from the structure to the outside environment.

D. Any existing openings discovered that should be fire stopped should be brought to the attention of the Owner.

3.13 System Testing Procedures

A. Prior to energizing or testing the system, ensure the following:

1. All products are installed in a proper and safe manner per the manufacturer's instructions.

2. Dust, debris, solder, splatter, etc., is removed.

3. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.

4. All products are neat, clean, and unmarred, and parts are securely attached.

B. Contractor shall ensure that each device in the system is functioning normally and in such a manner as to meet the functional and performance requirements in this specification.

C. Contractor shall be responsible for the following testing procedures:

1. Measure each area's ambient noise level during normal business operation.
2. Provide amplifier(s) and estimate speaker transformer tap values that provide acceptable performance without exceeding 80% of the amplifier's RMS power.
3. Acceptable performance is deemed to mean that a voice page or intercom call is 15 dB over the Ambient Noise level when measured at 5 feet above finished floor. Make all necessary adjustments per Owner and Consultant request.

D. This Contractor is ultimately responsible to ensure the overhead paging system voice pages are a minimum of 15 dB over the Ambient Noise Level in each area without exceeding 80% of the amplifiers' rated power.

E. Inspection: After Contractor's testing is complete and the system is properly adjusted, the Contractor shall contact the Owner to schedule a "spot test" of the system with the Owner and Consultant. Contractor shall make changes/adjustments per Owner and Consultant's request at no additional cost to Owner. These adjustments may include but not be limited to:

1. Adjusting volume control of amplifier.
2. Adjusting local volume control of individual speaker.
3. Re-tapping up to 20% of speakers at different wattage.

3.14 System Inspection

A. Contractor shall coordinate with project representative for inspection after Contractor has completed testing of entire system.

B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.

C. Contactor shall verify with Project Representative the precise positioning of camera aim and shall make fine adjustments as requested.

3.15 Labeling

A. Contractor shall neatly label all security devices and cabling at both ends. All labels shall be on Project as-built drawings.

3.16 Documentation

A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval as described in section 27 00 00 and 27 60 00. 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. Device label/identifier
    b. Location of each drop by orientation/permanent landmark in the room
    c. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.

3.17 Pre-Checkout

A. The Contractor shall demonstrate the following to Owner during system demonstration:
    1. The intercom stations are fully installed and functional.
    2. Calls can be placed and operate in full duplex mode.
    3. All-call functionality is working correctly.
    4. Individual zones can be paged.
    5. Integrations are functional.

3.18 Spare Parts

A. Deliver spare parts in protective wrapping and packaging for proper storage.

B. Provide the following spare parts:
    1. Digital Communications Controller (DCC): one (1)
    2. Digital Communications Expanders (DCE): one (1)
    3. Touch Screen Master Station: two (2)
    4. Replacement Gooseneck microphone for Touch Screen Master Station two (2)
    5. Push to talk switch for Touch Screen Master Station two (2)
    6. System boards: one (1) of each type unless noted otherwise
    7. Relay boards: one (1)
    8. Power Supply: one of each type/size

3.19 Final Acceptance

A. In addition to closeout requirements in section 27 00 00 and 27 60 00, This Contractor shall demonstrate the following before final approval.
    1. Owner training is complete.
    2. Punch list items are complete.
    3. As-built documentation is complete and submitted to Owner/Consultant.

3.20 Final Procedures

A. Perform final procedures in accordance with section 27 00 00 and 27 60 00.

End of Section

Section 27 60 00 – Physical Security General Requirements

Part 1 - General

1.01 Scope

A. Refer to Section 27 00 00 for additional project scope information.

B. This section describes the general product and execution requirements related to furnishing and installing Physical Security Systems. Physical Security Systems includes Video Surveillance (integration only), Electronic Access Control (integration only) and PLC/HMI systems and their sub systems.

C. This is a 24/7/365 mission critical facility and all systems shall be capable of a 99.99% uptime by utilizing redundant power supplies, enterprise grade components, UPS power and fail over whenever possible.

D. Contractor shall be responsible for providing complete and functional systems as described in this specification and project drawings.

E. Contractor shall provide low voltage power and control lines to and from power supplies, remotely controlled equipment, and other devices, even though not explicitly indicated on drawings or listed in equipment tables.

F. Contractor shall be, or Contractor shall provide, an Electrical Contractor for provision of high voltage power and conduits/raceway, where necessary.

G. Contractor shall be responsible for any and all related programming and end-user training unless noted otherwise.

1.02 Related Work

A. Section 27 00 00 – General Technology Requirements

B. Section 27 05 23 – Pathways for Technology Systems

C. Section 27 05 26 – Grounding and Bonding for Technology Systems

D. Section 27 16 00 – Communications Connecting Cords

E. Section 27 18 00 – Communications Labeling and Identification

F. Section 27 51 00 – Distributed Communications Systems

G. Section 27 61 00 – Command and Control Systems

1.03 Definitions

A. Refer to Section 27 00 00 for additional definitions.

1.04 Reference Standards and Codes

A. Refer to Section 27 00 00 for additional requirements.

1.05 Qualifications

A. Training: Programmer shall have received manufacturer-provided and/or manufacturer approved training in the configuration of the physical security system(s) being provided.

B. Certification: Programmer shall hold the highest applicable manufacturer programming certification(s) offered by the manufacturer(s) of the physical security system(s).

C. Submittal: Certification certificate shall be submitted with physical security system(s) submittals.

D. Refer to Section 27 00 00 for additional requirements.

1.06 Pre-Construction Submittals

A. Refer to Section 27 00 00 for additional requirements.

B. Hardware, Application Software, and Network Requirements: A system description including analysis and calculations used in sizing equipment required by the Physical Security Systems. The description shall show how the equipment will operate as a system to meet the performance requirements of the systems. The following information shall be supplied as a minimum:

1. Server(s) processor(s), disk space and memory size requirements
2. Workstation(s) processor(s), disk space and memory size requirements
3. Description of site (field) control equipment (Controllers/Field Panels) and their configuration
4. Operating System(s) Software, where software is provided or upgraded
5. Application Software, with Optional and Custom Software Modules supplied in this project
6. Integration Schemes: Proposed connectivity, software, development requirements, and SDK information, for inter-system communication.
7. Network reliability requirements
8. Number and location of LAN ports required
9. Number of IP addresses required.
10. Other specific network requirements, preferences, and constraints
11. Start-up operations

12. Battery backup power requirements in KVA

1.07 Construction Progress Submittals

A. Refer to Section 27 00 00 for additional requirements.

1.08 Closeout Submittals

A. Refer to Section 27 00 00 for additional requirements.

B. Quick-Reference Guides: Contractor shall create a concise quick-reference guide covering normal system operation and basic troubleshooting procedures for each room/system type. Length of each quick-reference guide shall be commensurate with the information needed for successful operation, subject to Owner approval.

