

SECTION 28 00 01 SECURITY GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 PROJECT INTENT

- A. The intent of this project is to refresh the existing Security Video Systems at six remote sites, the Main Office and Bus Yard, as well as install new Security Video Systems at two new remote sites. All sites are located in El Dorado County between El Dorado Hills and Placerville. Remote sites utilize wireless data connections with the Exacq Video Management System residing at the Main Office.

1.02 TERMINOLOGY

- A. This project's owner is referred to in this document as Owner, and the respondent is referred to as Bidder or Contractor. The term Owner also includes direct employees, affiliates owning the respective sites where the work is to be performed, and other Owner-appointed agents such as architects or consultants. These agents may be requested by Owner to represent Owner in undertaking certain project tasks.

The System Designer for the project is:

Security By Design, Inc. (SBD)

P.O. Box 1668

Lafayette, CA 94549

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1.03 PRECEDENCE

- A. If any statement in this or any other Specification is in conflict with any provision of the General Terms and Conditions to the contract, the provision stated in the General Terms and Conditions shall take precedence. Immediately bring to Owner's attention any questions that result from such potential conflict which require additional interpretation and guidance.

1. Architectural drawings shall have precedence over other drawings in regard to dimensions and location.

1.04 BASIC DEFINITIONS

- A. Business days, weekdays or working days:
1. In these specifications, mean 8:00 a.m. to 5:00 p.m., Monday through Friday (in local time zone) at Owner's site.
- B. Specified Items – Substitutions
1. No Substitutes: Provide without exception the exact make and model number identified in this specification.
 2. Or Equal: An item may be substituted for the specified item provided that in every technical sense, the substituted item provides the same or better capability.

3. Or Approved Equal: A substitute item for the specified item may be offered for approval by Owner. The proposed substitute item shall in every technical sense provide the same or better capability than the specified item. Submit such requests for approval in accordance with the provisions of PART 1 - BID RESPONSE - Prior Approvals, within the time frames outlined.

C. Beneficial Use

1. Each component of a system will be considered available for beneficial use when all components are installed, and conditions are met to make the system fully operational.
2. Beneficial use by the owner does not mean the warranty period has started. The warranty period only begins once the systems integrator has completed all of the contractual obligations for the contract. Reference PART 1 - GENERAL - WARRANTY.

D. Award of Contract

1. In these specifications, award of contract means both - Owner choosing Contractor as the successful bidder, and the parties executing a contract for the work. In all cases, it is a condition of an award of contract that Contractor agrees to use the form of contract supplied by Owner.

1.05 CODES AND STANDARDS

- A. Perform the work in accordance with current editions of the following codes, rules, and regulations:
 1. Appropriate state and local governmental codes
 2. National Electrical Code (NEC)
 3. International Building Code (IBC)
 4. National Fire Protection Association (NFPA), National Fire Code
 5. National Fire Protection Association (NFPA), Life Safety Code
 6. National Electrical Contractor's Association (NECA), National Electrical Installation Standards
 7. Federal Communications Commission (FCC), Communications Act of 1934
 8. Code of Federal Regulations, title 47, Telecommunication
 9. Underwriters Laboratories, Inc. (UL)

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications
 1. Furnish only system components by manufacturers of established reputation and experience who have produced similar equipment and who are able to refer to similar installations rendering satisfactory service.
- B. Contractor Qualifications
At the time of bid, provide evidence of:
 1. Having manufactured, supplied, or installed at least 3 other systems of similar size, complexity, and general operation as the systems described in these

specifications. Furnish written proof of compliance with this paragraph at time of bid.

2. Holding all legally required licenses necessary to accomplish the installation and activation of the described system at the facilities indicated. Submit copies of licenses.
3. Holding all legally required registrations.
4. Having a local office within 100 miles of the project site, staffed with factory-trained technicians with experience on systems of similar complexity and function as described in these specifications.
 - a. The factory-trained technicians shall be fully capable of system engineering support, installation supervision, system start-up, and providing Owner with training and service on both hardware and software for the systems specified.
 - b. Submit copies of the factory-training certifications.

1.07 BID RESPONSE

A. Bidders' Responsibility

1. Review the specifications and drawings (mandatory).
2. Verify actual conditions by walking the site (mandatory).
3. Advise Owner in writing of any conditions that may adversely affect the work.
4. The drawings are accurate in terms of work scope and design for the function sought by Owner but may have discrepancies in their depiction of the actual physical construction as of the date of production. Notify Owner if discrepancies are found.
5. Provide a bid response that meets the intent of the drawings and specifications to the satisfaction of Owner.

B. Unit Price Bid Response Form

1. Provide installed unit prices for each major component of the security systems and each lettered detail shown on the drawings and details. The unit prices shall be the basis for the costing of changes to the security systems.
2. Include pricing for 100 feet of all conductors required for wiring between the lettered detail and its respective security closet.
3. For sites with a delayed start date due to work by others required prior to Security Contractor scope, any increase in pricing compared to what is included in the bid response form must be validated with documentation to show an increase in costs incurred by Contractor.

C. Prior Approvals

1. Submit the following for any substitution proposed by Bidder for equipment items and material (identified by catalog numbers and specified brands or trade names) that are designated as "or approved equal".

- a. A list describing each proposed substitute item or material no later than 10 working days prior to bid opening.
- b. Provide sufficient data, drawings, samples, literature, or other detailed information to demonstrate that the proposed substitute is equal in quality, appearance, and functionality.
- c. Submit a statement listing every technical and operational variance from the specified item. If the bidder fails to list a particular variance that is subsequently deemed to be unsatisfactory, such equipment shall be replaced or modified without cost to Owner.
- d. Owner will respond in writing to substitution requests at least 5 working days prior to the bid opening date. An addendum will be issued listing products which are approved for substitution and will be the sole source for such approval.
- e. Such approval shall not relieve Contractor from complying with the requirements of the drawings and specifications.
- f. Contractor shall be responsible, at Contractor's sole expense, for any detrimental consequences resulting from Owner-approved Bidder-proposed substitutions, including, but not limited to, their impact upon Contractor's work or the work of others.

1.08 SUBMITTALS

- A. Requirements - At Bid Submission
 1. Submit the following:
 - a. List of manufacturers, model numbers, and technical information for all equipment proposed (this requirement is waived where manufacturer is dictated by Owner).
 - b. Letter from the manufacturer of each major system stating that Bidder is a factory-authorized distributor or installer of the proposed system.
 2. Submit unit prices using the Unit Price Bid Response Form described in PART 1 - GENERAL - BID RESPONSE - Unit Price Bid Response Form.
- B. Requirements - After Award of Contract
 1. No later than 15 working days after the effective date of the Agreement (for construction and/or services) submit for approval the following:
 - a. Plan of Operations and Project Schedule
 - 1) Submit for approval a complete plan and schedule of proposed operations.
 - 2) Account for the schedules of all subcontractors, transportation, storage, and all other matters affecting the work.
 - 3) Revise and present this schedule on a weekly basis to Owner.

- b. Point-to-Point Detail Drawings and Equipment Schedules
 - 1) System Designer will furnish point-to-point detail drawings and equipment schedules to Contractor.
 - 2) Submit for approval any proposed revisions to the point-to-point detail drawings or equipment schedules with clear, legible, specific markings on the affected detail drawings or schedules.
 - 3) Submit only those drawings that have proposed revisions.
 - c. Markings
 - 1) Submit for approval samples of wire marking, panel label, and typical per SECTION 28 05 01 - SECURITY WIRING AND CONDUIT and Wire Marking Format Detail 00.05.501.
2. Submit for approval each of the following no later than 20 working days after the effective date of the Agreement (for construction and/or services):
- a. Operations Manual
 - 1) Submit for approval a complete operation manual for all of the system products being supplied.
 - b. Test Procedures
 - 1) Submit for approval any additional test procedures to be followed in evaluating the installed system(s) as covered in SECTION 28 08 11 - SECURITY TESTING.
 - 2) Include all tests required by the equipment manufacturers.
 - c. Training Plan
 - 1) Submit for approval a training plan for operation and maintenance of the installed systems.
 - 2) Design the training program to provide selected Owner personnel with a basic level of competence with the systems.
 - 3) The trained Owner personnel will train other Owner personnel utilizing the training and the training documentation provided by Contractor.
 - 4) Comply with the requirements stated in PART 1 - GENERAL - SYSTEM TRAINING in SECTION 28 20 00 - SECURITY VIDEO SYSTEM.
 - 5) Submit a curriculum for each subject of actual training. Account for all required hours.
 - 6) Include "hands-on" experience with appropriate system equipment and identify the "hands-on" time in each lesson plan.

