

SECTION 28 05 00

COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies the basic requirements for Communications Systems installations as indicated or required, and includes requirements common to more than one Specification Section of this Division (such as related documents, related Sections, definitions, governing requirements, Contractor requirements, warranty requirements, submittal requirements/procedures, and project closeout requirements/procedures, as well as other requirements).

1.02 RELATED SECTIONS

- A. All Specification Sections in this Division.
- B. The following Sections in other Divisions:
 - 1. Division 26 – Electrical for Communications Systems
 - 2. Division 27 – Communications General Requirements

1.03 BASIC DEFINITIONS

- A. Denver Public Schools shall be referred to in this document as Owner or District and the respondent shall be referred to as Contractor. The term Owner or District includes direct employees and other appointed Owner agents such as Architects or consultants. These agents may be requested by Owner to represent Owner in undertaking certain project tasks.
- B. “Days”: As used in the specifications, the word “days” means calendar days including weekend days.
- C. “Provide”: As used in the plans and specifications, the word “provide” means to furnish, install, connect, program, test, commission and warranty the subject material or services.
- D. Specified Items - Substitutions
 - 1. “No Acceptable Equal”: The exact make and model number identified in this Specification shall be provided without Owner approval.
- E. “Beneficial Use”: Each component of a system is not considered available for beneficial use until and unless all components and conditions have been fulfilled to make the system fully operational.

1.04 LOCATION AND ACCESS TO PROJECT

- A. Permission for access to Owner sites may be revoked for any and all persons who violate Owner policies to include directions of the responsible Owner or project personnel. Contractor's personnel, operating forces, and delivery personnel shall be made aware of and shall comply at all times with the regulations and the direction of responsible Owner and project personnel.

1.05 SITE ACCESS CONTROL

- A. The Contractor shall obtain rules and regulations from the Owner's Project Manager and shall train construction and delivery personnel on their requirements, shall consistently remain in contact with Owner for revisions to project policy, and shall be held fully responsible for monitoring and ensuring Contractor and Subcontractor compliance.
- B. Contractor's personnel, operating forces, and delivery personnel shall strictly follow all rules and regulations including but not limited to those relating to credentialing, background checks, and access to restricted and secure areas, parking, the handling Owner security systems information, and the use of the facility.

1.06 DESCRIPTION

- A. General Description: This specification section covers general requirements for the furnishing, installation and testing of a complete expansion to the Owners' electronic access control, video surveillance system, electronic intrusion detection system and security intercom system.
- B. Furnish and install Electric Access Control System (EACS) hardware as shown and specified.
- C. Furnish and install Security Intercom System (SIS) sub-system to the EACS.
- D. Furnish and install Video Management System (VMS) as shown and specified.
- E. Furnish and install Electronic Intrusion Detection System (EIDS) as shown and specified.
- F. Furnish and install outlets, junction boxes, pull boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation. Requirements shall be in accordance with Division 26 Electrical, and Division 27 Communications.

1.07 EXISTING SYSTEMS AND SUBSYSTEMS

- A. Electronic Access Control System (EACS)
 - 1. The primary system for centrally managed physical access control within Denver Public Schools is the Open Options DNA Fusion Management System, manufactured by Open Options, Inc.
- B. Video Management System (VMS)
 - 1. Video Insight Digital Video System
 - a. The primary system for recording and monitoring Owner cameras is the digital video surveillance system manufactured by Panasonic-Video Insight.
- C. Electronic Intrusion Detection System (EIDS)
 - 1. The primary system for EIDS includes the Bosch panels.
- D. Control components which require unique, or proprietary, hardware or software interfaces to achieve parity with the existing system architecture are not acceptable.
- E. If records exist, drawings and diagrams of the existing systems will be made available, through the Owner, to the Contractor. The Contractor shall survey, research and confirm the existing equipment and configuration in-place, and coordinate expansion of the systems with the Owner to avoid any interruption in services.