1. Upon Owner approval, Contractor shall provide two (2) laminated copies and one (1) digital copy for each room/system type.

C. Serial Numbers: Contractor shall provide a list of serial numbers for all supplied components with serial numbers and with a unit price greater than $99. Organize list by room/system type.

D. IP addresses and MAC addresses: Contractor shall provide a list of IP addresses and MAC Addresses for all network components. Organize list by room/system type.

Part 2 - Products

2.01 Substitutions

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 Refer to individual sections for products and requirements.

2.03 Fire Stopping Materials

A. Refer to Section 27 00 00 for additional requirements.

Part 3 - Execution

3.01 Testing

A. Refer to Section 27 00 00 for additional requirements.

3.02 Training

A. Refer to Section 27 00 00 for additional requirements.

B. On-Site Training

1. General: Present, review and describe equipment and materials to the Owner and Owner's operating personnel and fully demonstrate the operation and maintenance of the systems, equipment and devices specified herein.
2. Include with new systems, Contractor to arrange and provide for video recording of each onsite training session.
    a. Provide professional video and audio recording of each software screen option with Owner approval of content.
    b. Provide end user video recording for Department of Safety & Security approved processes.
    c. Provide Security Systems Specialists approved recording of maintenance and troubleshooting process.
3. Training shall comprise two separate levels of training;
    a. User Group upon substantial completion of the project.
        i. User group training shall include a site/building walk through indicating locations of equipment and their usage.
        ii. User group training shall include the operation of workstation capability of system monitoring, command override and report generation.
    b. Maintenance Group upon completion of the project prior to close out.
        i. Maintenance group training shall include a site/building walk through indicating locations of equipment and their usage at up to six representative sites.
        ii. Review of a-build documentation at each controller location.
        iii. Troubleshooting techniques in hardware and software.
4. The training shall cover the overall system, each individual system, each subsystem, and each component. The training shall also cover procedures for database management, normal operations, and failure modes with response procedures for each failure. Each procedural item shall be applied to each equipment level.

C. Duration: Refer to the individual sections for the minimum time requirements.

3.03 Warranty

A. Refer to Section 27 00 00 for additional requirements.

B. Furnish and guarantee maintenance, repair and inspection service for the system using factory trained authorized representatives of the manufacturer of the equipment for a period of one year after final acceptance of the installation.

C. Third Party Device warranties are transferred from the manufacturer to the Contractor, which may then transfer third party warranties to the Owner. Specific

third party warranty details, terms and conditions, remedies and procedures, are either expressly stated on, or packaged with, or accompany such products. The warranty period may vary from product to product. These products include but are not limited to devices that are directly interconnected to the field hardware or computers and are purchased directly from the manufacturer.

D. Purpose

1. The Contractor shall repair any system malfunction or installation deficiency discovered by the Owner or their representatives during the burn in and warranty period.

2. The Contractor shall correct any installation deficiencies found against the contract drawings and specifications discovered by the Owner or their representatives during the warranty period.

3.04 Examination of Site and Documents

A. Bidder shall examine all documents, shall visit the site(s) prior to submitting the bid, record their own investigations, and shall inform themselves of all conditions under which the Work is to be performed at the site(s) of the Work, including the structure of the ground, the obstacles that may be encountered, and all of the conditions of the documents, including superintendence of the Work, requirements of temporary environmental controls, the time of completion, list of Subcontractors, and all other relevant matters that may affect the Work or the bid process.

B. Verify cable lengths comply with published standards.

C. Notify Owner/Consultant of installation that would exceed maximum lengths prior to installation of cable.

D. Contactor shall consult with Owner/Consultant regarding alternative routing or location of cable.

E. Do not proceed until unsatisfactory conditions have been corrected.

F. Failure to make the examination shall not result in any Change Order requests.

G. The Bidder shall base the bid on the site(s) examination, materials complying with the plans and specifications and shall list all materials where the proposal form requires.

H. The commencement of work by the Contractor shall indicate acceptance of existing conditions, unless a written notice of exceptions has been provided to the Owner/Consultant prior to commencement.

I. If the Contractor observes, during preliminary examinations or subsequent work, existing violations of fire stopping, electrical wiring, grounding, or other safety- or code-related issues, the Contractor shall report these to the Owner/Consultant in a timely manner.

3.05 Spare Parts

A. Refer to individual sections

3.06 Installation Requirements

A. Refer to Section 27 00 00 for additional requirements.

B. Contractor shall furnish and install all cables, connectors, and equipment as shown on Drawings and as specified herein.

C. It is the Contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified. This includes any modifications required to route and conceal horizontal distribution wiring.

D. Beginning installation means Contractor accepts existing conditions.

E. The Contractor shall be responsible for identifying and reporting to the Prime Contractor any existing damage to walls, flooring, tiles, and furnishings in the work area prior to start of work. All damage to interior spaces caused by the installation of cable, raceway, or other hardware shall be repaired by the Contractor.

F. Repairs shall match preexisting color and finish of walls, floors, and ceilings. Any Contractor-damaged ceiling tiles, floor, and carpet shall to be replaced to match color, size, style, and texture.

G. Where unacceptable conditions are found, the Contractor shall bring this to the attention of the construction supervisor immediately. A written resolution will follow to determine the appropriate action to be taken.

H. All wiring shall be run "free-air," in conduit, in a secured plastic raceway or in modular furniture as designated on the Drawings. All cable shall be free of tension at both ends. PLENUM rated cable shall be used in areas used for air handling.

I. Avoid abrasion and other damage to cables during installation.

J. The cable system will be tested and documented upon completion of the installation as defined in the section below.

K. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by manufacturers or as indicated in their published literature, unless specifically noted herein to the contrary.

3.07 Cooperation

A. The Contractor shall cooperate with Consultant's and Owner's personnel in locating work in a proper manner.

B. Should it be necessary to raise, lower, or move longitudinally any part of the work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

3.08 Commissioning Submittals

A. Provide the following to the Owner no later than 30 days prior to system commissioning/programming.

1. Commissioning Test Plan and Check-Off List: Specified elsewhere in this document.

2. Software: One set of fully functional software in manufacturer's original media packaging, temporarily licensed for a 30-day evaluation period.