- 7) Cover the overall system, each individual system, each subsystem, and each component. Also cover procedures for database management, normal operations, and failure modes with response procedures for each type of failure.
3. Software Installation Plan
 - a. At least 10 working days prior to software installation or upgrades, submit a step-by-step Software Installation Plan outlining processes, responsibilities, and estimates timeframe(s).

1.09 CHANGES

- A. Prior to proceeding with changes or claims for extras for work that is out of scope:
 1. Provide written notice to Owner.
 2. Obtain written approval from Owner.
 3. Substantiate the actual cost of each change or claim.
- B. Base the cost of each change upon the item cost as shown in PART 1 - GENERAL - BID RESPONSE - Unit Price Bid Response Form.

1.10 SUPERVISION OF WORK

- A. Supervise the work from beginning to completion and, within reason, keep the same workers and lead technician on site throughout the duration of the project.
- B. Site Project Manager
 1. Provide a site project manager to interface with all appropriate subcontractors during the installation of the system.
 2. Maintain continuing coordination with Owner via the site project manager regarding progress and any problems that may develop.
- C. Do not begin the work before receiving Owner approval of the complete plan and schedule of proposed operations submitted in accordance with PART 1 - GENERAL - SUBMITTALS.

1.11 PROJECT MEETINGS

- A. Pre-Construction Meeting
 1. Attend a pre-construction meeting to be scheduled prior to the start of construction.
 2. Owner will identify a representative at this time and will discuss specific work rules with Contractor.
 3. Discuss the various aspects of the work and procedures for smooth job progress.
- B. Progress Meetings
 1. Hold periodic job site meetings to review progress of the work and resolve installation problems. Invite representatives of Owner and System Designer. Provide current copies of Project Progress Spreadsheet (defined in PART 3 - EXECUTION - COORDINATION WITH OWNER) to all attendees.

2. At the initial meeting, review all required permits.
3. During the initial meeting, establish the frequency of future meetings to Owner's satisfaction. Meetings should not exceed one per week, except by mutual agreement.

1.12 EXAMINATION OF SITE AND VERIFICATION OF EXISTING CONDITIONS

- A. Visit the site and become familiar with all existing conditions prior to submitting bid.
- B. Verify all required dimensions, including those shown on the drawings, by measurement at the job site. Notify Owner of all exceptions before proceeding with the work.
- C. Confirm the availability of a proper power source for each piece of specified equipment to be installed, on the basis of site visits and the drawings. If proper power is not available, consult with Owner for affirmative guidance.

1.13 DATA ACCURACY

- A. Absolute accuracy of information regarding existing conditions is not guaranteed. The drawings and specifications are for the assistance and guidance of Contractor.
- B. Exact locations, distances, elevations, etc., will be determined by actual field conditions.
- C. Obtain prior approval where variations from the bid documents are required.
- D. Contractor is required to notify Owner of any discrepancies discovered at any stage during the project. Nothing shall excuse Contractor from satisfactorily completing the work in the manner customarily expected from a professional contractor.

1.14 PARKING

- A. Use normal facility parking.
- B. Make special arrangements with Owner if delivery to specific outside doorways or loading docks is required.

1.15 SECURITY

- A. Comply with all Owner and facility security requirements.
 1. If any deviation from Owner security requirements is necessary, obtain approval for such deviation from Owner.
 2. Comply with the policies and provisions of Owner regarding outside contractors and consultants.
- B. Do not disclose any confidential information of Owner.

1.16 UTILITIES

- A. Owner will supply utilities at the closest practical location for Contractor use.
- B. Provide all temporary connections and cables, lighting, light stands and hoses.
- C. Use utilities in accordance with applicable state and local government regulations with regard to operations, safety, and fire hazards.

1.17 PERMITS

- A. Secure all permits required for the performance and completion of the work.
- B. Review permit requirements at the initial project progress meeting.

1.18 NORMAL WORKING HOURS

- A. Do not begin work at the Main Office and Central Park and Ride facilities earlier than 5:00 a.m. and do not work later than 8:00 p.m., Monday through Friday, unless approved otherwise by Owner.
- B. Work at the remote Park and Ride facilities will be dictated by respective noise ordinance in place at each location. Owner does not have limitations on working hours at these locations.

1.19 WORK IMPACTING EXISTING SYSTEMS

- A. Do not shut off any existing systems without first notifying Owner and receiving Owner's express authorization.
- B. Give Owner at least 7 calendar days notice of any requirement to shut off or interfere with existing alarm, regulating, computer or other service systems.
- C. Owner will arrange and execute any shutdown.
- D. Perform all work necessary to establish or re-establish any system, such as splicing or connecting, in close coordination with Owner.

1.20 INTERFERENCES WITH OWNER

- A. Coordinate with Owner to eliminate or minimize interferences. Conduct transportation, storage of materials, work involving the facility, and all other matters affecting the use by Owner of its buildings, to cause the least possible interferences.

1.21 PROJECT RECORD DRAWINGS

- A. Project Record Drawings include all bid drawings, as-built drawings, and all submittals.
- B. CAD plans are not available for this project. Project record drawings shall be provided in PDF markup on the drawings provided by Owner.
- C. Obtain, keep up-to-date, and make available to Owner, complete electronic plans, details, and schedules of the project clearly annotated with as-built data as the work is performed. Include the following:
 - 1. Routing of conduit and cables, including the cable designations assigned to each cable
 - 2. Accurate location of all equipment installed under the specifications
 - 3. A complete equipment list for each functional area
 - 4. Complete schedules for all equipment, indicating addresses
 - 5. Complete point-to-point wiring diagrams, including complete terminal strip layout and identification, and wire termination and tagging for all conductors
- D. Redline drawings are required to be kept up-to-date on a daily basis and are required to be current prior to the authorization of each progress payment.

- E. Upon completion of this project, transfer all information shown on these prints to the final set of as-built drawings.
- F. The as-built drawing review will be performed in two stages.
 - 1. Stage 1. Submit the following to Owner for review:
 - a. Complete set of as-built plans in PDF
 - b. Complete set of as-built point-to-point detail drawings in PDF
 - c. Equipment schedules in spreadsheet format and PDF with clear line breakouts for each individual equipment item
 - 2. Stage 2. After receiving Owner's comments on the documents submitted in Stage 1, incorporate Owner comments and resubmit the following:
 - a. Complete set of as-built plans in PDF
 - b. Complete set of as-built point-to-point detail drawings in PDF
 - c. Equipment schedules in spreadsheet format and PDF with clear line breakouts for each individual equipment item
- G. Submit the final as-built drawings in accordance with PART 3 - EXECUTION - SYSTEM ACCEPTANCE REQUIREMENTS.

1.22 WARRANTY

- A. Provide one full year warranty after Notice of Completion that the equipment and work within this scope is:
 - 1. Free from defects in workmanship and material
 - 2. Suitable for the intended application
 - 3. Performing in the manner specified
- B. The warranty shall include on-site service for parts and labor:
 - 1. Normal Service
 - a. Provide normal service at no additional cost to Owner during normal business hours (7:00 AM to 5:00 PM) Monday through Friday on a next-day basis for service calls requested by phone before 1:00 PM Monday through Friday, excluding holidays. If normal service is requested after 1:00 PM on a working day or over a weekend or holiday, provide service within 2 business days of request.
 - b. Normal service is defined as repairs, adjustments, parts, replacement of parts, or any service that the system requires to be fully functional that is not an emergency service.
 - 2. Prior to filing the Notice of Completion, system maintenance of work in progress is the sole responsibility of Contractor.

PART 2 - PRODUCTS

2.01 WORK INCLUDED

- A. Provide all the materials listed in PART 2 - PRODUCTS of the individual specification sections and on the detail drawings unless specifically excluded or modified in other portions of the contract document.
- B. These material and equipment lists are not necessarily 100% complete and/or accurate. Verify all quantities and part numbers, whether listed or not.

2.02 MATERIALS

- A. Use the following items to complete equipment, wire and cable installation called for by the other security specification sections and detail drawings. Provide the make and model shown below when the items are needed but not called out in the specifications or the detail package drawings.
 - 1. Terminal Blocks
 - a. Phoenix Model UK5 Universal Terminal Blocks, or approved equal
 - b. Include Phoenix terminal marking material - ZB, SBS, or approved equal
 - c. Use Phoenix bridging accessories, end covers, partition plates, and other parts as required, or approved equal
 - 2. Mounting Rails
 - a. Phoenix Model NS 35/7.5 (perforated), or approved equal
 - 3. Wire Duct, Cable Ties, Cable and Wire Marking, Wire Soldering
 - a. Reference Section 28 05 01 - SECURITY WIRING AND CONDUIT, PART 2 - PRODUCTS.
 - 4. Tamper Resistant Screws
 - a. Tamperproof Snake Eyes type fasteners,
https://www.tamperproof.com/products-scs/snake_eyes_spanner or approved equal.
 - b. Provide 2 tamper-resistant screwdrivers and transfer to Owner prior to final acceptance testing.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. This contract may involve functioning systems.
 - 1. If it does, coordination with Owner is critical.
 - 2. Do not interrupt any functioning system without complying with PART 1 - GENERAL - WORK IMPACTING EXISTING SYSTEMS.
- B. This project requires a coordinated scheduling effort which must be closely followed in order to meet the completion dates.
 - 1. Review the proposed schedule at the Pre-Construction Meeting.