1.08 SCOPE OF WORK

- A. Systems: Provide an (EACS) expansion to the Open Options DNA Fusion Management System, a VMS expansion of the Video Insight system, Security Intercom System (SIS), Duress Monitoring System, and/or Security Communications Local Intercom System complete per the contract schedule, and with acceptable engineering and installation practices as described herein.
- B. Areas of work include, but are not limited to:
 - 1. Buildings identified on the plans
- C. Services: Contractor shall provide the following services complete and as scheduled:
 - 1. Project Planning and Management
 - 2. Shop Engineering and Documentation
 - 3. Wiring and Installation Diagrams
 - 4. Submittals
 - 5. System Installation
 - 6. System Integration
 - 7. Training

8. Start-up Testing
9. Commissioning
10. Close out As-Build documentation
11. Warranty

1.09 QUALIFICATIONS

A. General

1. The approved Contractor shall be responsible for satisfactory operation of the system and its certification.
2. Approval of the Owner is required of products or services of the proposed manufacturer, suppliers and installers and will be based upon conformance to the specifications.

B. Pre-qualified Contractors

1. The following Contractors have met the qualification requirements and are pre-approved (by system type) to bid the Work:
 - a. Security System(s):
 - 1) Video Surveillance
 - a) Contact DPS Department of Technology.
 - 2) Access Control:
 - a) Contact DPS Department of Technology.
 - 3) Intrusion Detection:
 - a) Contact DPS Department of Technology.

C. Manufacturer Qualifications

1. System components shall be furnished by manufacturers of established reputation and experience who shall have produced similar equipment and who shall be able to refer to similar installations rendering satisfactory service.
2. The manufacturer's products shall have been in satisfactory operation on at least three similar installations for not less than three years. Contractor shall submit a list of similar installations.
3. Components including, but not limited to, card access controllers, cameras, intercoms, computers, and power supplies shall have been tested and listed by Underwriters Laboratories, Inc., Factory Mutual Systems, or other approved independent testing laboratory.

D. Contractor Qualifications

1. Contractor shall be a pre-qualified supplier of DPS Strategic Sourcing (Purchasing) and Construction Services departments.
2. Hold current legally required City of Denver, Colorado Contractor's licenses necessary to accomplish the installation and activation of the described system at the facilities indicated. Contractor shall submit copies of licenses to Owner prior to the start of work.
3. Hold current legally required state registrations required to meet local requirements for submittal drawings.
4. Have manufacturers trained and certified engineering, field technicians and programming staff for a minimum of 1 year from time of bid for all major systems.
5. Indicate complete and total compliance with the provisions of these Specifications by letter or by submittal of the bid response forms, signed by an officer of the corporation, or a principal if other ownership exists. In addition, the letter or forms shall include appropriate attachments to elaborate on important aspects of the contractor's qualifications and a complete listing of exceptions, if any. Attachments to include

contractor's qualifications as a manufacturer certified partner, distributor and installer of all products requested in bid.

1.10 GENERAL CONDITIONS

- A. Contract Compliance: Provide the Systems and Services in accordance with the conditions and system descriptions as described in Part 1 of each specification section. Provide specified or Owner approved equivalent alternate products as described in Part 2 of each specification section. Utilize specified procedures and practices as described in Part 3 of each specification section.
- B. Codes: Furnish material and workmanship for this work in conformance with applicable legal and code requirements.
- C. Inclusive Work: Provide sufficient time, material and manpower to verify, revise or refine the Bid Drawings as necessary to develop fully engineered Shop Drawings as required by the General Requirements and in order for this work to realize complete, stable and safe operation.

1.11 PRECEDENCE

- A. If any statement in this or any other Security System specification is in conflict with any provision of the General Terms and Conditions of the contract, the provision stated in the General Terms and Conditions shall take precedence. Any questions that result from such potential conflict, which require additional interpretation and guidance shall be immediately brought to the Owner's attention.
- B. Obtain, read and comply with Division (26 00 00) Electrical and applicable sub-sections of the contract specifications. Where a discrepancy may exist between any applicable Division (26 00 00) sub-sections and directions as contained herein, this section shall govern.
- C. Architectural drawings shall have precedence over other drawings in regard to dimensions and location.

1.12 APPLICABLE PUBLICATIONS

- A. The edition of the appropriate code or standard at the time of permitting shall govern all applications.
- B. Standards: Perform the work in accordance with the following standards:
 - 1. UL Underwriters Laboratories, Inc., UL 294, UL 1076,
 - 2. EIA Electrical Industries Association.
 - 3. NEMA National Electrical Manufacturers Association.
 - 4. NECA National Electrical Contractors Association, Standards of Installation.
 - 5. NFPA National Fire Protection Association 101 Life Safety Code
 - 6. IBC w/ Denver Building Code Amendments
 - 7. NEB w/ Denver Building Code Amendments
 - 8. ADA Americans With Disabilities Act
 - 9. *OSHPD Office of State Health Planning Department (Omit if the project is not clinic related)*
- C. Where more than one code or regulation is applicable, the more stringent shall apply.
- D. Cable installation, identification and termination shall be performed in accordance with manufacturer's installation manuals in addition to the above applicable codes and Owner specifications.
- E. In the absence of manufacturer's recommendations on conductor applications, the Contractor shall ensure that the cable selected meets all technical requirements of the location of its installation, and of the equipment to be installed.