3. Web-based Training: Access to web-based training modules.

3.09 Commissioning

A. Provide programming and commissioning for each system as described in individual sections below.

B. This Contractor shall develop and submit a plan for coordination of settings and programming issues with the Consultant and Owner no later than 30 days prior to performing programming and commissioning.

C. The security Contractor is required to place entire system into full and proper operation as designed and specified.

D. Verify that all hardware components are properly installed, connected, communicating, and operating correctly.

E. Verify that all system software is installed, configured, and complies with specified functional requirements.

F. Perform final acceptance testing in the presence of Owner's representative, executing a point-by-point inspection against a documented test plan that demonstrates compliance with system requirements as designed and specified.

1. Submit documented test plan to Owner at least 14 days in advance of acceptance test, inspection, and check-off.

2. Conduct final acceptance tests in presence of Owner's representative, verifying that each device point and sequence is operating correctly and properly reporting back to control panel and control center.

3. Acceptance by Owner is contingent on successful completion of check-off; if check-off is not completed due to additional work required, re-schedule and

perform complete check-off until complete in one pass, unless portions of system can be verified as not adversely affected by additional work.

4. The system shall not be considered accepted until all acceptance test items have been successfully checked-off. Beneficial use of part or all of the system shall not be considered as acceptance.

3.10 Operation and Maintenance Manuals

A. Part One: Notwithstanding requirements specified elsewhere, submit the following labeled as the "Operating and Maintenance Manual" within thirty (30) days after Final Acceptance of the Installation:

1. Record Drawings: Submit two (2) copies of revised versions of drawings as submitted in the "Shop and Field" and "Equipment Wiring Diagrams" Submittals showing actual device locations, conduit routing, wiring and relationships as they were constructed. Include nomenclature showing as-built wire designations and colors. Drawings shall include room numbers coinciding with Owner space planning numbering. Drawings shall be submitted in electronic editable AutoCAD 2010 files, in ".dwg" format, on CD or DVD disks.

2. Manuals: Submit two (2) copies of each of the following materials in bound manuals, or electronic PDF copies, with labeled dividers:

a. A final Bill of Material for each system

b. Equipment Instruction Manuals: Complete, project specific comprehensive instructions for the operation of devices and equipment provided as part of this work.

c. Manufacturers Instruction Manuals: Specification sheets, brochures, Operation Manuals and service sheets published by the manufacturers of the components, devices and equipment provided.

d. Include information for testing, repair, troubleshooting, assembly, disassembly and recommended maintenance intervals.

e. Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.

f. Performance, Test and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.

g. Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturer's Warranty Registration papers as described herein.

B. Part Two: Within fourteen (14) days of receipt of Consultant reviewed Operating and Maintenance Manual (Phase One), submit three (3) electronic copies in AutoCAD 2010 editable .dwg format of the reviewed Record Drawings and three (3)

copies of the reviewed Operating and Maintenance Manuals to the Owner, on CD or DVD disks.

1. Within each equipment enclosure and/or terminal cabinet, the Contractor shall place a Single Line drawing of the system(s) and the respective Terminal Cabinet Wiring Diagram in a clear plastic sleeve permanently attached to the inside cover of the terminal cabinet.

2. In each equipment enclosure the Contractor shall place a drawing providing device locations served by the equipment within the enclosure with identification that is identical to the wiring tags and with the software description of each point.

3. The Contractor shall provide to the Owner one (1) copy of new administration and user software, including required graphical maps, on CD or DVD disks.

C. Sufficient information, (detailed schematics of subsystems, assemblies and subassemblies to component level) clearly presented, shall be included to determine compliance with drawings and specifications.

3.11 Closeout Procedures

A. Notification: Contractor shall provide written notification to Architect/Consultant and Owner when Contractor is satisfied that the work has been completed and is ready for inspection.

B. Closeout Submittals: Contractor shall provide closeout documentation to the Architect/Consultant. The Architect/Consultant shall receive the closeout submittals no less than 72 hours prior to the scheduled inspection time.

C. Inspection: Contractor shall be present for the inspection by the Architect/Consultant. Contractor shall supply all testing equipment needed to verify compliance with the specifications found in Bid package.

D. Punch List: Work or materials found to be incomplete, of unsatisfactory quality, failing to meet the specifications in the Bid package, and/or unacceptable to the Architect/Consultant shall be documented by the Architect/Consultant and provided to Contractor to rectify.

E. Re-Inspection: If a re-inspection is necessary, the costs of the Architect/Consultant's additional travel, hours, and expenses may be deducted by the Owner from the contract amount due Contractor.

F. Punch List Approval: The punch list shall be considered complete only after having been signed by the Owner and Architect/Consultant.

G. The system has successfully completed a 30-day performance period.

H. Payment Authorization: Final payment will be authorized only after all closeout procedures and requirements have been followed and fulfilled by Contractor and

approved in writing by the Owner and Architect/Consultant, including punch list(s) and/or re-inspection(s).

3.12 Service Contract

A. The service contract shall cover equipment and software related to this contract, and shall provide for the following parts and services, without additional cost to the Owner:

1. Bi-yearly inspections, preventative maintenance and testing of equipment and components in Year One of the warranty period.
2. Annual inspections, preventive maintenance, and testing of equipment and components in Years Two and above of the warranty period.
3. Regular Service, Emergency Service, and Call-Back Service
4. Labor and Repairs
5. Equipment, and Materials and transportation cost.

B. Response Time: Response time for service calls.

1. Emergency service calls where system is not responding to staff directed commands through the computer systems shall be within 2 hours to the project site.
2. Emergency service calls where controllers are not reporting shall be within 2 hours to the project site.
3. Normal service calls for device malfunctions shall be within 24 hours during normal working hours to the site.

C. Repair Time: Contractor shall stock parts in sufficient quantities such that repair or replacement shall be guaranteed within 12-hours. Temporary replacements within this time period shall be acceptable, provided temporary replacements do not compromise system functionality, and provided permanent replacement is achieved within 72 hours. Contractor may contact Owner representative for use of Owner supplied spare parts where delay of system repair will have negative impact on system performance.

D. Commencement: The warranty begins at the time of issuance of the statement of "Final Acceptance of the Installation" by the Owner.

E. Transferability: The warranty shall be transferable to any person or persons at the discretion of the Owner.

F. Transmittal: A copy of this Warranty shall be delivered to, and signed for by the Owner's representative whose primary responsibility is the operation and care of these systems. A copy of the signed Warranty document shall be delivered for review as part of the Final Submittals.

G. Registration: Register Warranty papers for all equipment and software in the name of the Owner. Furnish reproductions of all equipment Warranty papers to the Owner with the Final Submittals.