2. Provide work force staffing according to the schedule constraints presented at that meeting.
- C. Aesthetics are an important consideration in this installation.
 1. Install all components to have aesthetically pleasing results to Owner.
 2. Coordinate actual locations of all visible components in advance with Owner.
- D. Install, make fully operational, and test the system as indicated on the drawings and in the specifications.
 1. Where any requested information is not available from Owner for bidding purposes, assume the worst-case condition necessary to ensure complete, functional systems.
- E. Be responsible for interfacing with other systems under this contract.
 1. Show the details (both logical and physical) of such interfaces on the Submittal drawings and PART 1 - GENERAL - PROJECT RECORD DRAWINGS.
- F. Coordinate interfaces with Owner's telecommunications system with Owner.
- G. Where required or when requested by Owner, provide and terminate 120-VAC, 60-Hz power from nearest electrical panel through a junction box, to security system devices.
- H. Install all equipment parallel and square to building lines.
 1. Provide sufficient clearances to meet all applicable codes and to facilitate observation and testing.
 2. Securely hang and/or fasten with appropriate fittings to ensure positive grounding, free of ground loops, throughout the entire system.
- I. Install all equipment to achieve quiet and vibration-free operation.
 1. Adjust, repair, balance, or replace any equipment producing any noise or vibration that is objectionable to Owner.
 2. Provide additional brackets and bracing as necessary.
- J. Comply with PART 1 - GENERAL - CODES AND STANDARDS.
 1. Where more than one code or regulation is applicable, or where specifications and codes disagree, the more stringent shall apply.
 2. Install seismic bracing on equipment where required by local codes.
- K. Where new equipment is replacing existing equipment, remove the existing equipment and perform repair work as necessary to meet Owner standards.
- L. At the completion of work and prior to final testing, install fire stopping at all penetrations in slabs and fire walls to meet codes.
- M. Install Tamper resistant screws for all security equipment in accessible locations.

3.02 WORKMANSHIP

- A. Perform the installation in a professional manner.
- B. Perform all preparation, handling, and installation work in accordance with the manufacturers' written instructions and technical data.

- C. Perform all work in conformance with the National Electrical Contractor's Association "Standard of Installation" for general installation practice.
- D. On a daily basis, clean up all debris from work performed and deposit in appropriate containers. Stack and organize all parts, tools, and equipment when not being used.
- E. At the conclusion of the installation at all work areas, including all panel enclosures, vacuum and clean to remove all debris and grease.

3.03 COORDINATION WITH OWNER

- A. Coordinate closely with Owner to achieve a complete and aesthetically pleasing installation.
- B. Keep Owner fully apprised of job progress.
 - 1. Project Progress Spreadsheet - Once project progress has commenced, secure from System Designer a copy of the Project Progress Spreadsheet in Excel format. This spreadsheet will include all security points in the project: doors, cameras, alarm points, panels, etc. Contractor(s) will enter dates of completion in the pertinent cell to show when the task was completed, allowing coordination between all parties to accurately assess the status of all points and determine who's "Ball-in-court" the next required task falls under.
 - a. Standard columns to be used in the Project Progress Spreadsheet for effectively tracking progress include:
 - 1) Completion date columns: Wire Pulled, Mount Installed, Camera Installed, Camera Configured, Programmed, Operational, Contractor Tested, Owner/Designer Tested.
 - 2) Notes - This is the appropriate column to identify issues, explain reason for delay, or clearly communicate work that needs to be completed by others prior to proceeding. All notes should begin with the date, and information such as, "Conduit not installed in door frame" or "Camera backordered until *date*", would be appropriate in this column. This column is not intended to store a cumulative record of the history of work at each Detail Point. Resolved issues should be deleted and only the current issues or notes can be entered and updated as problems are corrected.
 - b. Columns may be added or removed by Designer, as needed, to customize this spreadsheet to the scope of the project.
 - c. The primary purpose of this document is to aid in the distribution of current and accurate data regarding the state of the project. While installation work is in progress, submit the latest electronic version of the spreadsheet to Owner and System Designer each week.
 - d. The spreadsheet will also assist Owner in making timely progress payments based on an accurate assessment of the degree of project completion.

- C. Coordinate with Owner for guidance on available switch ports to be used and any network upgrades required for the success of this project.

3.04 CUTTING, PAINTING, AND PATCHING

- A. Do not drill, bore, or notch any structural member in any manner that impairs its structural value.
 - 1. If cutting holes in structural members is required, written approval of Owner is required for each instance. Submit a confirming RFI with proposed plan.
- B. Returned to their original condition all walls cut or repaired during the installation process.
 - 1. Match colors and finishes to the satisfaction of Owner.

3.05 SITE MANAGEMENT RESPONSIBILITY

- A. Provide an on-site Project Manager as defined in PART 1 - GENERAL - SUPERVISION OF WORK.

3.06 SYSTEM DATA PREPARATION, CHECKING, AND ACTIVATION

- A. Provide Owner with the appropriate forms necessary to organize the security systems data inputs not less than 30 days prior to scheduled central system activation. Clearly identify the delivery of the forms on the Project Schedule.
- B. Train Owner-designated personnel to ensure their understanding of data format requirements and constraints not less than 30 days prior to scheduled central system activation.
- C. Clearly identify the training on the Project Schedule so that data preparations are accomplished in sufficient time to permit orderly and on time security systems activation.
- D. Owner will be responsible for the accuracy of the data by thoroughly checking all completed data entry forms.
- E. Ensure that all data formatting is correct prior to security systems activation.
- F. Import/enter the initial data into the security systems prior to activation.
 - 1. The data will include:
 - a. Hardware information: cameras, NVR's, etc.
 - b. Logical information: analytics, system operators and associated permissions, software parameters for system management, and integration details.
 - 2. Provide Owner with a digital copy of the final dataset for review and approval prior to security systems activation.
- G. Provide security systems activation.
 - 1. Once the security systems and data have been demonstrated to be functioning properly according to manufacturers' guidelines and the systems designs, future updates will be covered within the warranty period, as defined in PART 1 - GENERAL - WARRANTY. Further data entries will be the responsibility of Owner.

3.07 SOFTWARE INSTALLATION

- A. Provide Owner with step-by-step Software Installation Plan, in compliance with PART 1 - GENERAL - SUBMITTALS.
- B. Obtain from Owner IT:
 - 1. Network configuration and IP assignments
 - 2. System service account
- C. Provide Owner with:
 - 1. Complete list of required ports for software and hardware functionality
 - 2. Installation media and license files
- D. Coordinate with Owner prior to:
 - 1. Installing Server software
 - 2. Installing client software, as defined by Owner
- E. Verify communication with client workstations and hardware devices.

3.08 DATABASE AND SOFTWARE MANAGEMENT

- A. Ensure that all databases have a regularly scheduled back-up.
 - 1. Coordinate with Owner IT to comply with their system backup policy. Create a scheduled backup plan for all security system databases.
 - 2. Backup no less than once per week for systems with low database activity and daily backups for those with high activity. Verify actual frequency with Owner IT.
 - 3. Maintain off-site backups, in keeping with Owner's policies.
- B. If later versions of the operating security systems or application software are made available by the manufacturers, install the software and ensure that it is fully operational over the life of the software maintenance agreement(s).
 - 1. Before installing software upgrade:
 - a. Ensure that all applicable license files and installation media are accessible within Owner network.
 - b. Ensure that a current backup of existing database information has been performed.
 - c. If operating in a virtualized environment, ensure that a snapshot has been taken of the existing server.
 - d. Ensure that the installation service account has been granted appropriate access to both the server and database instance.
 - e. Coordinate with owner to schedule any system service which may cause outages. Do not initiate any of these services without written approval by Owner.

3.09 START-UP RESPONSIBILITY

- A. Properly ground each piece of electronic equipment prior to applying power.
- B. Properly ground all shielded wire shields to the appropriate earth ground at the hub end only, not at the remote or device end.
- C. Initiate security systems operation.
 - 1. Provide competent start-up personnel on each consecutive working day until the security systems are functional and ready to start the acceptance test phase.
- D. Where appropriate, bring the security systems on-line in their basic state (i.e., alarm reporting, facility code access control, etc.).
 - 1. Owner will provide the specific database information that will allow fully integrated security systems operation.
 - 2. Request the database information from Owner in sufficient time to not delay the project schedule.
- E. Use a start-up sequence that incrementally brings each portion of the system on-line in a logical order that incorporates checking individual elements before proceeding to subsequent elements until the entire system is operational.
- F. If any technical problems occur, and if adequate progress is not being demonstrated in resolving the problems within 15 working days, provide manufacturers' factory technical representatives and diagnostic equipment until the problems are resolved.