1.13 SHOP DRAWING & EQUIPMENT SUBMITTAL

- A. General: Bid documents, including drawings, details and specifications are considered conceptual in nature, and provide direction on products and project requirements. Contractor is given a choice of methods that may be

incorporated into the system. These choices may affect the overall design, configuration and installation of the proposed system.

B. Contractor Responsibility: Prepare and submit shop drawings, rendered in the latest AutoCAD and PDF format, which show details of all work to insure proper installation of the work using those materials and equipment specified or allowed under the approved plans and specifications. A complete Shop Drawing submittal package shall consist of Drawings, Equipment Data Sheet Submittals and an Acceptance Testing Plan.

1. Shop Drawings shall be numbered consecutively and shall accurately and distinctly present the following information:
 - a. Title Sheet
 - b. Floor Plans: Showing devices, pull boxes, cabinets, conduits and conductors in their proposed locations with device numbering scheme.
 - c. Riser Diagram: Showing all conduit relationships between devices shown on the Floor Plans. Show all power sources.
 - d. Single-Line/Block Diagrams: Show signal relationships of controls and devices within the system.
 - e. Custom Assembly Diagrams: For each custom assembly such as Access Control Terminal Cabinets, receptacle assemblies, or door control panels, provide an assembly drawing illustrating the appearance of the assembled device. Include dimensions, assembly components, and functional attributes (momentary or alternate action switch, lens color, panel finish)
 - f. Component Connection Diagrams
 - 1) For each equipment component such as a computer, video switcher, camera or video recorder, show the rear elevation of the device and all connectors/terminations as a pictorial.
 - 2) Show the wire designations on connectors. [Typical wiring detail where multiple of same device is provided.
 - 3) Show a schedule of the wire colors connected to the pins on each device connector.
 - g. Equipment Wiring Diagrams
 - 1) Show a pictorial illustration of each equipment enclosure and/or terminal cabinet, including terminals, components and wiring devices.
 - 2) Show the device nomenclature exactly as shown on the single line diagrams.
 - 3) Terminations: Show every termination and terminating cable, with applicable cable and wire numbers matching the single line diagrams.
 - a) Every termination in the system must be documented.
 - b) Termination information may be rendered as a wiring list(s), if properly coordinated with, and referenced to, typical component and single-line diagrams. Otherwise, the Shop Drawings shall show a pictorial of every component in the system, with its terminations.
 - 4) Show wire colors for each terminal.
 - 5) For each wire exiting the enclosure, show the destination of the wire by floor, room number and the drawing number of the panel where the wire terminates.
 - h. Provide working dimensions and erection dimensions.
 - i. Arrangements and sectional views
 - j. Necessary details, including complete information for making connections between work under this Contract, existing work, and work under other Contracts.
 - k. Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.
 - l. Duplicate of design drawings may be used where each sheet is modified to reflect contractor coordination, specific requirements of the project and multidiscipline conditions.

- m. Each Drawing or page shall include:
 - 1) Project name, Project Number and descriptions.
 - 2) Submittal date and space for revision dates.
 - 3) Identification of equipment, product or material.
 - 4) Name of Contractor and Subcontractor.
 - 5) Name of Supplier and Manufacturer.
 - 6) Relation to adjacent structure of material.
 - 7) Physical dimensions, clearly identified.
 - 8) ASTM and Specifications references.
 - 9) Identification of deviations from the Contract Documents.
 - 10) Contractor's stamp, initialed or signed, dated and certifying to review of submittal, certification of field measurements and compliance with Contract.
 - 11) Location at which the equipment or materials are to be installed. Location shall mean both physical location and location relative to other connected or attached material.