H. Subcontracting: Warranty service work may not be subcontracted except with specific permission and approval by the Owner.

I. Resolution of Conflicts

1. The Owner retains the right to resolve unsatisfactory warranty service performance at any time by declaring the work unsatisfactory, stating specific areas of dissatisfaction in writing.

2. If the Contractor or his approved Subcontractor does not resolve such stated areas of dissatisfaction within thirty (30) days, the Owner may appoint any alternative service agency or person to fulfill the terms of the Warranty; the cost of which shall be borne by the Contractor. This action may be taken repeatedly until the Owner is satisfied that Warranty service performance is satisfactory. Satisfactory resolution of a malfunction shall be considered adequate when the device, equipment, system or component which is chronically malfunctioning is brought into compliance with the standards of performance as contained herein and published by the manufacturers of the equipment installed.

End of Section

Section 27 61 00 – Command and Control Systems

Part 1 - General

1.01 Scope

A. Refer to Section 27 00 00 and 27 60 00 for additional project scope information.

B. The two buildings, Central Jail and Annex, shall be able to operate independently but also as one. The Master Control in the Central Jail shall be able to take full control of the Annex.

1.02 Related Work

A. Section 27 00 00 – General Technology Requirements

B. Section 27 05 23 – Pathways for Technology Systems

C. Section 27 05 26 – Grounding and Bonding for Technology Systems

D. Section 27 16 00 – Communications Connecting Cords

E. Section 27 18 00 – Communications Labeling and Identification

F. Section 27 51 00 – Distributed Communications Systems

G. Section 27 60 00 – Physical Security General Requirements

1.03 Summary

A. The Command and Control Systems shall consist of the following integrated subsystems as specified herein and within the related specification sections:

1. Integration to existing Electronic Access Control Systems
2. Integration to existing Video Surveillance System
3. Human Machine Interface Platform (HMI)
4. Intercom and Public Address
5. Computer Workstations and Video Displays
6. Command and Control Consoles
7. Equipment Racks and Cabinets
8. Wire and Cable

B. All components shall be suitable for installation in facilities which may be subject to vandalism and other abuses.

C. The Contractor shall be responsible for providing complete, fully operational, and functionally integrated Security System to the Owner. This shall include, but not be limited to, all raceway, cabling, electronic components, power supplies, UPS units, and hardware and software required to create such system.

D. The Contractor shall be responsible for providing a complete turnkey installation with the exception of those items noted as being provided by others, including but not limited to, all material, labor, warranties, freight and permits.

E. The Contractor shall be responsible for providing all labor and materials subcontracted by the Contractor for completion of the project, whether or not that labor and materials is claimed by related trades or included as part of the project as described in this Specification.

F. The Contractor shall be responsible for providing all power supplies (including conduit, backboxes, wire and cable, fire alarm system interconnects, etc.) with the exception of those items noted as being provided by others, as described herein and as required by the various manufacturers.

1.04 Pre-Construction Submittals

A. Refer to Section 27 00 00 for requirements.

B. Shop Drawings in addition to requirements in Section 27 00 00 and 27 60 00:

C. The Contractor shall submit the Human Machine Interface Platform screen shots at 30%, 60% and 90% complete and intended functionality for approval prior to implementation.

1.05 Qualifications

A. The Contractor shall have a minimum of 5 years of experience and performed at least 6 similar projects with the manufacturer of PLC equipment and HMI software.

B. Refer to Section 27 00 00 for additional requirements.

1.06 Pre-installation Procedures

A. All equipment shall be fully pre-configured, racked, programmed and tested prior to being delivered to the project site.

B. Each cable, new or existing, shall be labeled and assigned a port prior to the equipment arriving on site.

C. The Owner shall have the opportunity to experiment with the HMI interface before it is connected to the system to familiarize themselves before the cut over.

D. The Contractor shall provide the Owner and the Consultant the opportunity to travel to the Contractors shop to get a functional system demo and the opportunity to provide comments prior to the equipment shipping to the site. The Owner and

Consultant will pay for travel and lodging. The Contractor shall give at least a 2-week notice so travel can be booked.

E. Refer to section 27 00 00 for additional requirements.

1.07 Owner-Furnished Workstaions

1.08

1.09 Construction Progress Submittals

A. Refer to Section 27 00 00 for requirements.

1.10 Closeout Submittals

A. Refer to Section 27 00 00 for requirements.

Part 2 - Products

2.01 Substitutions

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 System Architecture

A. Architecture:

1. The Command and Control System shall be a fully integrated IP based system consisting of an IP Video Surveillance, IP Intercom/PA Systems, Electronic Access Control, Intrusion Detection and the Common Systems Interface Platform PLC interface. The Security System Monitoring and Controls shall consist of a primary monitoring location for “24-7-365” monitoring.

2. The main Command Center and Annex Command Center will be the primary monitoring and control point of the Physical Security Systems. The main Command Center will consist of 2security operators and the Annex Command Center will consist of 1 operator.

3. Security Software shall be provided for operating the various security systems on the computer workstations. This shall include software licenses and web access licenses to allow operators to monitor cameras and/or access control points from dedicated security workstations or remotely via web access.

4. Computer Workstations shall be provided as indicated. These workstations shall be designed for viewing the physical security systems. Workstations shall have multiple video display interfaces to allow for connecting multiple monitors to the workstation. These monitors may include a combination of desktop or

console mounted monitors and/or large wall mounted event “call-up” video monitors such as a video wall.

5. Workstations operating the HMI PLC interface shall be able to operate independently. If one workstation fails, the other workstation shall be able to operate the faculty as normal. Actions performed on one workstation shall be shown on the other workstation, for example if a door is opened on one workstation the icon should change state on both workstations.

2.03 System Software

A. Human Machine Interface (HMI) Platform

1. This system shall provide centralized control, monitoring and integration of the physical security systems including but not limited to the following:
   a. PLC systems
   b. Door locking control
   c. Overhead door control
   d. Video surveillance systems
   e. Intercom and PA systems
   f. Electronic Access Control Systems
   g. Hard wired panic devices
   h. Lighting control
   i. Electrical receptacle control
   j. HVAC Economizer Control
   k. Inmate telephone systems
   l. Additional systems as identified on existing documentation
2. The Contractor shall schedule a series of 90 to 120 minute meetings to discuss the desired functionality and layout. The Contractor shall then submit screen shots of the interface with intended functionality to the Consultant and Owner for approval before installed at the project site.
3. Manufacturers:
   a. Wonderwear InTouch
   b. Indusoft
   c. No substitutions

2.04 Reporting, Logging and Archiving

A. The system shall log and archive all actions performed by individual user with time and dates associated.

B. The system shall log and archive all alarms with time, date and duration.

C. The system shall log and archive all system faults and errors with a description of the problem.

D. These logs shall be capable of being exported into a document that can be emailed to administration.

E. The logs shall only be accessible by people defined as an administrator with the correct credentials and passwords.

F. The logs shall be filterable and searchable.

G. The Owner will provide a server to be utilized for these functions. The Contractor shall be responsible for the configuration and installation of the server. The Contractor shall provide the Owner with the server performance requirements.