3.10 PREPARATION FOR ACCEPTANCE (PRIOR TO FINAL INSPECTION)

- A. If, under the scope of Services of this project, Contractor is required to remove and dispose of any existing apparatus or materials, undertake such disposal in accordance with any and all legal requirements.
- B. Label all components in accordance with SECTION 28 05 01 - WIRING AND CONDUIT and SECTION 28 20 00 - SECURITY VIDEO SYSTEM.
- C. Have all systems, equipment, and devices in full and proper adjustment and operation.
- D. Have all equipment and materials in neat, clean, and unmarred condition with parts securely attached.
- E. Replace or properly repair all broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc. Clean up and appropriately discard all debris.
- F. Deliver and store all extra materials at the premises as directed.
- G. Complete the test reports of each system and each system component, the As-built project drawings, and the O&M manuals and deliver to Owner for review and acceptance.

3.11 SYSTEM ACCEPTANCE REQUIREMENTS

- A. Before final acceptance of work, perform and/or deliver each of the following in the order stated.
 - 1. System Operations and Maintenance Manuals
 - a. Deliver in PDF format. Each separate PDF shall contain appropriately tabbed sections:

- 1) Warranty: Warranty statement including date of warranty termination, complete contact information to include: Name, email address and phone number of the person to be called in the event of equipment failure.
 - 2) Operating Procedures: Set of operating procedures for the security systems that includes all required Owner activities and describes Owner operation of all attributes and facilities of the security systems.
 - 3) Manufacturers' Information: Separate sections containing the manufacturer's information for each specific type of equipment. Include all manuals, instruction sheets, and any related literature from the original shipping containers for the equipment. Include all warranty cards.
2. Testing
- a. Perform all tests required by the Security Testing Specification SECTION 28 08 11 and those submitted per the "Test Procedure" section of PART 1 - GENERAL - SUBMITTALS.
 - b. Activate all devices and verify proper operation of the security systems. Include supervisory and trouble circuit tests.
 - c. Submit a test report for each piece of equipment to Owner. Include a complete listing of all security systems devices, the dates tested, by whom, the results, and dates retested (if failure occurred during any previous tests).
 - d. Successful testing of all security systems devices is required. Failure to completely test and document the tests will delay final testing and acceptance.
3. As-built Drawings
- a. After completion of all the tests listed above, and prior to the final acceptance test, Contractor shall submit the complete as-built drawings as identified in PART 1 - GENERAL - PROJECT RECORD DRAWINGS.
 - b. The final as-built drawings shall consist of full-size format plans, point-to-point detail drawings, equipment schedules, and the complete detailed technical data that was shipped by the Manufacturer with all installed System components. Provide final drawings as described in PART 1 - GENERAL - PROJECT RECORD DRAWINGS.
- B. Final Acceptance Test
1. Before final acceptance testing begins, submit the following to Owner for review and approval:

- a. Operations and maintenance manuals
 - b. Test reports
 - c. As-built drawings
 - d. Tamper-resistant screwdrivers
2. After the manuals, test reports, and as-built drawings are approved by Owner, test the completed security systems in the presence of Owner. Demonstrate performance and compliance with security systems specifications.

3.12 NOTICE OF COMPLETION

- A. Letter of Completion. After the system acceptance requirements described above, including the final acceptance testing described above, have been satisfactorily completed, Owner will issue a letter of completion to Contractor indicating the date of such completion.
- B. Notice of Completion. Record the Notice of Completion upon receipt of Owner's letter of completion. The date of recording shall be the start of the warranty period.

END OF SECTION 28 00 01

SECTION 28 05 01
SECURITY WIRING AND CONDUIT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Furnish and install wire and cable for the security system components shown on the security drawings, details, and schedules.
- B. Work Included:
 - 1. Furnish, install, tag, and document wire and cable to provide all electrical and data circuits for the Access Control and Alarm Monitoring System, the Security Video System, all other systems, and any other associated work shown on the security drawings, details, and schedules.
 - 2. Furnish and install Security Junction Boxes (SJB's) and associated back panels.
 - 3. Terminate low voltage conductors and install all of the security components.
 - 4. Coordinate with Owner (and, where applicable, Owner's General Contractor) for all aspects of work and schedule.
- C. Work Included but Specified under other sections:
 - 1. Section 28 00 01 - Security General Requirements
 - 2. Section 28 05 02 - Fiber-Optic Communications System
 - 3. Section 28 08 11 - Security Testing
- D. Related Work:
 - 1. Section 28 20 00 – Security Video System
- E. Work By Others:
 - 1. Conduit, back boxes, and junction boxes to support wiring and mounting of security devices on walls and ceilings.
 - 2. 120VAC Emergency Power Circuits.
 - 3. This work will require close coordination between Owner, other contractors, and System Designer.

1.02 BASIC DEFINITIONS

- A. Abbreviations:
 - 1. SVS: Security Video System

PART 2 - PRODUCTS

2.01 WORK INCLUDED

- A. Provide all materials listed in both this section and the Detail Package unless specifically excluded or modified in other portions of the contract documents.

- B. Wire/cable pulls are scheduled in the detail package. Use the wire/cable brand and type shown unless a substitute has been specifically approved by Owner.

2.02 MATERIALS

- A. Wire Hangers
 - 1. Provide “Stiffy Supports” type. UL 2239 and UL 2043 for use in plenum environments. Use comfort cradle, clip-on, trapeze, or radius drop trapeze as determined by jobsite conditions. Mounting type for concrete, wood, or beam clamp with length as specified.
 - 2. Provide and install hangers at 4-foot maximum intervals along every wire run.
- B. Wire Duct
 - 1. Tyton or Panduit wire duct with slotted sidewall and cover, or approved equal.
 - 2. Size for specific backboard or backplane space and load requirements.
- C. Cable Ties
 - 1. Provide hook and loop type, plenum-rated cable ties, sized appropriately to the conditions, to prevent damage to the cables where bundled.
 - 2. Do not use plastic zip-ties or twist ties to secure cabling.
- D. Cable and Wire Labels
 - 1. Temporary Wire Tags
 - a. During installation, cables may be tagged with Panduit, Brady, or approved equal wrap around tags.
 - b. Write on temporary tags with a black “Sharpie” brand permanent marker (or equal).
 - 2. Permanent Wire Labels
 - a. At every cable termination point, provide Brady, Panduit, Brother or approved equal heat-shrink or permanent wrap-around, machine-printed, polyolefin wire labels for all cables.
 - b. Handwritten tags are not acceptable.
- E. Wire Termination
 - 1. If screw type terminals are specified, terminal strip connections shall be locking, tongue style, pressure crimp, solderless spade lug.
- F. Wire Splicing
 - 1. Provide and install UL Listed 3M Insulation Displacement Connector (IDC) moisture resistant seal or approved equal, where splicing is approved by Owner.
- G. Conduit, Back Boxes, Junction Boxes, and Fittings
 - 1. Electrical Contractor scope:
 - a. Provide conduit, back boxes, and j-boxes as required. Refer to the plans and the detail package.

- b. Existing walls: Provide mounting rings and pull strings to the rings.
 - c. Furnish conduit and wire required for 120VAC Emergency Power Circuit.
2. Security Contractor scope:
- a. Furnish Security Junction Boxes (SJB's) with metal back panel above dropped ceiling or exposed wall in non-ceiling areas where shown on drawings.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. Install all necessary back boxes, pull boxes, connectors, ceiling wires, supports, cable and wire to provide a complete and reliable system. Verify exact location of all boxes, cable and wiring runs with Owner in advance of any installation.
- B. Obtain specific approval from Owner for the location and appearance of any cable or raceway that is not hidden. If approved, install as inconspicuously as possible and parallel with building lines.
- C. Comb wire groups. Route and support all wiring and cable to achieve the highest quality appearance in all areas, including the interior of all panels and racks.
- D. Install and terminate cable in accordance with manufacturer's installation manuals and applicable codes.
- E. Install all wires/cable on walls in exposed areas in EMT conduit, or other Owner approved raceway, unless otherwise noted or exempted.
- F. For wire/cable runs above suspended ceilings, clamp cable to underside of deck or use wire hangers noted above in PART 2 - PRODUCTS - MATERIALS - Wire Hangers; do not allow cable to lie on top of the ceiling panels. In open ceiling areas, clamp cable to underside of deck in pan troughs or along beams to aid concealment. Do not attach wiring or raceway to suspended ceiling support wires.
- G. Wiring Inspection
 1. Visually inspect wire and cable for faulty insulation prior to installation.
 2. After installation, visually inspect all wiring for flaws such as cuts, punctures, and abrasions. If any flaws are found, replace the wire at no additional cost to Owner.
- H. All wires installed between buildings or in underground conduit: Test with a megohmmeter. A reading of 20 megohms minimum is required. Test between each conductor and ground, and between each pair of conductors.
- I. Prior to termination: Test each conductor for voltage. Replace and re-pull any conductor that has voltage. Splices are not an acceptable alternative.
- J. Where it is cost effective, and with Owner's written permission, conduits and raceways from more than one detail point may be grouped together only if:
 1. Physical space allows.