- 3. Equipment Submittals :
 - a. Provide a Title Page, with project name, Contractors name and address, contact information, date of submission, and submission revision number.
 - b. Provide a Parts List, for proposed equipment, materials, components and devices, listing the following information for each line item:
 - 1) The system type
 - 2) Model number
 - 3) Specification sheet page reference
 - c. Provide Manufacturers Specification Sheet with descriptive information for equipment, materials, components and devices. Number each page, to correspond with the Parts List.
 - d. Clearly delineate (with highlighter, arrow, or underline) on each specification sheet, specific model numbers, options and configurations being proposed for this project.
 - e. Indicate kinds of materials and finishes for equipment where more than one option is presented.

- 4. Acceptance Testing Plan:
 - a. Submit a written document detailing the test procedures to be followed in evaluating and proving the installed system(s).
 - b. Provide a sample of the test forms to be used for each system and for each component of each system.
 - c. Include all tests required by the equipment manufacturer and by this Specification.

- 5. Include where requested by Owner [Spare Parts List: Submit a list of recommended spare parts. Spare parts shall comprise a minimum of 5% or minimum of 2 each of field devices, device termination boards and a minimum of 1 system controller boards.]

- 6. Training Program:
 - a. Submit a training program 10 working days prior to schedule training to be followed in training key employees in the operation and maintenance of the installed system at the project site. The proposed training program shall be designed to provide a level of basic competence with the system for selected personnel. These selected personnel shall then be expected to train other personnel as required, utilizing the training that they have been given and the body of training documentation provided by Contractor. This plan shall comply with the requirements stated in the "Training" section, of these Specifications, all stated hours of which shall be considered to be classroom hours.
 - b. Submit a curriculum to account for, and relate, each subject to actual training time. All required hours shall be accounted for in this curriculum.
 - c. The training plan shall cover the overall system, each individual system, each subsystem, and each component. The plan shall also cover procedures for database management, normal operations, and

failure modes with response procedures for each failure. Each procedural item must be applied to each equipment level.

7. The Contractor shall be responsible for extra costs incurred by the Owner caused by the Contractor's failure to comply with the procedure outline above.

1.14 OPERATING AND MAINTENANCE MANUALS: RECORD DOCUMENTS)

A. 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 one electronic 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.
2. Manuals: Submit two (2) copies of each of the following materials in bound manuals, or electronic PDF copies, with labeled dividers:
 - a. A final Bill of Material for each system
 - b. Equipment Instruction Manuals: Complete, project specific comprehensive instructions for the operation of devices and equipment provided as part of this work.
 - c. Manufacturers Instruction Manuals: Specification sheets, brochures, Operation Manuals and service sheets published by the manufacturers of the components, devices and equipment provided.
 - d. Include information for testing, repair, troubleshooting, assembly, disassembly and recommended maintenance intervals.
 - e. Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.
 - f. Performance, Test and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.
 - g. Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturer's Warranty Registration papers as described herein.

1.15 CHANGES

A. Before proceeding with changes or claims for extras, Contractor shall provide written notice, secure prior written approval from the Owner, and substantiate actual cost of each change or claim.

1.16 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 two years 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. Examples may include but not be limited to; servers, cameras, video recorders, card readers, and computers.
- 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.

- D. The service contract shall cover equipment and software related to this contract, and shall provide for the following parts and services, without additional cost to the Owner:
 - 1. Quarterly Inspection, Preventative Maintenance and Testing of equipment and components
 - 2. Regular Service, Emergency Service, and Call-Back Service
 - 3. Labor and Repairs
 - 4. Equipment and Materials
- E. Response Time: Response time for service calls.
 - 1. Emergency service calls where system is not responding to staff directed commands through the computer systems shall be within 2 hours to the project site.
 - 2. Emergency service calls where controllers are not reporting shall be within 2 hours to the project site.
 - 3. Normal service calls for device malfunctions shall be within 24 hours during normal working hours to the site.
- F. Repair Time: Contractor shall stock parts in sufficient quantities such that repair or replacement shall be guaranteed within 12-hours. Temporary replacements within this time period shall be acceptable, provided temporary replacements do not compromise system functionality, and provided permanent replacement is achieved within 72 hours. [Contractor may contact owner representative for use of owner supplied spare parts where delay of system repair will have negative impact on system performance]
- G. Commencement: The warranty begins at the time of issuance of the statement of "Final Acceptance of the Installation" by the Owner.
- H. Transferability: The warranty shall be transferable to any person or persons at the discretion of the Owner.
- I. Transmittal: A copy of this Warranty shall be delivered to, and signed for by the Owner's representative whose primary responsibility is the operation and care of these systems. A copy of the signed Warranty document shall be delivered for review as part of the Final Submittals.
- J. Registration: Register Warranty papers for all equipment and software in the name of the Owner. Furnish reproductions of all equipment Warranty papers to the Owner with the Final Submittals.
- K. Sub-Contracting: Warranty service work may not be sub-contracted except with specific permission and approval by the Owner.
- L. Resolution of Conflicts:
 - 1. The Owner retains the right to resolve unsatisfactory warranty service performance at any time by declaring the work unsatisfactory, stating specific areas of dissatisfaction in writing.
 - 2. If the Contractor or his approved subcontractor does not resolve such stated areas of dissatisfaction within thirty (30) days, the Owner may appoint any alternative service agency or person to fulfill the terms of the Warranty; the cost of which shall be borne by the contractor. This action may be taken repeatedly until the Owner is satisfied that Warranty service performance is satisfactory. Satisfactory resolution of a malfunction shall be considered adequate when the device, equipment, system or component which is chronically malfunctioning is brought into compliance with the standards of performance as contained herein and published by the manufacturers of the equipment installed.