2.05 PLC (Programmable Logic Control) Systems

A. The Contractor shall replace the existing PLC system with completely new system. The existing cabling may be reused at the Contractor's discretion. The existing cabling that is reused shall be warranted as if it was new. The existing cable shall only have a single splice when required to extend to the new system. The existing racks and cabinets shall not be reused. Ceiling heights vary and some are less than 7'. The Contractor shall field verify before pre-configuring cabinets.

B. The PLC system shall utilize Ethernet communications. Serial communications are not acceptable. The Contractor shall not provide their own sub network switches such as 8-port Netgear switches. The system shall utilize the facilities network. The Contractor shall provide the correct amount of network cabling to the PLC controllers for the telecommunications closet.

1. All network communications shall be encrypted.

C. The system shall allow for future expansion and future sub-systems. The Contractor shall provide a minimum of 10% spare capacity which includes relays and fuse holders in each security closet for future expansion.

D. The PLCs shall be non-propriety and readily available through standard distribution.

E. Provide with the appropriate hardware for rack and DIN rail mounting.

F. Provide a IP networked PLC processor in:

1. A117

2. B163
3. D104
4. F107
5. H202
6. J202
7. K202
8. N202
9. Annex 108
10. Annex Control B

G. Manufacturers:

1. Allen Bradley
2. GE
3. Modicon
4. Omron
5. Square D
6. Or pre-approved equal

2.06 Relays

A. The contractor shall replace all existing relays with new including the holders.

B. The relays shall be non-propriety or custom manufactured and readily available through standard distribution.

C. The relays shall be appropriate for the application and rated for the proper current.

D. The relays shall be din rail mounted and standalone (not integrated into I/O modules).

2.07 Fuses

A. The contractor shall replace all existing fuses with new including the holders.

B. The fuses shall be non-propriety and readily available through standard distribution.

C. The fuses shall be appropriate for the application and rated for the proper current.

D. The fuses shall have a LED that illuminates when a fuse is blown.

E. The fuses shall be din rail mounted and standalone.

2.08 TVSS Monitoring

A. The Contractor shall provide TVSS modules that are monitored by the PLC system.

B. The TVSS module shall be appropriate for the application and rated for the proper current.

C. The TVSS unit shall have a LED that illuminates when activated

D. The TVSS module shall be non-propriety and readily available through standard distribution.

2.09 Lock connectivity

A. The system shall interface with the existing locks.

B. The Contractor shall coordinate with the Owner to obtain the part number and voltage of all locks for their PLC programming.

C. The Contractor may choose to utilize the existing cable at their discretion. Any existing cable that is utilized shall be warranted as new.

D. The Contractor shall provide new power supplies.

2.10 Power Supplies

A. The Contractor shall provide all new power supplies for the security hardware, door lock control and other systems as required. No existing power supplies shall be reused without permission.

B. The Contractor shall provide the voltage required for each application. The power supplies shall not exceed 70% of their output rating for headroom.

C. The power supplies shall be DIN rail mounted.

D. Manufacturer:

1. Phoenix Contact
2. Sola HD
3. Emerson
4. Or approved equal

2.11 HMI Interface

A. Each screen shall be able to operate independently.

B. The screens shall show the floor plan of the area being controlled with the entire floor plan show on the screen with selectable areas.

C. The screens shall utilize a grey scale background so symbols, icons and notifications clearly stand out.

D. Each device type shall have its own clearly identifiable symbol or icon.

2.12 VMS Interface/Camera Call Ups

A. Each Genetec Security Center call up monitor shall be interfaced to the PLC system utilizing Pelco ASCII serial commands.

B. The Corrections contractor shall furnish and install all serial to IP and IP to serial electronics to connect to the VMS workstations. Lantronix or equal.

C. The Connections contractor shall furnish and install all serial cable between the electronics including any horizontal cable if required.

D. Assume approximately 180 cameras and approximately 500 call up serial strings.

E. Refer to Part 3 for additional integration requirements.

2.13 Auxiliary Control Systems

A. Telephone System:

1. The inmate telephone control system shall provide for remote switching, on an individual or group basis, of audio circuits from the telephone backboard(s) to the inmate phones. Inmate telephone control shall be implemented through the use of electro-mechanical double pole, double throw relays (controlled through PLC output modules) installed in series with the audio circuits. A minimum of one relay shall be provided for each audio circuit being controlled.

2. Inmate phones shall be remotely controlled through the use of the touch screen control station(s). Inmate phones shall be controlled on an individual or group basis.

B. Water Valve Control:

1. The water valve control system shall provide for remote switching, on an individual basis, of water valves, which provide water to inmate-occupied areas of the facility. Water valve control shall be implemented through the use of electro-mechanical relays controlled through PLC output modules. A minimum of one relay shall be provided for each water valve being controlled.

2. Water valves shall be remotely controlled through the use of the touch screen control station(s). Water valves shall be controlled on an individual basis.

C. Fail Safe Configuration: Upon loss of power to the auxiliary system or failure of the PLC input and output modules, the system shall change state to the safest condition for the facility staff.

1. Lighting relays shall fail closed to allow lighting to be on if lighting circuit is powered.
2. Receptacle relays shall fail open keeping staff safe from electric shock.
3. Inmate telephone relays will open to prevent use during a power failure.
4. Door locks shall fail secure in a locked position.

D. Lighting Relays:

1. The Contractor shall refer to original drawings, electrical panel schedules or field verified to determine what type of lighting that is being switched. Relay type will be selected by the Contractor to meet codes and specific load requirements.

E. Electrical Receptacle Relays:

1. The Contractor shall refer to original drawings and electrical panel schedules to determine what type of load that is being switched. Relay type will be selected by the integrator to meet codes and specific load requirements.

2.14 Temporary Manual Controls

A. The Contractor shall assist the Owner with the identification of circuits, relays or other connections that will require temporary control when the PLC system is taken offline. The temporary controls will be furnished and installed by the Owner.

2.15 Enclosures:

A. The enclosures are existing and may be reused or replaced at the contractor's discretion. The contractor shall field verify dimensions prior to purchase or installation of equipment for enclosure.