2. Appropriately sized junction boxes are used.
 3. Conduits do not exceed the maximum 40% fill.
 4. The total bends and length of conduit run allow the wire or cable to be pulled without causing damage to it.
- K. Run wires continuously from termination to termination without splices. Splices at certain junction box locations may be allowed at the discretion of Owner. Make recommendations for splices at such points to Owner and obtain written approval to proceed.
1. Where splices are allowed, join the wire with solder, not wire nuts, then cover with heat shrink insulation in an appropriate manner to ensure mechanical and electrical integrity. An acceptable alternative is to utilize UL-rated IDC moisture resistant seal connectors to connect the cables.
- L. Install wire hangers at 4-foot intervals for every wire run. Run wires at least 1 foot above the ceiling where possible. Run wires above other crossing items where possible. In no case shall a wire run rest on the ceiling tiles unless specifically approved by Owner in writing. Install cable ties at 4-foot maximum intervals, roughly centered between hangers, and at other appropriate locations to keep the wire groups neat.
- M. Support wire and cable in all equipment, terminal cabinets, pull boxes, vertical risers, and horizontal runs with wire duct and strap-type supports.
1. Install appropriate wire duct at all locations where wire duct is required for tidy wire management, whether shown on elevations or not.
 2. Arrange cables neatly to allow inspection, removal, and replacement.
 3. Lace cables as required.
 4. Spot tie wire bundles with cable ties and secure to panels.
 5. Where terminal strips with more than 10 terminals are used, install wire duct on both sides. At no time shall wires cross over terminal boards.
 6. For any exposed wiring, all cables are to be neatly tethered and either braided or combined using cable ties. Reference PART 2 - PRODUCTS - MATERIALS - Cable Ties.
- N. Protect cable ends within enclosures until they are terminated to prevent shorting risk.
- O. Protect wire and cable from kinks.
- P. At no time subject any fiber optic cable to any bend of less than 8-inch radius.
- Q. For new conduit runs:
1. Run 1 pull string for all conduits less than 3”.
 2. Run 1 pull rope for all 3" or larger sized conduits.
 3. Use pull tape with appropriate tensile rating and printed length markings for conduit runs over 20' (6m).
- R. Provide grommets and strain relief material where necessary to avoid abrasion of wire and excess tension on wire and cable.

- S. Adhere to the shielding design shown on the Detail Package, particularly the requirements of 00.06.501, Wire Shield Termination. Proper shielding is crucial to maintaining data integrity.

3.02 IDENTIFICATION AND TAGGING

- A. Identify all cables, wires, with labels or other permanent markings. Reference PART 2 - PRODUCTS - MATERIALS - Cable and Wire Labels above.
 - 1. Clearly indicate the function, source, or destination of all cabling, wiring and terminals. Including any existing SVS related connections in Main Office MDF.
 - 2. Use the wire-marking format and appropriate naming convention shown on Detail 00.05.501 for all wiring.
 - 3. Install tags at both ends of each cable.
 - 4. Temporary Wire Tags
 - a. During installation, cables may be tagged with wraparound tags.
 - b. Write on temporary tags with a black permanent marker.
 - c. Following installation, install the permanent tags and remove all temporary tags.
 - 5. Permanent Wire Labels
 - a. At every cable termination point, provide machine-printed labels for all cables.
 - b. Handwritten tags are not acceptable.
- B. If the wire-tagging format as shown on the drawings cannot be used, submit a substitute format that complies with the intent to provide documentation for end-to-end tracing of all wiring.

END OF SECTION 28 05 01

SECTION 28 05 02
FIBER-OPTIC COMMUNICATIONS SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included:
 - 1. Furnish and install fiber and equipment for fiber-optic communication.
 - 2. The site fiber distribution system is designed to be installed so that the fiber and fiber connections will not be moved over the expected life of the system.
 - 3. Where existing fiber is to be reused, test connections to verify they meet performance standards identified in this specification.
- B. Work included, but specified under other sections:
 - 1. Section 28 00 01 - Security General Requirements
 - 2. Section 28 05 01 - Security Wiring and Conduit
 - 3. Section 28 08 11 - Security Testing
- C. Related Work:
 - 1. Section 28 20 01 – Security Video System

1.02 BASIC DEFINITIONS

- A. Site Fiber - Fiber cable that extends from a fiber-optic termination enclosure in a building's Security Closet to another building's fiber optic termination enclosure. Provide all site fiber as loose tube, gel-filled.
- B. Building Fiber - Fiber cable that extends from a Security system device to the building's Security Closet or between Security system devices. This includes any fiber jumpers that are required to complete the communication that is shown on the block diagrams. Provide all building fiber as tight-buffered cable.
- C. Fiber-Optic Circuit - The complete run of fiber cable from one fiber transceiver to the associated fiber transceiver. This includes Site Fiber and Building Fiber.
- D. Fiber-Optic Distribution and Power Supply Termination Boxes - The boxes where the fibers are terminated or distributed at various locations around the site.
- E. Abbreviations:
 - 1. SVS: Security Video System
 - 2. SOC: Security Operations Center
 - 3. dB: decibel
 - 4. km: kilometer
 - 5. MHz: Megahertz
 - 6. OTDR: Optical Time Domain Reflectometer
 - 7. μm : Micron

1.03 SUBMITTALS

- A. Provide submittals as required in SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS.
- B. Within 15 Days of Award of Contract:
 - 1. Provide the Owner with a cut sheet for each type of fiber that is to be installed prior to ordering.
 - 2. Provide the Owner with a schedule of the cross connections of the initial fiber-optic circuit configuration.
 - 3. Provide the Owner with circuit layout diagrams that show the arrangement of strands within each termination cabinet.
- C. As-Built:
 - 1. Provide the Owner with a schedule of the cross connections of the final fiber-optic circuit configuration.
 - 2. Provide the Owner with circuit layout diagrams that show the as-built arrangement of strands within each termination cabinet.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide all materials listed in both this section and the Detail Package unless specifically excluded or modified in other portions of the contract documents.
 - 1. Fiber-Optic Cable:
 - a. Corning Corporation
 - b. Berk-Tek
 - c. Or approved equal

2.02 PERFORMANCE CRITERIA

- A. Where multimode fiber is specified, furnish fiber-optic cable meeting the following:
 - 1. Corning 50/125 μ m multimode OM3/4
 - 2. UL listed for outdoor, indoor/outdoor, or indoor use
 - 3. UL 1666 riser rated with the marking "Type OFNR-(UL)" for horizontal and riser environments
 - 4. UL 910 plenum rated with the marking "Type OFNP-(UL)" for plenum environments
 - 5. 50 μ m core size, 125 μ m cladding size
 - 6. Graded index
 - 7. Maximum attenuation:
 - a. 3.0 dB/km at 850 nm
 - b. 1.0 dB/km at 1300 nm

- c. 1500/500 MHz-km bandwidth
- B. Where singlemode fiber is specified, furnish fiber-optic cable meeting the following:
 - 1. Corning singlemode OS2
 - 2. UL listed for outdoor, indoor/outdoor, or indoor use
 - 3. UL 1666 riser rated with the marking "Type OFNR-(UL)" for horizontal and riser environments
 - 4. UL 910 plenum rated with the marking "Type OFNP-(UL)" for plenum environments
 - 5. Graded index
 - 6. Maximum attenuation:
 - a. 0.4 dB/km at 1310 nm
 - b. 0.4 dB/km at 1383 nm
 - c. 0.3 dB/km at 1550 nm
- C. FIBER COATING, MEET OR EXCEED:
 - 1. Corning CPC6 mechanically strippable acrylate
- D. TIGHT BUFFER CABLES, MEET OR EXCEED:
 - 1. 900µm coating diameter
 - 2. All dielectric cable materials
- E. LOOSE TUBE CABLES, MEET OR EXCEED:
 - 1. 250µm coating diameter
 - 2. All dielectric cable materials
 - 3. Cable core interstices filled with water-blocking compound
 - 4. Buffer tubes containing fibers shall be color coded
 - 5. Each fiber distinguishable by color coding
- F. EXTERIOR JACKET, MEET OR EXCEED:
 - 1. Non-armored: Medium density Polyethylene
 - 2. Armored: Medium density Polyethylene with armor made from corrugated steel tape, plastic-coated on both sides and applied with an overlapping seam with the corrugations in register.
- G. CONNECTORS:
 - 1. Wait 24 hours after pulling the cable before installing connectors to allow the cable to stabilize.
 - 2. Furnish and install LC, SC, or ST (as appropriate to match existing equipment) compatible, ceramic, heat-cured connectors with 1.0 dB maximum coupling losses per connection pair.
- H. SPLICES:

1. Utilize the fusion splicing method for all fiber splices, with equipment authorized by the fiber cable manufacturer.
 2. Utilize standard fiber splice cases, organizer trays, splice trays, etc. for all fusion splices, as recommended by the fiber cable manufacturer.
- I. FIBER-OPTIC ENCLOSURES:
1. Furnish and install in the Security Equipment areas and the SOC, fiber-optic connector and splice enclosures per Security Detail Package Bills of Material, Elevations, and this Specification.
 - a. Corning
 - b. Legrand
 - c. Or approved equal

2.03 SPARE PARTS

- A. None required.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.
- B. Perform OTDR test on fiber spools prior to installation.
- C. Test existing fiber cables to be reused and inform Owner of any cables that fail and should be replaced.