1.17 PERMITS AND INSPECTIONS

- A. Responsibility: Obtain permits and inspections required for the work. Permit and inspection costs will be borne by the Contractor.
- B. Performance: Perform tests required herein, or as may be reasonably required to demonstrate conformance with the Specifications or with the requirements of any legal authority having jurisdiction.
- C. Review: Obtain approvals from authorities responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with all requirements of reference codes indicated herein and required

by the appropriate jurisdiction. Make corrections, changes or additions as required and deliver certificates of acceptance, operation, and/or compliance with the "Operating and Maintenance Manuals" as described herein.

1.18 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 DoTS approved processes.
 - c. Provide DoTS approved recording of maintenance and troubleshooting process.
3. Training shall comprise two separate levels of training;
 - a. User Group upon substantial completion of the project.
 - 1) User group training shall include a site/building walk through indicating locations of equipment and their usage.
 - 2) 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.
 - 1) Maintenance group training shall include a site/building walk through indicating locations of equipment and their usage.
 - 2) Review of as-build documentation at each controller location.
 - 3) 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 must be applied to each equipment level.
5. Duration: Provide at least 2 hours of on-site training on each system for each group of designated representatives of the Owner at a location convenient to the Owner.
6. On-site training shall commence as follows:
 - a. EACS: Just prior to completion of the first phase of work which establishes the new EACS control over systems entry and exit portals.
 - b. VMS: Just prior to completion of the first phase of work which establishes the new VMS control over fixed or positional able cameras.

1.19 SAFEGUARDS AND PROTECTION

- A. Barriers: Provide and maintain suitable barriers, guards, fences and signs where necessary to accommodate the safety of others relative to and/or for the protection of this work.
- B. Regulations: Comply with OSHA, Federal, State, and local regulations and standards pursuant to this work.
- C. Protection: Protect all materials and equipment to prevent the entry or adhesion of any and all foreign material. If necessary, cover equipment with temporary protective material suitable for this purpose.
- D. Finishing: Check, clean and remove defects, scratches, fingerprints and smudges if necessary from all equipment and devices immediately prior to Acceptance of the Installation.
- E. Damage: Replace all damaged or defective material or work at no additional cost prior to Final Acceptance.

- F. Documentation: Provide written description of accidents by workers, students and staff of any incident occurring on the project. Report incident in writing to Owners representative immediately and to the Project Manager for follow up.