B. The enclosures shall utilize barriers to separate the high and low voltage cables. Coordinate the location of the enclosure(s) with the electrical Contractor to be located near branch circuit panel boards.

2.16 Computer Workstations and Servers for Command and Control Systems

A. General Requirements:

1. Computer workstations will be Owner provided and Contractor configured and installed. The Owner will purchase the workstations and ship them to the contractor for configuration. The Contractor shall be responsible to ship to the site.
2. The system BIOS shall be set to re-boot upon power restoration.
3. A shell command shall be in place to boot the machine directly into the HMI software and require an administration password to perform any task other than control the HMI. The removal of a keyboard is not an acceptable means of restriction.

B. Owner Furnished Workstations and Server Requirements

1. County will furnish a total of 17 workstations (2 for spare) to host the HMI operational software to operate the HMI.
2. County will furnish 1 server to provide the PLC/HMI logging services and any other required service. This server will also act as the remote support machine.
3. County will install all County required programs such as an anti-virus on the 17 workstations and 1 server prior to being turned over to the contractor for inspection.
4. The contractor will install, configure, and program the work stations and server to operate the system as intended. The workstations will be delivered with an OEM license Windows 10 operating system and the server will be delivered with an OEM Windows Server 2012 RS operating system. These licenses shall not be modified in any way.
5. All 17 workstations and 1 server will be delivered with a county supplied computer name and local account with administrator rights for the contractor to use to configure their software and run their system.
6. 17 of the work stations and the 1 server will be delivered to the Central Jail for the contractor to inspect. Upon the contractors' inspection and acceptance of the work stations and server the 17 workstations and 1 server can be shipped to the contractor's work place for software installation and functional testing. The contractor is to install only the Engineer of Record pre-approved specific software on the 17 workstations and 1 server.
7. All costs associated with the shipping of the 17 workstations and 1 server will be at the contractors' expense. The contractor may also choose to do all configuration and software installation on site.
8. Upon the return of the 17 work stations and 1 server to the Central Jail AND before the work stations and server are connected to the county network the county Information Technology Services Department will inspect the returned equipment, install county antivirus software, and confirm the 17 work stations and 1 server image is acceptable and approved to connect to the county network.
9. When the 17 work stations and 1 server have been inspected and accepted by county ITS for connection to the county network the vendor may proceed to install the 17 work stations and 1 server.
10. The vendor will also provide complete and detailed instructions and any needed software and licenses on how to install the HMI software onto the 2 spare work stations that were not previously configured by the contractor. These 2 work stations will be configured on site by the county ITS group with the input of the contractor. When the 2 work stations are configured they will be placed in

operation in a POD determined by the county. The 2 work stations removed will be stored on site as emergency replacement units.

2.17 Desktop monitor speakers

A. The speaker shall be compact, self-powered, full range speakers with volume control.

B. Minimum frequency response of 56Hz – 20kHz with a max SPL of 101 dB.

C. XLR, ¼" and mini jack inputs. Provide adapters as required.

D. Dimensions: 9.5"H x 5.8W"T x 8.4"T

E. Manufacturer:

1. Tannoy Reveal 402

2. Or approved equal

F. Provide with a passive mixer/combiner manufactured by RDL or equal when multiple workstations and intercom stations need to utilize a single pair of speakers. Provide with permanent mounting solution.

2.18 Wire and Cable

A. The Contractor shall provide the Command and Control Systems wire and cable. Wire and cable shall meet the following minimum specifications:

1. All wire and cable shall be Underwriter's Laboratories (ULC) listed and plenum rated where required.

2. All wire and cable shall meet individual system or subsystem manufacturer requirements or recommendations.

3. All insulated wire and cable shall conform to the minimum requirements of Insulated Cable Engineers Association (ICEA) Standards. Wire and cable shall comply with the applicable requirements of the National Electrical Code (NEC), latest edition, in regards to cable construction and usage.

4. The conductors of wires shall be copper, and have conductivity in accordance with the standardization rules of the Institute of Electrical and Electronics Engineers, Inc. (IEEE). The conductor and each strand shall be round and free of kinks and defects.

5. Color coding shall be accomplished by using solidly colored insulation. Grounding conductors, where insulated, shall be colored solid green or identified with green color as required by the National Electric Code (NEC).

6. All wire and cable insulation shall be rated for a minimum of 300 V.

2.19 Equipment racks and cabinets

A. The Contractor shall provide new equipment racks as required or as identified. These cabinets shall be sized as required for the space and equipment needs with additional space for expansions.

B. The cabinets shall be properly grounded.

C. Provide rack extenders as required when depth is not adequate on existing racks and cabinets.

D. Manufacturer:

1. Hoffman
2. Lowell
3. Winsted
4. Or approved equal

2.20 Command and Control Consoles and Credenzas

A. General Requirements

1. The Contractor shall be responsible for providing and installing all racks, cabinets, writing surfaces, panels and equipment (with the exception of those listed as provided by others) as required for a complete and operational command and control console and equipment room as indicated.
2. The Contractor shall provide all rack mounting hardware, brackets, shelves, doors, etc. as necessary to install all console equipment and devices.
3. Colors and finishes of all console and rack equipment and hardware shall be reviewed by the Owner, Consultant, and Engineer prior to purchase and installation. The Contractor shall coordinate with the Architect and Consultant to finalize exact finish requirements, mounting dimensions and any special requirements for a quality installation.
4. The Console shall be grounded to the grounding system.

B. Command and Control Console and Credenzas

1. The Contractor shall provide all monitor mounting brackets and any other components required to secure monitors to the security console.
2. The Contractor shall coordinate the exact location of the console and all monitoring and controls equipment with the Owner, Engineer, and Consultant through the shop drawing process, prior to installation.

3. The console shall have built in cable pathways similar to that of modular office furniture. Cable connections shall be provided to console mounted voice/data outlets.
4. The console shall have pre-wired power outlets similar to that of modular office furniture. Power connections shall be provided to console mounted outlets by others.
5. Any furniture with an integrated equipment rack shall have power and voice/data connections integrated. This credenza shall have a vented and lockable door. The integrated equipment rack shall be a standard 19" equipment rack with enough space to house the required equipment.
6. The furniture shall utilize a Marmoleum top, with full rubber surrounds.
7. The furniture shall have a 10-year warranty.
8. Manufacturer:
    a. Winsted. The Contractor shall refer to Winsted quote # 12630012 for engineered equipment list, custom pieces and surface types for reference and design intent only. The Contractor shall confirm all dimension and design and make any necessary corrections prior to submittals. Contact Jessie James, jessiej@winsted.com, 952-914-3866.