3.02 GENERAL INSTALLATION

- A. Furnish and install the fiber-optic termination enclosures in each Security Equipment Area in the conduit enclosures indicated on the Security Details and in the equipment racks in the SOC.
- B. Where a cable leaves its conduit, create a loop that is in excess of a 24:1 ratio of coil-to-cable diameter. Remove the outer jacket where the cable enters the termination enclosure. Route the individual cores to their appropriate area and remove the core grouping material. In all cases, provide non-stress loop length in the routing and do not loop cable tighter than the following bend radii:

Loose Tube:	10" Minimum bend radius
Tight Buffered (2-24):	6" Minimum bend radius
Tight Buffered (26-72):	12" Minimum bend radius
- C. During all phases of construction, coil and hang the fiber well clear of the floor in order to protect the fiber from damage.
- D. Utilize non-stress hanging methods to support the fiber optic cable. Zip ties, or other tensioning methods, are not acceptable.
- E. In the Security Equipment areas, route the cable to the appropriate enclosure, and use wire duct to route the fiber within the enclosure.

- F. Tag each terminated fiber in accordance with SECTION 28 05 01 - SECURITY WIRING AND CONDUIT.
- G. A pull-string shall be installed in each empty innerduct.
- H. Bring site fiber (0.9 mm jacket) directly into the fiber patch panel with a cover protecting the site fiber from movement or being touched. Utilize 3.0 mm jacketed fiber for any fiber span, whether a jumper or not, that is outside of a fiber patch panel.

3.03 SYSTEM ACCEPTANCE REQUIREMENTS

- A. Before final acceptance of work, test the performance of each module of the equipment as required in PART 2 - PRODUCTS - MATERIALS and comply with the appropriate portions of SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS.
- B. Functionally test the completed system to ensure that all components of the system are operating properly in accordance with the manufacturer's criteria.
- C. Test each fiber:
 - 1. Test each installed fiber as defined in SECTION 28 08 01 - SECURITY TESTING.
 - 2. Replace all fiber-optic cable and/or connectors that cause the OTDR or Optical Power Meter Test to show unacceptable signal losses for any fiber within the cable. The Owner will determine acceptable power losses based on the terminations and the specifications for losses of the cable itself.

3.04 WARRANTY SERVICE

- A. Provide warranty service in accordance with the provisions stated in SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS.

END OF SECTION 28 05 02

SECTION 28 05 11 CYBER SECURITY

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Configure Cyber Security parameters of all IP components. Key characteristics are:
 - 1. Harden the setup of all field devices
 - 2. Harden the switches that support the field devices
 - 3. Harden the configurations of the servers
- B. Work included, but specified under other sections:
 - 1. Section 28 00 01 - Security General Requirements
 - 2. Section 28 05 01 - Security Wiring and Conduit
 - 3. Section 28 05 02 - Fiber-Optic Communications System
 - 4. Section 28 08 11 - Security Testing
- C. Related Work:
 - 1. Section 28 20 00 - Security Video System

1.02 BASIC DEFINITIONS

- A. Abbreviations:
 - 1. AD: Active Directory
 - 2. IDF: Intermediate Distribution Frame
 - 3. IP: Internet Protocol
 - 4. LAN: Local Area Network
 - 5. MDF: Main Distribution Frame
 - 6. OS: Operating System
 - 7. SLAN: Security Local Area Network
 - 8. SOC: Security Operations Center
 - 9. VLAN: Virtual Local Area Network
- B. Terminology:
 - 1. Server: Central Server Computer – Could be a virtual server

1.03 SUBMITTALS

- A. Submit a cyber hardening planning document that outlines all the hardening activities.
 - 1. Submit a Cyber Hardening Plan that specifies each type of IP connected field device and defines the configurations that will be applied to each type of device in accordance with manufacturer recommendations and Owner IT guidelines.

2. Work with Owner to define Contractor's appropriate access to the systems for remote support.
 - a. Define required access.
 - b. Owner will define guidelines that provide the required access in a safe and secure manner that meets the Owner's security policies.

1.04 ASSISTANCE

- A. Coordinate with the Owner for any of the settings that are within Owner's direct operational control, and which form a component of the cyber security plan.

1.05 OVERVIEW OF THE CYBER PROTECTION PROGRAM

- A. The following is an overview of the cyber hardening configuration and is provided to define a framework for understanding the design philosophy:
 1. Security System Devices:
 - a. Each device must be hardened at the time of installation of that device on the LAN
 - b. Strong passwords
 - c. Current firmware
 - d. Least required permissions
 - e. Disable unused services
 - f. Any security device connected to a network requires cyber hardening

PART 2 - PRODUCTS

2.01 WORK INCLUDED

- A. Furnish all of the materials listed below in PART 2 - MATERIALS, and in the Details.

2.02 MATERIALS

- A. There are no physical materials specified by this section.

2.03 SPARE PARTS

- A. No spare parts required.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. This contract may involve currently functioning systems. Coordination with Owner is critical. Do not interrupt any functioning system without complying with the provisions of SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS.

3.02 CYBER PROTECTION IMPLEMENTATION

- A. Work with Owner to agree on a strong password procedure for use for each type of device. Securely provide to Owner complete list of username and password combinations for all devices included in scope.
- B. Enable encryption for access to the camera using HTTPS. Once the device is fully configured, disable web services.
- C. Turn off or disable all extra, non-used options:
 - 1. UPnP
 - 2. Bonjour
 - 3. AVHS
 - 4. Discovery Services
 - 5. Link-local Address
 - 6. SOCKS
 - 7. QoS
 - 8. Always Multicast Video
 - 9. SSH
 - 10. Audio
 - 11. Anonymous Viewing
- D. Set network time throughout the system using a link to Owner's NTP.
- E. Where there is a Radius server supporting 802.1x, set up the certificates and enable IEEE 802.1x.
- F. Field Devices
 - 1. Harden each device according to documented Cyber Hardening Plan as described in PART 1 - GENERAL - SUBMITTALS above, at the time of installation of that device on Owner network.
 - 2. Set strong passwords in accordance with procedure agreed upon with Owner.
 - 3. Confirm firmware is up to date.
 - 4. Configure device to have the least privileges required for intended functionality.
 - 5. Disable any unused services.
- G. Set up switches
 - 1. Set strong passwords in accordance with procedure agreed upon with Owner.
 - 2. Validate that switches have the current software and firmware.
 - 3. Set port security with shutdown and short timeout.
 - 4. Deactivate unused ports.
 - 5. Where VLANs are being used:
 - a. Define the access to the switch and VLANs for the least required privileges.
 - b. Implement port segmentation to support required VLAN architecture.

- c. Connect the camera subnet to the recording server VLAN subnet only.

H. Servers

- 1. Disable all services that are not required for system operation or recovery.
- 2. Validate that the OS and database are current and appropriate for the site.
- 3. Utilize AD sign on.
- 4. Follow Microsoft OS Security Best Practices.
- 5. Create dedicated service accounts.

I. Clients

- 1. Utilize AD sign on.
- 2. Current OS and Owner standard image.

J. Firewalls

- 1. Utilize firewalls between the security systems and the organization's network.
- 2. Provide path for remote serviceability with control.

3.03 SYSTEM TESTING

- A. Validate each configuration setting.
- B. Test the port security feature by disconnecting a field IP device. The port should shut down and require manual action to reactivate the port.

3.04 WARRANTY SERVICE

- A. Provide normal and emergency warranty service in accordance with the provisions stated in SECTION 28 00 01 - GENERAL SECURITY REQUIREMENTS.