PART 2 PRODUCTS

2.01 GENERAL

- A. These general criteria shall apply to “Part 2-Products” of all Electronic Safety Systems specifications that are a part of this work.
- B. Product Acceptability: Products sections contain lists of Owner acceptable products. If product substitutions are proposed, they must be made based upon a comparison of equivalence to the product specified. Considerations may include but shall not be limited to functional, physical, aesthetic and/or interface aspects. The Owner shall be the sole judge of whether or not a submitted substitution is deemed to be "equivalent" to that specified.
- C. Manufacturers Specification Reference: Where a specific material, devices equipment or systems are specified directly, the current manufacturers' specification for the same becomes a part of these specifications, as if completely elaborated herein.
- D. Equipment shall be new and the current model of a standard product of a manufacturer of record. A manufacturer of record shall be defined as a company whose main occupation is the manufacture for sale of the items of equipment supplied.
- E. For each item of equipment offered, Manufacturer shall maintain:
 - 1. A factory production line.
 - 2. A stock of replacement parts.
 - 3. Engineering drawings, specifications, operating manuals and maintenance manuals.
 - 4. Manufacturer shall have published and distributed descriptive literature and equipment specifications on each item of equipment offered.
- F. Complete System: Auxiliary and incidental equipment necessary for the complete operation and protection of the systems specified herein shall be furnished and installed as if specified in full.
- G. Similar Devices: Similar devices within a system shall be identical unless specific color variances are required by the Owner or Architect.
- H. Safety: Unless otherwise specified, equipment shall be UL rated individually and listed as an assembly. Electronic equipment shall be of the dead front type, having no exposed live electrical connections, terminals or exposures to hands-on operating surfaces or other exposed surfaces during any power-on condition. Every live electrical connection, terminal or exposure shall be covered with durable, removable insulating material.
- I. Rack Mounting: Rack-mounted electronic equipment shall be specifically designed or modified for standard 19-inch rack mounting unless otherwise noted.
- J. Keying: Key panels identically where provided for similar usage within a system. Coordinate lock types with Owner.
- K. Aesthetics: Coordinate console or control panels so that their general appearance is similar. Control panels shall be contained within back boxes.
- L. Labeling: Provide ½” label maker labels (Black letters on white label) for function on or adjacent to panel assemblies, power supplies cabinets.
- M. Engraving, labels, decals or other identification on any device, equipment or miscellaneous component shall be coordinated with the associated Field and Shop and Equipment Wiring Drawings.
- N. No proprietary identification on assemblies will be permitted
- O. No contractor proprietary equipment will be permitted.

- P. Manufacturer's Recommendations: Components and devices shall be operated in accordance with recommendations of the manufacturer and shall contain sufficient permanent identification to facilitate replacement.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall insure that installation personnel understand the requirements of this Specification.

3.02 COORDINATION

A. General:

1. This project involves functioning systems. Coordination with the Owner is critical. Do not interrupt any functioning system without complying with the requirements of "Notification" section of this specification.
 2. Coordinate the work with the Owner and all trades to assure that where this work interfaces to other trades, those interfaces are provided, complete and functional.
 3. Meet with a representative of the Owner and each trade. Identify devices needed to complete functional operation of this work which are being provided by Owner, General Contractor or another trade, and assure that the work being provided by others will be acceptable.
- B. Equipment shall be mounted with sufficient clearance to meet applicable codes and facilitate observation and testing. Securely hang and/or fasten with appropriate fittings to ensure positive grounding, free of ground loops, throughout the entire system. Units shall be installed parallel and square to building lines.
 - C. Installation shall comply with "Codes and Standards" section of this specification. Where more than one code or regulation is applicable, the more stringent shall apply.
 - D. Where new equipment is replacing old equipment, Contractor is responsible for removing the old equipment and doing repair work necessary to meet standards determined by Owner.
 - E. Install fire stopping for penetrations in slabs and firewalls to meet code at the completion of work and prior to final testing demonstration to Owner. Ref. Div 270528.
 - F. Supervision: Maintain a competent supervisor and supporting technical personnel acceptable to the Owner during the entire installation. A change of supervisor during the project shall not be acceptable without prior written approval from the Owner.
 - G. Found Conflicts: Continuously make known to the Owner, conflicts discovered which may affect the orderly completion or the specified performance of this work. Cooperate with the Owner and other trades to accommodate such changes as may be necessary to resolve found conflicts.

3.03 WORKMANSHIP

- A. The installation shall be performed in a professional and workmanlike manner.
- B. On a daily basis, clean up and deposit in appropriate containers debris from work performed under the appropriate Specification sections. Stack and organize parts, tools and equipment when not being used.
- C. Work shall conform to the National Electrical Contractors Association "Standard of Installation" for general installation practice.
- D. At the conclusion of the installation, work areas shall be vacuumed and cleaned to remove debris and grease.

3.04 EQUIPMENT ENCLOSURES, RACK AND CONSOLE INSTALLATION

- A. Construction: Coordinate access openings and wire paths through the cabinets for all desk mounted devices.
- B. Enclosures: Fasten removable covers containing any wired component with a continuous hinge along one side with associated wiring secured and dressed to provide an adequate service loop. Appropriate stop locks shall be provided to hold all hinged panels and drawers in a serviceable position.
- C. Service Loop: Provide a wiring service loop allowing relocation of termination to any point within the enclosure.