Part 3 - Execution

3.01 Testing

A. Refer to Section 27 00 00 for additional requirements.

3.02 Training

A. Refer to Section 27 00 00 for additional requirements.

3.03 Warranty

A. Refer to Section 27 00 00 for additional requirements.

3.04 Installation Practices

A. All services provided shall be professional and conform to the highest standards for industry practices. The Owner reserves the right to halt any installation due to poor workmanship. All work shall be defect free, and the installer shall replace, at their expense, any work found to be defective.

B. The Owner reserves the right to halt any installation due to failure of Contractor to observe installation-free periods due to instructional or administrative requirements. To the maximum extent possible, the Owner will provide advance notice of such periods.

C. Contractor is responsible for providing complete and functional systems.

D. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers, or as indicated in their published literature, unless specifically noted herein to the contrary.

E. Contractor shall follow these standards and approved submittals for locations of power supplies. The Owner intends to limit the number and location of power supplies to facilitate more effective long-term support and maintenance of the system.

3.05 Coordination

A. Contractor shall provide up to 8 hours (up to four, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with sequence of operation, rule creation and coordination as requested by Owner or Consultant.

3.06 Training

A. Provide system operations, administration, and maintenance training by factory-trained personnel qualified to instruct.

1. Contractor shall provide up to 16 hours of scheduled and dedicated training time in eight (8) two (2) hour sessions.

2. Provide printed training materials for each trainee, including product manuals, course outline, workbook or student guides, and written examinations for certification.

3. Provide hands-on training with operational equipment.

4. Training should include the video surveillance interface and call ups.

5. Training shall be oriented to the specific system being installed under this contract as designed and specified.

6. Contractor shall provide all necessary documentation of system operating parameters prior to scheduled training sessions.

3.07 Aesthetics

A. All cables and equipment terminating at panels frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.

B. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.

C. For any given location, a horizontal and vertical alignment for all mounting hardware will be maintained to provide a symmetrical and uniform appearance to the distribution frame.

D. All surface-mounted devices shall be firmly secured level and plumb

E. All rack mount equipment shall be securely installed.

3.08 Hardware Layout

A. Hardware positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.09 Server Installation Practices

A. Verify that the manufacturer approved server hardware, OS meets the Owner's IT standards prior to ordering.

B. Coordinate server power, cooling, and mounting requirements with Owner prior to installation.

C. Coordinate virus scan/security software requirements with Owner and manufacturer prior to installation and connection to network.

3.10 Device Cabling/Wiring Installation Practices

A. All external wire and cables shall be supported at least every five feet from the structure or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables. Provide j-hooks as needed where cable tray or raceway is not available.

B. All cables, regardless of length, shall be labeled within 18" of both ends with an identifier that is keyed to the door, room, or corridor number as identified.

C. Cabling shall be adequately supported with Velcro wire wraps. Cables shall be dressed in a neat and orderly fashion. Any cabling or equipment installation that is deemed unacceptable by the Owner or Consultant shall be replaced or corrected by the Contractor at no additional cost. **Plastic zip ties are not allowed.**

D. All cables are to run at right angles to the structure, placed above the ceiling in halls or corridors.

E. Cables shall not run above red iron joist.

F. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests.

G. Ties and straps shall be installed snugly without deforming cable insulation. Ties shall be spaced at uneven intervals not to exceed four feet. No sharp burrs shall remain where excess length of the cable tie has been cut.

H. Contractor shall notify Owner immediately if obstruction or hazard is discovered in a pathway provided by others.

I. Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the manufacturer's rating.

3.11 Cable Termination

A. Termination hardware (blocks and patch panels) positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.12 PLC Integration with Command and Control System and System Functionality

A. The Physical Security Systems shall be integrated into the Command and Control System platform.

1. All integrations shall be via a native IP interface.

2. The Intercom integration shall be a native IP interface.

B. The Contractor shall provide any and all licensing to integrate the systems together including any additional items to be added to the yearly maintenance agreement.

C. The following minimum features shall be included in the integration; the following list is not all inclusive or exhaustive. The integration shall be a turnkey solution:

1. Graphical maps showing icons.

2. Camera views associated with intercom stations and doors.

3. Device names brought in from the integrated systems.

4. Database entries for all actions performed.

5. Time syncing via common NTP server.

6. Microsoft Exchange integration for email notifications, one way outbound SNTP to Exchange.

D. Video Surveillance System Integration

1. The PLC/HMI shall integrate to the existing Genetec Security Center system for camera call up.

2. The County's incumbent sub-contractor will provide all Genetec licensing required. The PLC contractor shall coordinate their solution with them to ensure a full understanding is met and all costs are identified in the base bid.
3. The integration shall be done via serial to IP and IP to serial interfaces furnished and installed by this Contractor.
4. The integration shall be accomplished by sending Pelco ASCII serial strings from the PLC/HMI system to the Genetec workstation.
5. The Contractor shall obtain a list of all cameras to be added to the touch screens and integrated in.
6. The Contractor shall assume 4 call up windows on all VMS workstations. Window 1 shall be the primary camera associated with an intercom event. Window 2 shall be any secondary camera associated with an intercom event such as the camera on the backside of the door. The 3rd and 4th windows shall be for alarms such as duress buttons. The Contractor shall coordinate this with the Owner prior to finalizing.
7. These cameras shall be associated with the devices on the HMI and call up when the device is triggered.

E. System Functionality

1. General: Each controlled or monitored device shall have its own unique icon and color associated with it. When an icon is pressed or there is a notification the icon shall illuminate and there shall be an audible tone. The following list functionalities describe the minimum features to be integrated. The system shall have the capabilities of selecting automated messages through the integrated Intercom/PA system for emergency announcements like fire, tornado, lockdown, etc. All existing functionality shall be carried over from the existing system. Final functionality shall be coordinated with the Owner and Consultant prior to implementation.
2. Door lock/unlock: The icon shall provide control options for the door when pushed. The unlock period shall be coordinated with the Owner and is currently approximately 3 seconds. The unlock pulse shall be of sufficient duration to bring the hardware to a full unlock. The icon shall be neutral colored when the door is in a locked secure state, red when the door is open less than the set duration of time and flashing red when the door is held open too long, is in alarm or when the system has lost communication with it. When a door is in alarm the associated cameras and intercoms for communication shall pop-up and be displayed. The alarm shall have the ability to be silenced for times when the door needs to be held open.
    a. Group unlocks shall require two steps of verification before the doors are sequenced open. The final step of authentication shall include a pop-up with a warning message.

b. There shall be no option for a facility wide unlock.