END OF SECTION 28 05 11

SECTION 28 08 11 SECURITY TESTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The close out of a project is the culmination of many steps from inception to fully operational. Testing is the critical process required by SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS that leads to project completion and the Owner's assurance by the Integrator that every design element is fully functional. Test all installed work using the SBD ASSIST web portal (ASSIST) to document the results.
- B. Work Included:
1. Complete mandatory ASSIST testing training to understand requirements for testing and documenting points prior to providing a bid. The testing process requires on-line forms to be filled out and photos taken and uploaded to ASSIST. The demo of this testing is at: <https://sbd.us/training/testing>. Log in with the following information:
 - a. Username is "testing"
 - b. Password is "site"
 - c. Training Code is "EDT0001"
 2. Test each defined point and element shown on the drawings and details to verify the appropriate operation. Submit test results, documented on the ASSIST forms located at <https://sbd.us/Assist/Login>. Use the same location for documenting the Final Acceptance Test. Refer to PART 1 - GENERAL - SUBMITTALS to obtain login information.
 - a. Photos of completed work are required as part of this testing process to clearly show the quality of the installation.
 - b. After all information and required photos have been entered for each point, certify the point as "Tested". Notify Owner and Designer once all points are certified as "Tested".
 - c. The Contractor, Designer, and other Owner Representatives will participate in the Final Acceptance Test once all of the system elements are verified as "Completed" in ASSIST by the Owner and/or Designer.
- C. Work Included, But Specified Under Other Sections:
1. Section 28 00 01 - Security General Requirements
 2. Section 28 05 01 - Security Wiring and Conduit
 3. Section 28 05 11 - Cyber Security
 4. Section 28 20 00 - Security Video System

1.02 SUBMITTALS

- A. Submit written test procedures for approval in accordance with specification SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS - PART 1 - GENERAL - SUBMITTALS.
- B. Each ASSIST user will need a unique login to document the testing.
 - 1. Provide a first and last name, company, email, and mobile phone number with mobile phone service provider for each user to enable account creation to the Designer. The users should be the technicians who will be performing the testing.
 - 2. ASSIST includes 2-factor authentication using a one-time password (OTP) code that can be sent via text or email. Please select each user's preferred option to receive the login confirmation code sent each time they log in. A new code is required each time a user signs in.
 - 3. SBD will send a direct link to ASSIST along with login information following account creation.
- C. After Contractor testing and at least 2 working days prior to Final Acceptance Testing, ensure the testing and photo documentation is completed online for review. Submit a report to the owner of all points by building and floor or plan sheet to verify completion of contractor testing.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide test data electronically as described above in PART 1 - GENERAL - SUBMITTALS.

PART 3 - EXECUTION

3.01 GENERAL

- A. Execute the tests required to completely test all work. All work must be physically functional at its point of use and be operationally integrated into the appropriate system.
- B. Use ASSIST to provide photo and written test results on web forms. Where appropriate, load printouts from test equipment and/or the systems being tested.
 - 1. Take portrait photos where possible and adjust rotation as required. Photo resolution and quality must be sufficient to clearly read wire tags, see wire terminations, and door hardware, where applicable. Refer to line drawings as examples of the views desired to capture the appropriate information.
 - 2. Review requirements for photos and test information prior to initiating testing and upload results once online connection is restored. The same forms will be used for documenting the Final Acceptance Test. In the event that sufficient connectivity is not available to complete the testing documentation online at the site, information and photos can be identified by door or point number and uploaded at a later time.
 - 3. The quality of the information is critical, both data and photos. By marking the "Tested" box, the Integrator is assuring the Owner that the work is neat, high quality, and 100% ready.

4. All field work will be tested via this process prior to scheduling validation completion by Owner.
 5. The Owner and/or Designer will review all the data that is marked Tested and will be able to certify each point as Completed once the data appropriately supports the design intent. These forms will be made available to the contractor and to the Owner for review and as a permanent record.
 6. When any wiring change or correction is made to a field point or a panel/IDF/MDF equipment area, all potentially affected system components must be retested to ensure complete functionality as designed.
 7. A Final Acceptance Test with the Integrator, Designer, and other Owner Representatives will be scheduled once all of the system elements are Completed. The Designer will create a punch list based on the Final Acceptance Test. When all items on the punch list are resolved, a Letter of Completion will be issued. The date on the Letter of Completion is the start date of the system warranty.
- C. Not all of the information in the web forms is the result of an actual test. Some of the information that is required in the test documentation is for maintenance and represents information such as serial numbers, MAC addresses, and model numbers. Make sure that this information is captured during the installation so that there is no need to uninstall any component just to be able to fill out the testing information. Other information defines the location and space.
- D. Provide qualified personnel to test each type of work.

3.02 BASIC TEST PARAMETERS

1. Confirm that all camera parameters identified in SECTION 28 20 00 - SECURITY VIDEO SYSTEM have been programmed in accordance with design specifications.

3.03 SPECIFIC TEST DEFINITIONS

- A. Overall
1. The tests included in this specification section are the base level of testing requirements.
 2. In addition to the tests defined by ASSIST, perform all manufacturer recommended test procedures that exercise all normal system attributes.
 3. In the absence of manufacturer-defined tests, use a copy of the operator manual to define tests that demonstrate the operation of each system function. Initial and date each function successfully demonstrated and include the pages in the testing binder.
- B. Fiber-Optic Tests
1. Optical Power Meter (OPM) Test
 - a. Test each fiber twice from end to end, including all splices and connections, once from the remote end to the hub end and once from the hub end to the remote end.
 - b. Document the results on the test forms.
 2. Optical Time Domain Reflectometer (OTDR) Test

- a. Test each fiber once from end to end, including all splices and connections.
 - b. Store the test results and print as data values and a graphical trace of the data. Label and attach the print to the test form for each fiber.
 - c. Annotate each graphical trace to identify and explain the following discontinuities that deviate from the normal exponential decay slope of the trace:
 - 1) Launch pulse
 - 2) End-of-fiber reflection pulse
 - 3) Splice reflections
 - 4) Losses due to poor connections
 - 5) Any other losses (or gains)
 - d. Document the results on the test forms.
- C. Cat 6 Tests Unshielded Twisted Pair (UTP) Wiring
1. The Category 6 cable runs shall be tested for conformance to the specifications of EIA/TIA 569-C Category 6 and must be tested for:
 - a. NEXT
 - b. PS NEXT
 - c. Attenuation
 - d. Continuity
 - e. Insertion Loss
 - f. Distance
 - g. Delay Skew
 - h. ACR
 2. Any new pairs not meeting the requirements of the standard shall be brought into compliance by the contractor, at no charge to the Owner.
 3. Any existing pairs being tested for re-use not meeting the requirements of the standard shall be brought to the attention of the Owner.
 4. Complete, end to end, test results must be submitted to the Owner prior to any request by Contractor to have the Owner sign off the project.
 5. Verify and test all Category 6 cables with a Level III tester. The testing device must be approved by the Owner prior to use. Failure to gain approval is at Contractor's own risk.
 6. All test results shall be submitted to the Designer and Owner one week prior to move in. Test results shall be submitted in electronic format.
 7. Provide copies of testing documentation prior to installing cameras. If installed by others, obtain copy of testing documentation.

- a. Notify Owner of any pairs not meeting the requirements of the standard. These pairs shall be brought into compliance by the Owner and re-tested. Verify compliance on new testing documentation prior IP device installation.
- D. Factory manufactured CAT6 jumper cables do not require field testing.
- E. Dynamic Battery Test
 1. Test each battery.
 - a. Measure the voltage across a 3-ohm high watt resistor for 20 seconds.
 - b. Verify that the voltage does not drop below 90% of the rated voltage.
 2. Replace any battery for which the measured voltage drops below 90% of the rated voltage during the 20-second test.

3.04 TEST FORMS

- A. The test forms are automatically assigned as part of the ASSIST testing.
 1. Where a specific item on a test form does not apply, select or type "N/A".
 2. Where a test form does not apply, but a similar form would be more applicable, submit a substitute form for approval prior to commencing any relevant testing.

