

Attachment B

Section 27 60 00 – Physical Security General Requirements

Part 1 - General

1.01 Scope

- A. This section describes the general product and execution requirements related to furnishing and installing Physical Security Systems. Physical Security Systems includes Video Surveillance, Electronic Access Control, Intrusion Detection, and their sub systems.
- B. Contractor shall be responsible for providing complete and functional systems as described in this specification and project drawings.
- C. 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.
- D. Contractor shall be, or Contractor shall provide, an Electrical Contractor for provision of high voltage power and conduits/raceway, where necessary.
- E. Contractor shall be responsible for any and all related programming and end-user training unless noted otherwise.

1.02 Related Work

- A. Section 27 62 00 – Electronic Access Control System
- B. Section 27 64 00 – Video Surveillance System

1.03 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.
- D. Consultant: True North Consulting Group.
- 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.

1.04 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)
maintained by NFPA – National Fire Protection Association
www.nfpa.org
15. NECA – National Electrical Contractors Association
www.necanet.org
16. NEMA – National Electrical Manufacturers' 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.

1.05 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.

1.06 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.
- C. 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
 - 2. Workstation(s) processor(s), disk space and memory size
 - 3. Operating System(s) Software, where software is provided or upgraded
 - 4. Application Software, with Optional and Custom Software Modules supplied in this project
 - 5. Integration Schemes: Proposed connectivity, software, development requirements, and SDK information, for inter-system communication.
 - 6. Network reliability requirements
 - 7. Number and location of LAN ports required
 - 8. Number of IP addresses required.
 - 9. Other specific network requirements, preferences, and constraints

10. Backup/archive system size and configuration
11. Start-up operations
12. Description of site (field) control equipment (Controllers/Field Panels) and their configuration
13. Access control power calculations.
14. Battery backup requirements

1.07 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.

1.08 Closeout Submittals

- A. Refer to Section 27 60 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.

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 60 00.

2.02 Grounding and Bonding

- A. The Contractor shall bond and ground the primary protectors and the metallic member of cable sheaths to building ground utilizing a minimum of 14-awg and no greater than 6-awg at the closest point of entrance as practical, not exceeding 50 feet, in accordance with the NEC.

2.03 Refer to individual sections for additional product information.

2.04 Fire Stopping Materials

- A. Refer to Section 27 60 00 for additional requirements.

Part 3 - Execution

3.01 Network Time Protocol (NTP) Synchronization

- A. All security systems as well as additional integrated systems such as intercom/PA, SQL/database servers and data logging servers shall synchronize to a common NTP server.
- B. All systems including servers and workstations shall be within 250ms of each other or less depending on specific system requirements. The synchronization frequency shall be no less than every 1 hour. The Contractor shall use software such as NetTime (www.timesynctool.com) installed on the servers and dedicated workstations.
- C. The Contractor shall coordinate with the Owner for a NTP server connection address.

3.02 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.

3.03 Training

A. 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 all training levels.
- 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.

B. Duration: Refer to the individual sections for the minimum time requirements.

3.04 Warranty

- A. 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.
- B. 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.
- C. 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.

3.05 Examination of Site and Documents

- A. Bidder shall examine all documents, shall visit the site(s) prior to submitting proposal, 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 proposal 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 proposal 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.
- J. General: The Contractor shall be responsible for removal, collection, transportation, and recycling of all cabling and components that become abandoned as a result of this project. This shall include the delivery of cable and components to the proper recycling centers. If material is to remain on site for more than seven days after removal, Contractor shall coordinate with Owner for an acceptable storage location.
- K. Verification: Contractor shall field-verify existing conditions prior to beginning demolition work. Any discrepancies shall be reported to the 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.
- L. Abandoned Cable: The Contractor shall remove all abandoned cable back to the headend. Where it is not possible to remove cables without damaging other cables that are to remain, such as in a shared conduit, the Contractor shall report these conditions to the Consultant for approval. These cables shall be cut at entry and exit points, leaving a minimum of 24" of cable at each end.
- M. Cover Plates: The 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.
- N. Equipment: The Contractor shall remove all equipment abandoned as part of this project. The Contractor shall be responsible for the delivery of this equipment to a proper recycling facility. Any electrical service connected to the equipment shall be properly decommissioned and labeled to prevent any safety issues.
- O. Right of Refusal: The Owner shall have first right of refusal to any abandoned cable or equipment. The Owner has the right to remove any components from the equipment before it is recycled.

3.06 Demolition

- A. General: The Contractor shall be responsible for removal, collection, transportation, and recycling of all cabling and components that become abandoned as a result of this project. This shall include the delivery of cable and components to the proper recycling centers. If material is to remain on site for more than seven days after removal, Contractor shall coordinate with Owner for an acceptable storage location.
- B. Verification: Contractor shall field-verify existing conditions prior to beginning demolition work. Any discrepancies shall be reported to the 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: The Contractor shall remove all abandoned cable back to the headend. Where it is not possible to remove cables without damaging other cables that are to remain, such as in a shared conduit, the Contractor shall report these conditions to the Consultant for approval. These cables shall be cut at entry and exit points, leaving a minimum of 24" of cable at each end.
- D. Cover Plates: The 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.
- E. Equipment: The Contractor shall remove all equipment abandoned as part of this project. The Contractor shall be responsible for the delivery of this equipment to a proper recycling facility. Any electrical service connected to the equipment shall be properly decommissioned and labeled to prevent any safety issues.
- F. Right of Refusal: The Owner shall have first right of refusal to any abandoned cable or equipment. The Owner has the right to remove any components from the equipment before it is recycled.

3.07 Installation Requirements

- A. Refer to Section 27 60 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 General 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.

3.08 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.

3.09 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.

3.10 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.

3.11 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 USB Drive.

2. Manuals: Submit two (2) copies of each of the following materials in bound manuals, and electronic PDF copies USB drive, 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 USB Drive.
 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 laminated and permanently attached to the inside cover of the terminal cabinet.
 2. In each equipment enclosure the Contractor shall place a laminated and permanently attached 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.
- 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.

3.12 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 digitally on USB Drive, 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) laminated and permanently attached 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.

3.13 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).

End of Section