3. Motorized doors, gates and sliders: The icon shall provide open/close/stop functionality. The unlock and open pulse shall be of sufficient duration to bring the hardware to a full unlock and full open position. Pressing the stop button while opening or closing shall immediately stop the door. The icon shall be neutral colored when the door is in a locked secure state, red when the door is open or opening and flashing red when the door is in alarm or when the system has lost communication with it. When a door is in alarm the associated cameras and intercoms for communication shall pop-up and be displayed.

4. Door interlock: Where multiple doors form an interlock the icons or area shall display as yellow indicating the interlock is active. The controls logic shall only allow for a single door to be open at any given time. An interlock override shall be provided.

   a. Interlock override shall require two steps of verification before the override is active. The final step of authentication shall include a pop-up with a warning message.

5. Overhead door control: The icon shall provide open/close/stop functionality. The open pulse shall be of sufficient duration to bring the hardware to a full open position. Pressing the stop button while opening or closing shall immediately stop the door. The icon shall be neutral colored when the door is in a locked secure state, red when the door is open or opening and flashing red when the door is in alarm or when the system has lost communication with it. When a door is in alarm the associated cameras and intercoms for communication shall pop-up and be displayed.

6. Video surveillance cameras: The icons shall call up the camera and associated intercom or audio channel for communication if applicable. The camera icon shall have its associated camera number visible. The Contractor shall obtain all the existing camera locations to be shown on the screens from the Owner and their integrator.

7. Intercom Sub-stations: When a call is received the intercom icon shall flash and produce an audible tone unique to an intercom call. The call shall pop-up the associated camera or cameras. When the call is answered the audio channel shall open and the desktop push-to-talk microphone shall function. The operator shall not be required to push an icon to push-to-talk.

   a. When an icon is pressed when no call is active the audio channel shall open for listening and communicating using the push-to-talk microphone and the associated camera shall pop-up.

   b. Each icon shall provide the ability to silence the individual intercom for scenarios when an inmate becomes a nuisance. When an intercom is silenced the icon shall flash a unique color indicating it is still in a silenced mode. This action shall be specifically logged in the database.

c. When the system has an emergency intercom call in that call shall be placed at the top of the queue.

8. PA zones: Each zone, each floor, corridor, pod and all call all zones shall have the ability to be paged from the touch screen by pressing an icon associated with the zone. When the icon is pressed the audio channel shall open and the push-to-talk microphone shall be active. The icon for the all zone all call shall only require a single step to make the page rapidly. There shall also be the ability to initiate pre-recorded messages that loop until stopped.

9. Staff wired duress alarms: When a duress alarm has been pressed the icon or icons indicating the area where the signal was received shall flash red, sound a unique audible tone and the associated cameras will pop-up. When the alarm in acknowledged the icon shall go to solid red, the audible alarm shall silence until the device is reset at which point the icon shall go back to green. There shall be different icons for wireless antennas and hardwired duress buttons.

10. Inmate telephone control: The inmate telephones shall be controlled from the touch screen. When the icon is pressed it shall enable/disable the telephone and show a unique color for each state.

11. Lighting control: The icon shall control the on/off state of a lighting circuit. The icon shall change state and remain changed while the lights are on. There shall be circuit groups to allow the user to control large zones with a single press of a button.

12. Electrical receptacle control: The icon shall control the on/off state of an electrical circuit. The icon shall change state and remain changed while the circuit is energized. There shall be circuit groups to allow the user to control multiple circuits with a single press of a button.

    a. When the receptacle is controlling a specific device such as a television there shall be an option to assign a unique icon appropriate to the device being controlled.

13. Water valve control: The icon shall control the on/off state of a water valve or group of water valves. The icon shall change state and remain changed while the valves are closed. There shall be valve groups to allow the user to control large zones with a single press of a button.

14. HVAC Economizer Control: The system shall be interfaced with the HVAC system to enable or disable the ventilation in the associated areas. The icon shall control the on/off state of an economizer. The icon shall change state and remain changed while the economizers are active.

15. Device Supervision: The system shall have a screen that shows the status of the PLC's, TVSS monitors, ect. When an issue occurs the system shall alert the user with an alarm that can be silenced. There shall be an icon for each monitored device.

16. The Contractor shall set up a meeting between the Owner and Consultant to determine the exact functionality of the integrations before the integration starts.

3.13 Fire Stopping

A. Fire stopping of openings between floors, fire-rated walls, and smoke-rated walls, created by others for This Contractor to pass cable through, shall be the responsibility of the This Contractor. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.

B. Any openings created by or for this Contractor and left unused shall be sealed up by this Contractor.

C. This Contractor shall be responsible for creating a waterproof seal in and around any openings that This Contractor creates from the structure to the outside environment.

3.14 System Testing Procedures

A. Prior to energizing or testing the system, ensure the following:

1. All products are installed in a proper and safe manner per the manufacturer's instructions.

2. Dust, debris, solder, splatter, etc., is removed.

3. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.

4. All products are neat, clean, and unmarred, and parts are securely attached.

B. Contractor shall ensure that each device in the security system is functioning normally and in such a manner as to meet the functional and performance requirements in this specification.

3.15 System Inspection

A. Contractor shall coordinate with project representative for inspection after Contractor has completed testing of entire system.

B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.

3.16 Labeling

A. Contractor shall neatly label all security devices and cabling at both ends. All labels shall be on Project as-built drawings.

3.17 Documentation

A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval as described in section 27 60 00. 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. Door label/identifier

b. Location of each drop by orientation/permanent landmark in the room

c. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.

3. The Contractor shall provide all HMI files, logic programming, licenses and any other custom developed software or configuration files to the Owner.

3.18 Spare Parts

A. Deliver spare parts in protective wrapping and packaging for proper storage.

B. The Contractor shall provide the following spare parts:

1. (2) of each type of PLC CPU used

2. (4) of each type of PLC Input modules

3. (4) of each type of PLC output modules

4. (2) of each type of PLC power supply

5. (2) of each type of door power supply

6. (8) of each type of relays used

7. (24) of each type of fuse used

3.19 Pre-Check out

A. The Contractor shall demonstrate the following to Owner during system demonstration.

3.20 Final Acceptance

A. In addition to closeout requirements in section 27 60 00, This Contractor shall demonstrate the following before final approval.

1. Owner training is complete.

2. Punch list items are complete.
3. As-built documentation is complete and submitted to Owner/Consultant.

3.21 Final Procedures

A. Perform final procedures in accordance with section 27 60 00

End of Section

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