END OF SECTION 28 08 11

SECTION 28 20 00
SECURITY VIDEO SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide, install, program, and activate equipment for a Security Video System (SVS) with central control, monitoring, and recording capability.
- B. All work involving presently active systems must be carefully scheduled to minimize any disruptions to service. Components currently in use should not be uninstalled until the replacement components have been received and are ready to be installed.
- C. Work Included:
 - 1. Uninstall existing equipment to be replaced or abandoned. Furnish and install appropriate seals for any exterior holes not being reused.
 - 2. Furnish, install, program, and activate devices to connect to the existing SVS as described in this section and in the associated Drawings and Details.
 - 3. Furnish, install, test, and make fully operational at locations shown, the specified equipment and all associated conductors to provide a completely operational SVS.
- D. Work Included, but Specified Under Other Sections:
 - 1. Section 28 00 01 - Security General Requirements
 - 2. Section 28 05 01 - Security Wiring and Conduit
 - 3. Section 28 05 02 - Fiber-Optic Communications System
 - 4. Section 28 05 11 - Cyber Security
 - 5. Section 28 08 11 - Security Testing

1.02 BASIC DEFINITIONS

- A. Abbreviations:
 - 1. DORI: Detection, Observation, Recognition, and Identification
 - 2. FOV: Field of View
 - 3. IDF: Intermediate Distribution Frame
 - 4. IP: Internet Protocol
 - 5. FPS: Frames Per Second

- 6. MDF: Main Distribution Frame
- 7. NVR: Network Video Recorder
- 8. PPF: Pixels Per Foot
- 9. PTZ: Pan, Tilt, & Zoom
- 10. SAN: Storage Area Network
- 11. SOC: Security Operations Center
- 12. SVS: Security Video System

1.03 SUBMITTALS

- A. Provide submittals as required in SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS.

1.04 SYSTEM TRAINING

- A. Furnish personnel to execute the training plan described in SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS.
- B. Provide a minimum of 4 hours total operator and management training time. Provide training literature and outlines at the beginning of each session. Training shall include system operation and database management. Once the system is operational, coordinate with Owner to schedule training.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Furnish all materials listed in both this section and the Detail Package unless specifically excluded or modified in other portions of the contract documents.
- B. Review the Details and Schedules to identify any additional components required to provide a complete and operable system. The quantities of individual components shall be determined by reviewing the design Drawings and Details.
- C. Primary SVS headend components for this project shall be obtained from the following manufacturer(s):
 - 1. BCD Video
 - 2. Antaira
 - 3. Cradlepoint

- D. Primary, field end camera equipment shall be obtained from the following manufacturer(s):
 - 1. Axis
 - 2. Antaira
- E. Furnish the following SVS components in the locations shown:
 - 1. Cameras as defined in the plans and security details.
 - 2. Site headend equipment as specified in the security details.
 - 3. Tamper-resistant type fasteners for installation of all cameras, camera mounts, camera enclosures, and associated junction boxes and panel boxes serving the SVS.
- F. Furnish remote site NVRs as specified on plans and in security details.
- G. Furnish a new BCD104-PVS-336-32T-8 NVR for the Main Site to replace existing NVR.
- H. Furnish annual Professional software updates, SSA-EVIP-01, for all cameras for a period of 3 years.
- I. EVIP-01 Professional camera licenses for all cameras are provided by Owner.

2.02 SPARE PARTS

- A. No spare parts required.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. Comply with the provisions of SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS.
- B. Uninstall existing equipment and cables to be replaced, as required, and confirm with Owner if there is any equipment Owner wishes to retain. Dispose of all unwanted equipment in accordance with applicable regulations.
- C. Prior to installation, take a picture of the back of each camera to include the sticker that identifies the serial number/MAC address and upload to ASSIST. Ensure this is captured under the appropriate point number where that camera is installed.
- D. Locate all cameras according to plans. Some locations will require coordination with Owner to optimize the aesthetics. Be prepared to coordinate each location. Notify Owner of obstructions that may block the desired camera view.

- E. Install all cameras on the mount/enclosure specified on the plans and security details, ensuring that mounting location and method provide the necessary camera stability to meet system performance standards. If the specific mount is no longer suitable in a location due to design updates or ceiling conflicts, notify Owner. Types of cameras and their respective mount/enclosures are identified in the camera details. In locations with existing media converter cabinets, select a camera mount that is compatible with the existing mounting pattern on the cabinet, if possible.
- F. Install cabling for all SVS devices in conformance with SECTION 28 05 01 - SECURITY WIRING AND CONDUIT and SECTION 28 05 02 FIBER OPTIC COMMUNICATIONS SYSTEM.
- G. Verify all existing camera cabling and connections from camera back to server are working properly, notifying Owner of any issues.
- H. Route the PoE Ethernet cable for SVS devices in conformance with SECTION 28 05 01 - SECURITY WIRING AND CONDUIT.
- I. Verify all cameras at the remote sites are being powered through the UPS in the site headend enclosure. Notify Owner of any existing camera not powered through the UPS.
- J. Provide appropriate lightning protection for line voltage feeds to field end media converter cabinets in accordance with all applicable electrical codes.
- K. The Alpha enclosures at each remote site will have custom heat shields installed as part of a parallel scope, requiring welding work on the existing enclosures. Although the welding work is not included in this scope, scheduling coordination will be required so that the welding can be performed by others after Contractor uninstalls existing headend components from the enclosures, but prior to installation of new components. Agree on scheduled dates with Owner at least 12 days in advance so Owner has reasonable time to schedule with the welder.
- L. Install SVS headend components in the site enclosures in accordance with the configuration layout being provided in the security details.
 - 1. Coordinate with Owner IT representative to configure Cradlepoint routers.
 - 2. Coordinate with Designer for instructions on reconfiguring WAN port on Cradlepoint routers to function as LAN port for monitoring UPS statuses.
 - 3. Plug all unused ethernet ports on all devices inside exterior enclosures to prevent ingress of dust and pests.
- M. Work with Owner to program the NVRs and demonstrate their operability. None of the preparation and demonstrations associated with this task is part of training.
- N. Work with Owner to help get all cameras up and operational. The video will be on a LAN, and there will be time and effort required for IT coordination and to obtain IP

addresses for each camera. Program all cameras and provide support to the installation process through final sign-off.

- O. Set up the system to send a “video loss” alarm input to the system in the event that the loss of any video signal longer than 5 seconds is detected. Program the alarm input to identify the specific camera involved.
- P. Replace NVR in Main Office MDF room with model listed in PART 2 - PRODUCTS - MATERIALS above. Transfer cameras and licenses from existing NVR to new unit. Existing NVR will be left installed and online for access to recorded video, if required as part of any investigation, until the new NVR is fully functional and has at least 30 days of video archived. Remove existing NVR after confirmation with Owner that any desired content has been exported.
- Q. Bass Lake Rd. Park and Ride site will be impacted by pending construction of the Water Works building in which the SVS site headend will be installed. New camera poles and underground conduit can be installed prior to completion of the Water Works building. Coordinate with Owner for scheduling remainder of work on this site.

3.02 CAMERA SETUP

- A. Set up all cameras per manufacturer’s instructions, and to optimize the end-user experience.
 - 1. Once camera is installed in scheduled location, connect with laptop and portable PoE injector, as required, to verify the following:
 - a. View meets objective and is not obstructed by any fixtures, parts of the building, or vegetation. If there is a need to adjust a camera’s physical position, coordinate with the construction team and present an option.
 - b. Camera is in focus.
 - c. Verify WDR and IR settings are appropriate to environment.
 - d. Coordinate with Owner to determine any edge analytics to be used. Enable and configure as required.
 - e. Configure NTP settings.
 - f. Configure appropriate network settings to be provided by Owner IT representative.
- B. Specified cameras will provide minimum PPF following the DORI guidelines to effectively meet the goals of each camera view. Coordinate with Designer where any camera substitutions or location changes may impact the PPF. Reference plans and Security Details for specific values.
- C. Do not leave any default passwords on any camera. Coordinate passwords with Owners.

- D. Do not implement any cameras with < 10 FPS, unless otherwise specified.
- E. Cameras should be set to their maximum resolution, unless otherwise specified.
- F. Provide 100% live video streams for monitoring.

3.03 SYSTEM PROGRAMMING

- A. For all cameras, program the video system to make fully functional: resolution, codec, framerates, recording times, and detection windows.
- B. Program all cameras in this scope into the Owner's existing Video Management System. Coordinate with Owner on load balancing of NVRs.
- C. All cameras should be set to record at all times. Coordinate with Owner on any masks and active areas that will need to be set for each and configure zones for motion recording.
- D. Program VMS based analytics. Coordinate with Owner to determine the appropriate analytics to be implemented and specific configuration required for each camera.
- E. For remote Park and Ride sites, configure two streams for each camera.
 - 1. Full resolution set to record on motion, 10 seconds pre and 30 seconds post.
 - 2. 720p, 5 FPS, continuous recording.

3.04 SYSTEM TESTING

- A. After the system is completely installed in accordance with the Specifications, Drawings, and Details, conduct a full systems test. Use the test procedures submitted as outlined in SECTION 28 08 11 - SECURITY TESTING to test and evaluate the system. These tests shall be part of the overall Final System Acceptance Testing Requirements.
- B. In the test procedure for the SVS, each camera and all associated video must be checked for a clear, focused video image.

3.05 WARRANTY SERVICE

- A. Provide warranty service in accordance with the provisions stated in SECTION 28 00 01 - SECURITY GENERAL REQUIREMENTS.

END OF SECTION 28 20 00